Water Supply Reserve Fund – Grant and Loan Program
Water Activity Summary Sheet
July 17-18, 2019
Agenda Item 8(a)
Amended Grant Request

Co-Applicants:	NEIRBO Hydrolgeology/Colorado Corn Administrative Committee
Grantee:	Colorado Corn Administration Committee
Water Activity Name:	Historical Analysis of South Platte River Salinity to Identify Severity, Trends, and Potential Sources (Salinity Study)
Water Activity Purpose:	Multipurpose/Study (Ag/M&I/Needs Assessment)
County:	Multiple South Platte Basin Counties
Drainage Basin:	South Platte
Water Source:	South Platte River
Amount Requested:	$15,270 South Platte Basin Account $15,270 Metro Account $30,540 Total Request $39,000 South Platte Basin Account (previous approval March 2019) $69,540 Total Combined WSRF Basin Account Request
Matching Funds:	Applicant & 3rd Party Match (cash & in-kind) = $17,500 • 25% of the Total Combined Basin Account request (meets 25% min)

Staff Recommendation:
Staff recommends approval of up to an additional $15,270 from the South Platte Basin Account, and up to $15,270 from the Metro Account to help fund the project titled: Historical Analysis of South Platte River Salinity to Identify Severity, Trends, and Potential Sources.

Water Activity Summary: CWCB staff noticed a commonality between the South Platte Regional Water Development Concept Feasibility Study (SPRWDC) WSRF Grant approved by the CWCB in September 2018, and the first iteration of this WSRF Grant (Salinity Study) request approved by CWCB in March 2019. Therefore staff requested the respective parties involved in both grants to work together to determine if by expanding the scope of work of the Salinity Study it could better inform the SPRWDC efforts when evaluating potential water treatment strategies. The result of that collaboration determine that yes, by expanding the Salinity Study scope of work to include additional constituents the SPRWDC efforts would be advanced beyond that originally proposed.

From the amended application:

The South Platte Regional Water Development Concept Feasibility Study (SPRWDC) is evaluating water-supply development concepts, which includes identifying appropriate water treatment strategies.

The source water quality will dictate the constituents that require treatment and the most appropriate treatment methods. The SPRWDC has requested that 12 additional constituents be included in the South Platte River (SPR) water-quality evaluation (Table 1). It is proposed that these additional constituents be included with Total Dissolved Solids (approved in prior SPBRT WSRF Grant) and analyzed for trends and correlations. The analyses will focus on how concentrations vary in relation to SPR flow and seasonal influences.

In addition to an expanded list of constituents to be examined, Colorado Corn proposes to establish a demonstration plot along the South Platte River where dry beans will be irrigated with untreated South Platte River water to determine the effects untreated river water may have on the viability of raising dry beans.

From the original Water Activity Summary:

WSRF grant funds, if approved, will assist NEIRBO Hydrogeology and the Colorado Corn Administrative Committee investigate current salinity and the historical salinity trends along the South Platte River. Total Dissolved Solids (TDS) is an indicator of salts in irrigation water that can damage soils, reduce crop yields, and negatively impact the sustainability of irrigated agriculture. South Platte River sampling in September 2018 confirmed that TDS concentrations increase dramatically through the Denver Metro area and reach levels that can damage crops. Potential salinity sources include Municipal waste water treatment facility sewage effluent, agricultural return flows, road deicing solutions, geologic formations, livestock waste, and produced water from oil and gas development.

Project objectives are to determine if salinity concentrations are a concern for irrigated agriculture, identify salinity severity and trends, evaluate the influence of historical water management practices, and to identify potential salinity sources. This project will analyze historical TDS concentrations to identify trends over time and along the South Platte River. Long-term, seasonal, and spatial trends will be used to identify potential salinity sources. Trends will be analyzed for correlations with major water-management policies.

Discussion: This project supports the goals of maintaining, enhancing and proactively manage water quality for all use classifications as called for in the South Platte Basin Implementation Plan, as well as assisting the state to promote protection and restoration of water quality as called for in Chapter 10, Section 10.3 F. Watershed Health. Environmental, and Recreation in Colorado's Water Plan.

Issues/Additional Needs: No issues or additional needs have been identified

Eligibility Requirements: The application meets requirements of all eligibility components: General Eligibility, Entity Eligibility, Water Activity Eligibility, and Eligibility Based on Match Requirements.

Evaluation Criteria: This activity has undergone review and evaluation and staff has determined that it satisfies the Evaluation Criteria. Please refer to Basin Roundtable Chair's Recommendation Letter and the WSRF Grant Application for applicant's detailed response.

Funding Summary/Matching Funds:

Funding Sources	Cash	In-kind	Total	Status
Colorado Corn Administrative Committee	$15,000	$0	$15,000	Secured
Central Colorado Water Conservancy District	$0	$2,500	$2,500	Secured
Subtotal	$15,000	$2,500	$17,500	
WSRF South Platte Basin Account (previous approval)	$39,000	$0	$39,000	Secured
WSRF South Platte Basin Account	$15,270	$0	$15,270	Secured
WSRF Metro Account	$15,270	$0	$15,270	Secured
Subtotal Total Combined WSRF Basin Accounts	$69,540	$0	$69,540	
Total Study Costs	**$84,540**	**$2,500**	**$87,040**	

CWCB Project Manager: Craig Godbout

South Platte Basin Roundtable
Garrett Varra, Chair

June 12, 2019

Craig Godbout
Water Supply Planning Section
Colorado Water Conservation Board
1313 Sherman Street, Room 718
Denver, CO 80203

VIA EMAIL to craig.godbout@state.co.us

RE: Approval Recommendation for Amended Historical Analysis of South Platte River Salinity to Identify Severity, Trends, and Potential Sources

Dear Craig,

At the June meeting of the South Platte Basin Roundtable the membership voted to recommend that the Colorado Water Conservation Board (CWCB) approve funds for the amended Water Supply Reserve Fund (WSRF} grant application titled "Historical Analysis of South Platte River Salinity to Identify Severity, Trends, and Potential Sources". A quorum was present at the meeting. The Colorado Corn Administrative Committee (CCAC} is the applicant and they have provided $17,500 in matching funds. The total amount recommended to be approved with this application is $15,270.

This amended grant application expands the project scope to include compilation and analysis of additional water-quality parameters. This analysis will support the on-going South Platte Basin Regional Water Development Concept (SPRWDC) project. The SPRWDC project is developing water-treatment strategies and an understanding of salinity and other key constituent concentrations, trends, and variability is needed to frame this task. A prioritized list of 12 additional water-quality constituents has been provided by the SPRWDC. Expanding the original project scope provides cost efficiencies and delivers results to the SPRWDC in a timely manner.

The Colorado Water Plan (2015) and the South Platte Basin Implementation Plan (SP-BIP) address water-shortage concerns by encouraging water reuse, storage, conveyance, and conservation. This expanded scope will assist the SPRWDC in evaluating the feasibility of water storage and conveyance concepts. Water treatment may be necessary to meet municipal water-use standards and these costs need to be considered in the feasibility analysis.

South Platte Basin Roundtable
Garrett Varra, Chair June
12, 2019

The design, construction, and management of current and future facilities need to understand and consider water quality.This study addresses the suitability of water for the SP-BIP high priority projects, irrigated agriculture sustainability, and the environment.There will also be an educational component as the results can be used to inform water providers and water uses of this currently under scrutinized problem. The results of this study can guide future water management actions that improve the sustainability of water resources in the South Platte Basin and other state-wide basins.

A salinity impact demonstration task is also included, and it involves planting 7 acres of pinto beans and irrigating with lower basin South Platte River water. Pinto beans are among the crops that are most sensitive to salinity. The crop response and the irrigation water TDS will be monitored and documented. There are antidotal accounts of crop damage due to salinity and this demonstration task provides an opportunity to document the effects of poor water quality and salinity on irrigated crops. This documentation and a stop on the June 18-19 Water Education Colorado tour provide educational opportunities for the importance of water quality to irrigated agriculture.

The South Platte Basin Roundtable, therefore, recommends that the CWCB approve the additional funds for this amended WSRF grant application. Understanding water-quality trends and changes along the South Platte River is an important step in evaluating the feasibility of water storage and conveyance projects.

Sincerely,

Garrett Varra

Metro Roundtable
Barbara Biggs, Chair

June 14, 2019

Craig Godbout
Water Supply Planning Section
Colorado Water Conservation Board
1313 Sherman Street Suite 718
Denver, CO 80203

Subject: Approval Recommendation for Amended WSRF Grant Application "Historical Analysis of South Platte River Salinity to Identify Severity, Trends, and Potential Sources"

Dear Mr. Godbout:

The Metro Roundtable unanimously approved funding of $15,270 from the Metro Basin Account for the Amended WSRF Grant Application "Historical Analysis of South Platte River Salinity to Identify Severity, Trends, and Potential Sources" project. The project was reviewed by the Roundtable on June 13 at our monthly meeting. There was a quorum of members present at the meeting.

Note that the South Platte Basin Roundtable had approved $39,000 to support the original project scope of work. This amended application requests an additional $30,540 and this cost will be split equally ($15,270) between the South Platte Basin Roundtable and the Metro Roundtable.

Please contact the applicant directly or me at (303) 979-7286, barbarabiggs802@gmail.com, if you have any comments or questions.

Sincerely,

Barbara Biggs

Barbara Biggs
Metro Roundtable Chair

cc: Megan Holcomb, CWCB Staff

Last Update: August 3, 2017

Colorado Water Conservation Board
Water Supply Reserve Fund **Grant Application: Amended June 6, 2019**

Instructions

All WSRF grant applications shall conform to the current 2016 WSRF Criteria and Guidelines.

To receive funding from the WSRF, a proposed water activity must be approved by a Roundtable(s) **AND** the Colorado Water Conservation Board (CWCB). The process for Roundtable consideration and recommendation is outlined in the 2016 WSRF Criteria and Guidelines. The CWCB meets bimonthly according to the schedule on page 2 of this application.

If you have questions, please contact the current CWCB staff Roundtable liaison:

Arkansas	**Gunnison | North Platte | South Platte | Yampa/White**	**Colorado | Metro | Rio Grande | Southwest**
Ben Wade	Craig Godbout	Megan Holcomb
ben.wade@state.co.us	craig.godbout@state.co.us	megan.holcomb@state.co.us
303-866-3441 x3238	303-866-3441 x3210	303-866-3441 x3222

WSRF Submittal Checklist (Required)	
✓	I acknowledge this request for funding was recommended for CWCB approval by the sponsoring Basin Roundtable(s).
✓	I acknowledge I have read and understand the 2016 WSRF Criteria and Guidelines.
✓	I acknowledge the Grantee will be able to contract with CWCB using the Standard Contract.(1)
Exhibit A	
✓	Statement of Work(2) *(Word – see Exhibit A Template)*
✓	Budget & Schedule(2) *(Excel Spreadsheet – see Exhibit A Template)*
✓	Letters of Matching and/or Pending 3rd Party Commitments(2)
Exhibit C	
✓	Map(2)
	Photos/Drawings/Reports
✓	Letters of Support
	Certificate of Insurance(3) (General, Auto, & Workers' Comp.)
Contracting Documents	
	Certificate of Good Standing(3)
	W-9(3)
	Independent Contractor Form(3) (If applicant is individual, not company/organization)
	Electronic Funds Transfer (ETF) Form(3)

(1) Click "Grant Agreements". For reference only/do not fill out or submit/required for contracting
(2) Required with application if applicable.
(3) Required for contracting. While optional at the time of this application, submission can expedite contracting upon CWCB Board approval.

Last Update: August 3, 2017

Schedule		
CWCB Meeting	**Application Submittal Dates**	**Type of Request**
January	December 1	Basin Account; BIP
March, 2019	February 1, 2019	Basin/Statewide Account; BIP
May	April 1	Basin Account; BIP
July	June 1	Basin Account; BIP
September	August 1	Basin/Statewide Account; BIP
November	October 1	Basin Account/BIP

Desired Timeline	
Desired CWCB Hearing Month:	March 2019
Desired Notice to Proceed Date:	May, 2019

Water Activity Summary	
Name of Applicant	Colorado Corn Administrative Committee 127 22nd Street Greeley CO 80631 NEIRBO Hydrogeology 231 S Howes St Fort Collins, CO 80521
Name of Water Activity	Historical Analysis of South Platte River Salinity to Identify Severity, Trends, and Potential Sources

Approving Roundtable(s)	Basin Account Request(s)(1)
South Platte Basin (Approved)	$39,000
South Platte Basin (additional request)	$15,270
Metro Basin (additional request)	$15,270
Basin Account Request Subtotal	$39,000 + $30,540 = $69,540
Statewide Account Request(1)	$0
Total WSRF Funds Requested (Basin & Statewide)	$39,000 + $30,540 = $69,540
Total Project Costs	$56,500 + $30,540 = $87,040

(1) Please indicate the amount recommended for approval by the Roundtable(s)

Last Update: August 3, 2017

Grantee and Applicant Information	
Name of Grantee(s)	Colorado Corn Administrative Committee
Mailing Address	127 22nd Street Greeley CO 80631
FEIN	84-1074476
Grantee's Organization Contact(1)	Mark Sponsler
Position/Title	Executive Director
Email	msponsler@coloradocorn.com
Phone	(970) 351-8201
Grant Management Contact(2)	Mark Sponsler
Position/Title	Executive Director
Email	msponsler@coloradocorn.com
Phone	(970) 351-8201
Name of Applicant (if different than grantee)	Co-Applicants – Grantee above and the following:
Mailing Address	NEIRBO Hydrogeology, 231 S HOWES ST, FORT COLLINS, CO 80521
Position/Title	GRADY O'BRIEN, MEMBER / PRINCIPAL
Email	grady@neirbo.com
Phone	(970) 817-0630

(1) Person with signatory authority
(2) Person responsible for creating reimbursement invoices (Invoice for Services) and corresponding with CWCB staff.

Description of Grantee
Provide a brief description of the grantee's organization (100 words or less).
The Colorado Corn Administrative Committee (CCAC) was established by the 1987 Corn Marketing Order (a legislative action that provided the framework) to manage a one-penny-per-bushel assessment collected from corn producers by first handlers from sales of field corn for grain in Colorado. Those funds are allowed to be used specifically for market development, promotion, research and education on behalf of corn producers in this state.

Last Update: August 3, 2017

Type of Eligible Entity (check one)	
	Public (Government): municipalities, enterprises, counties, and State of Colorado agencies. Federal agencies are encouraged to work with local entities. Federal agencies are eligible, but only if they can make a compelling case for why a local partner cannot be the grant recipient.
	Public (Districts): authorities, Title 32/special districts (conservancy, conservation, and irrigation districts), and water activity enterprises
	Private Incorporated: mutual ditch companies, homeowners associations, corporations
	Private Individuals, Partnerships, and Sole Proprietors: are eligible for funding from the Basin Accounts but not for funding from the Statewide Account.
✓	**Non-governmental organizations:** broadly, any organization that is not part of the government
	Covered Entity: as defined in Section 37-60-126 Colorado Revised Statutes

Type of Water Activity (check one)	
✓	Study
	Implementation

Category of Water Activity (check all that apply)		
	Nonconsumptive (Environmental)	
	Nonconsumptive (Recreational)	
✓	Agricultural	
✓	Municipal/Industrial	
✓	Needs Assessment	
	Education & Outreach	
	Other	Explain:

Location of Water Activity	
Please provide the general county and coordinates of the proposed activity below in **decimal degrees**. The Applicant shall also provide, in Exhibit C, a site map if applicable.	
County/Counties	South Platte Basin, Northeastern Colorado
Latitude	
Longitude	

Last Update: August 3, 2017

Water Activity Overview
Please provide a summary of the proposed water activity (200 words or less). Include a description of the activity and what the WSRF funding will be used for specifically (e.g. studies, permitting, construction). Provide a description of the water supply source to be utilized or the water body affected by the activity. Include details such as acres under irrigation, types of crops irrigated, number of residential and commercial taps, length of ditch improvements, length of pipe installed, area of habitat improvements. If this project addresses multiple purposes or spans multiple basins, please explain. The Applicant shall also provide, in Exhibit A, a detailed Statement of Work, Budget, and Schedule.

This activity investigates the current salinity conditions, select water-quality concentrations, and the historical trends along the South Platte River (SPR). Total Dissolved Solids (TDS) is an indicator of salts in irrigation water that can damage soils. reduce crop yields, and negatively impact the sustainability of irrigated agriculture. SPR sampling in September 2018 confirmed that TDS concentrations increase dramatically through the Denver Metro area and reach levels that can damage crops and require treatment for municipal use. Potential salinity sources include Municipal waste water treatment facility (WWTF) sewage effluent, agricultural return flows, road deicing solutions, geologic formations, livestock waste, and produced water from oil and gas development.

Project objectives are to determine if salinity concentrations are a concern for irrigated agriculture, identify salinity severity and trends, evaluate the influence of historical water management practices, and to identify potential salinity sources. This project will analyze historical TDS concentrations to identify trends over time and along the SPR. Long-term, seasonal, and spatial trends will be used to identify potential salinity sources. Trends will be analyzed for correlations with major water-management policies.

The South Platte Regional Water Development Concept Feasibility Study (SPRWDC) is evaluating water-supply development concepts, which includes identifying appropriate water treatment strategies. The SPR water quality will dictate the constituents that require treatment and the most appropriate treatment methods. The SPRWDC has requested that 12 additional constituents be included in the SPR water-quality evaluation (Table 1). It is proposed that these additional constituents be included with TDS and analyzed for trends and correlations. The analyses will focus on how concentrations vary in relation to SPR flow and seasonal influences.

The Colorado South Platte River Basin data sources for this study will include Central and Northern Colorado Water Conservation Districts, Colorado Department of Public Health and Environment (CDPHE), U.S. Geological Survey, U.S. Environmental Protection Agency, and the Colorado Department of Agriculture. Additional data sources may be used if the data can be readily obtained.

Measurable Results	
To catalog measurable results achieved with WSRF funds please provide any of the following values.	
	New Storage Created (acre-feet)
	New Annual Water Supplies Developed or Conserved (acre-feet), Consumptive or Nonconsumptive
	Existing Storage Preserved or Enhanced (acre-feet)

Last Update: August 3, 2017

Measurable Results		
	Length of Stream Restored or Protected (linear feet)	
	Efficiency Savings (indicate acre-feet/year OR dollars/year)	
	Area of Restored or Preserved Habitat (acres)	
	Length of Pipe/Canal Built or Improved	
✓	Other	Explain: Document South Platte River salinity severity, select water-quality concentrations, trends, and sources

Water Activity Justification
Provide a description of how this water activity supports the goals of Colorado's Water Plan, the most recent Statewide Water Supply Initiative, and the respective Roundtable Basin Implementation Plan and Education Action Plan [(1)]. The Applicant is required to reference specific needs, goals, themes, or Identified Projects and Processes (IPPs), including citations (e.g. document, chapters, sections, or page numbers). For applications that include a request for funds from the Statewide Account, the proposed water activity shall be evaluated based upon how well the proposal conforms to Colorado's Water Plan criteria for state support (CWP, Section 9.4, pp. 9-43 to 9-44;) (Also listed pp. 4-5 in 2016 WSRF Criteria and Guidelines).

Last Update: August 3, 2017

Water Activity Justification

This project meets the following goals of the South Platte Basin Implementation Plan (SP-BIP):

Page 1-27. Section 1.9.5 Water Quality
Goal: Maintain, enhance and proactively manage water quality for all use classifications.
MO#1 – Maintain or improve the delivery of safe water supplies throughout the basin.
E&R MO#1 – Monitor, protect and improve watershed water quality and identify and document progress and improvements.
E&R MO#2 – Improve areas where water quality may be limiting the suitability of focus areas identified by BRTs through environmental and recreational mapping efforts.

Page 3-7. 3.1.11 Water Quality Management
Higher quality water sources are essentially fully tapped and municipal water suppliers are facing the challenges of using lower quality, more distant water sources. …After current IPPs are implemented, greater use of the lower quality water sources may be significantly constrained depending on whether the industry's technological advancements satisfy regulatory requirements for disposal of highly concentrated waste streams from advanced water treatment processes.

Page 4-12. 4.2.3 Water Quality Overview
From a water quality perspective in the South Platte Basin, the following examples demonstrate the diversity of concerns relative to current and future Statewide planning:

1. Wastewater treatment and reuse are important facets of the Basin's water supplies. Innovative systems are being developed in the Basin to increase water availability for various beneficial uses.
11. There are salinity concerns related to wastewater treatment plant discharges and salted roads. These salinity issues can impact both surface water and groundwater supplies.

Colorado Water Plan,
Page 7-18 Water Quality and Quantity Connections: Managing water quantity may cause a change in water quality. When entities divert water to farms or cities, store it for future use or flood control, or manage it as return-flows to address downstream water rights, water quality can change

Page 7-19: One option for addressing future municipal water supply needs is the use of alternative agricultural transfers, such as rotational fallowing and interruptible supply options. High concentration of salts and other pollutants from this source water, however, may require advanced water-treatment technologies, such as reverse osmosis, to make the water usable for communities.

page 7-20: Cause-and-effect connections related to water quality and quantity are integral to the State's ability to make sound water management decisions. The State considers these connections during decision-making processes that are dependent on statutory, regulatory and management relationships related to water quality and quantity.

(1) Access Basin Implementation Plans or Education Action Plans from Basin drop down menu.

Matching Requirements: Basin Account Requests

Basin (only) Account grant requests require a 25% match (cash and/or in-kind) from the Applicant or 3rd party and shall be accompanied by a **letter of commitment** as described in the 2016 WSRF Criteria and Guidelines (submitted on the contributing entity's letterhead). Attach additional sheet if necessary.

Contributing Entity	Amount and Form of Match (note cash or in-kind)

Last Update: August 3, 2017

Matching Requirements: Basin Account Requests	
Colorado Corn Administrative Committee	$15,000 (cash)
Central Colorado Water Conservation District	$2,500 (cash)
Total Match	$17,500 (cash)
If you requested a Waiver to the Basin Account matching requirements, indicate the percentage you wish waived.	

Matching Requirements: Statewide Account Requests	
Statewide Account grant requests require a 50% match as described in the 2016 WSRF Criteria and Guidelines. A minimum of 10% match shall be from Basin Account funds (cash only). A minimum of 10% match shall be provided by the applicant or 3rd party (cash, in-kind, or combination). The remaining 30% of the required match may be provided from any other source (Basin, applicant, or 3rd party) and shall be accompanied by a **letter of commitment.** Attach additional sheet if necessary.	
Contributing Entity	Amount and Form of Match (note cash or in-kind):
Currently not being pursued	
Total Match	$
If you requested a Waiver to the Statewide Account matching, indicate % you wish waived. (Max 50% reduction of requirement).	

Related Studies
Please provide a list of any related studies, including if the water activity is complimentary to or assists in the implementation of other CWCB programs.

Last Update: August 3, 2017

Related Studies

Northern Colorado Water Conservation District (Northern) conducted a salinity study from 2002-2006 and produced a report, which will be used in this study.

Northern and Central Colorado Water Conservation District (Central) are collecting electrical conductivity data that will be used in this study.

The USGS and the Department of Agriculture are collecting data and have produced reports that will be used.

Previous CWCB Grants

List all previous or current CWCB grants (including WSRF) awarded to both the Applicant and Grantee. Include: 1) Applicant name; 2) Water activity name; 3) Approving RT(s); 4) CWCB board meeting date; 5) Contract number or purchase order

Not applicable

Tax Payer Bill of Rights

The Tax Payer Bill of Rights (TABOR) may limit the amount of grant money an entity can receive. Please describe any relevant TABOR issues that may affect the applicant.

Not applicable

Last Update: January 9, 2018

Colorado Water Conservation Board	
Water Supply Reserve Fund	
Exhibit A - Statement of Work	
Date:	**February 1, 2019; Updated June 6, 2019**
Water Activity Name:	**Historical Analysis of South Platte River Salinity to Identify Severity, Trends, and Potential Sources**
Grant Recipient:	**Colorado Corn Administrative Committee**
Funding Source:	**Water Supply Reserve Fund, South Platte Basin**

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.

This activity investigates the current salinity and the historical salinity trends along the South Platte River (SPR). Total Dissolved Solids (TDS) is an indicator of salts in irrigation water that can damage soils. reduce crop yields, and negatively impact the sustainability of irrigated agriculture. SPR sampling in September 2018 confirmed that TDS concentrations increase dramatically through the Denver Metro area and reach levels that can damage crops. Potential salinity sources include Municipal waste water treatment facility (WWTF) sewage effluent, agricultural return flows, road deicing solutions, geologic formations, livestock waste, and produced water from oil and gas development.

Project objectives are to determine if salinity concentrations are a concern for irrigated agriculture, identify salinity severity and trends, evaluate the influence of historical water management practices, and to identify potential salinity sources. This project will analyze historical TDS concentrations to identify trends over time and along the SPR. Long-term, seasonal, and spatial trends will be used to identify potential salinity sources. Trends will be analyzed for correlations with major water-management policies.

The South Platte Regional Water Development Concept Feasibility Study (SPRWDC) is evaluating water-supply development concepts, which includes identifying appropriate water treatment strategies. The source water quality will dictate the constituents that require treatment and the most appropriate treatment methods. The SPRWDC has requested that 12 additional constituents be included in the SPR water-quality evaluation (Table 1). It is proposed that these additional constituents be included with TDS and analyzed for trends and correlations. The analyses will focus on how concentrations vary in relation to SPR flow and seasonal influences.

The Colorado South Platte River Basin data sources for this study will include Central and Northern Colorado Water Conservation Districts, Colorado Department of Public Health and Environment (CDPHE), U.S. Geological Survey, and the U.S. Environmental Protection Agency ~~and the Colorado Department of Agriculture~~. Additional data sources may be used if the data can be readily obtained.

Table 1. Prioritized list of constituents requested by SPRWDC for analysis

1. Total Organic Carbon	7. Iron
2. Turbidity	8. Calcium
3. pH	9. Magnesium
4. Hardness	10. Temperature
5. Alkalinity	11. Bromide
6. Manganese	12. Nitrogen

Last Update: January 9, 2018

A salinity impact demonstration task involves planting 7 acres of pinto beans and irrigating with lower basin SPR water. Pinto beans are sensitive to salinity and crop yields begin to decrease at TDS concentrations greater than 450 mg/l. Crop growth and the irrigation water Electrical Conductivity will be monitored. Irrigation water salinity can limit the crops that can be successfully grown. Crops that are viable in the upper basin may not be successful in the lower basin. The demonstration plot will be included as a stop on the June 18-19 Water Education Colorado tour. This demonstration, like all farming, depends on favorable weather conditions.

Objectives: (List the objectives of the project)

1. Obtain concurrent water samples from upstream of the Denver Metro area to the state line near Julesburg to determine if salinity concentrations are a concern for irrigated agriculture sustainability;
2. Identify salinity severity, select water-quality concentrations, and trends in the South Platte River from approximately 1990 through 2017, or a period feasible with the available data;
3. Correlate salinity trends with changes in water-management policy;
4. Use long-term, seasonal, and spatial salinity trends to identify potential salinity sources;
5. Provide initial estimates of select water-quality constituent concentrations, variability, and data availability to identify potential water treatment needs that will assist in development of treatment strategies developed by the SPRWDC study; and
6. Provide an educational opportunity and demonstration of salinity's impact on irrigated agriculture.

Last Update: January 9, 2018

Tasks
Provide a detailed description of each task using the following format:
Task 1 - Water-quality Sampling
Description of Task:
South Platte River sampling from upstream of Denver Metro area to near State line at Julesburg, including major tributaries. Field parameters (EC, Specific Conductance, pH, RDO, temperature) measured with a multiparameter sonde. Water-samples collected and analyzed by a laboratory for TDS, cations, anions, and Sodium Absorption Ratio. (Completed, September 2018)
Method/Procedure:
• Sampling site selection • Daily multiparameter sonde calibration • GPS location and photographs at each site • Field parameter data collection at sampling sites • Obtain water grab sample, filter, and ice sample • Water-samples shipped to laboratory for chemical analysis • Data processing and analysis, including piper diagrams, Stiff diagrams, maps, tables, and graphs
Grantee Deliverable: (Describe the deliverable the grantee expects from this task)
Database with compiled and organized data (Excel spreadsheets). Table(s), graphs, and map(s) illustrating data collected.
CWCB Deliverable: (Describe the deliverable the grantee will provide CWCB documenting the completion of this task)
Completion of this task will be documented in the project status reports. Working copies of table(s), graphs, and map(s) illustrating data collected.

Tasks
Provide a detailed description of each task using the following format:
Task 2 - Data Compilation & Evaluation
Description of Task:
TDS, electrical conductivity, and Table 1 constituents from sources listed below will be compiled and organized in a relational database. Monitoring locations, representative South Platte River reaches, and stream flow data will be selected for analysis. Analysis methods will be designed based on data availability and quality. 1. Central Colorado Water Conservation District (CCWCD); 2. Northern Colorado Water Conservation District (NCWCD); 3. Colorado Department of Public Health and Environment (CDPHE); 4. U.S. Geological Survey (USGS); and 5. ~~Colorado Department of Agriculture~~.
Method/Procedure:
• Obtain data from agency staff or on-line databases. Data to include water quality, stream flows, ~~groundwater levels, precipitation~~; • Evaluate data period of record, data quality, and completeness; • Identify monitoring locations that can be used to identify salinity sources (e.g. near WWTF, agricultural return flows, geologic formation outcrops, stormwater runoff, de-icing runoff, tributaries); • Identify water-quality monitoring locations and appropriate river reaches for aggregating representative data used in analyses; • Remove duplicate data and reconcile equivalent monitoring locations; • Convert database values to common units and measurements (e.g. electrical conductivity converted to Total Dissolved Solids); and • Compile river flow data representative of specific sites and river reaches.
Grantee Deliverable: (Describe the deliverable the grantee expects from this task)
Database with compiled and organized data (MS Access or Excel spreadsheets). Table(s), graphs, and map(s) illustrating data availability and data quality.
CWCB Deliverable: (Describe the deliverable the grantee will provide CWCB documenting the completion of this task)
Completion of this task will be documented in the project status reports. Working copies of table(s), graphs, and map(s) illustrating data availability and data quality.

Tasks
Provide a detailed description of each task using the following format:
Task 3 – Data Analysis
Description of Task:
TDS from the selected sites will be analyzed for trends and correlations. Seasonal influences may include precipitation, streamflow (spring runoff, stormwater runoff), road de-icing, irrigation season (ditch flows, river diversions, infiltration), groundwater recharge. Long-term trends will be analyzed for correlations with historic water management policies (e.g. curtailing groundwater pumping, augmentation plans, water reuse, water conservation, etc.). Selected water-quality concentrations will be analyzed for trends at specific monitoring locations or within river reaches depending on data availability. If possible, the influence of South Platte River flow on concentrations will be evaluated. Results will be presented in maps, graphs, and tables. Basic statistics will be computed.
Method/Procedure:
• Data will be analyzed statistically on a site-by-site basis, spatially, and temporally to identify the salinity severity, water-quality concentrations, and trends; • Match river flow data to constituent concentrations; • Develop relationships between river flow and constituent concentrations, if data availability is adequate; • Geographic Information System software, graphing software, and statistical software will be used; • Maps, graphs, and tables will be created to illustrate the analysis results and trends.
Grantee Deliverable: (Describe the deliverable the grantee expects from this task)
Tables, graphs, and maps illustrating trends and correlations.
CWCB Deliverable: (Describe the deliverable the grantee will provide CWCB documenting the completion of this task)
Completion of this task will be documented in the project status reports. Working copies of table(s), graphs, and map(s) illustrating trends and correlations.

Last Update: January 9, 2018

Tasks
Provide a detailed description of each task using the following format:
Task 4 – Final Report
Description of Task:
A final report (electronic format) will be prepared and submitted to the SPBRT and contributing entities, including recommendations for future actions.
Method/Procedure:
• Results of Tasks 1, 2, and 3 will be finalized; • Salinity severity, water-quality concentrations, trends, and spatial distribution will be illustrated using maps, graphs, and tables; • Descriptive text will be prepared to explain the results; • Adequacy of data availability and quality for water-quality studies will be discussed; • Recommendations for future actions will be prepared; • A third-party technical expert will be selected to review the document; and • Report will be provided in electronic format for distribution.
Grantee Deliverable: (Describe the deliverable the grantee expects from this task)
Report (electronic format) with text, maps, tables, and graphs documenting TDS concentrations, trends, and correlations in the Basin.
CWCB Deliverable: (Describe the deliverable the grantee will provide CWCB documenting the completion of this task)
Completion of this task will be documented in the project status report and an electronic copy of the final report.

Last Update: January 9, 2018

Tasks
Provide a detailed description of each task using the following format:
Task 5 – Salinity Impact Demonstration
Description of Task:
Pinto beans will be planted on 7 acres and irrigated with lower basin SPR water that has been shown to have elevated salinity levels. Crop growth and the irrigation water Electrical Conductivity will be monitored. The demonstration plot will be included as a stop on the June 18-19 Water Education Colorado tour. This demonstration, like all farming, depends on favorable weather conditions.
Method/Procedure:
• Prepare field; • Plant beans; • Irrigate with SPR water as needed; and • Obtain periodic plant photographs to document growth and vitality; and • Document irrigation water applications and electrical conductivity.
Grantee Deliverable: (Describe the deliverable the grantee expects from this task)
• Photographic documentation of plant growth; • Irrigation water applications and electrical conductivity; • A documented example of how salinity impacts crop viability and how salinity limits irrigated agriculture's crop diversity.
CWCB Deliverable: (Describe the deliverable the grantee will provide CWCB documenting the completion of this task)
An electronic document with photographs, irrigation water applications, and electrical conductivity measurements.

Last Update: January 9, 2018

Tasks
Provide a detailed description of each task using the following format:
Task 6 – Grant Administration
Description of Task:
Administrative tasks required to obtain grant funding, meet reporting requirements, and distributing funding. Specific tasks may include: • Grant contract documentation submittals; • Creating reimbursement invoices; • Submitting contractor payments; • Preparation and submittal of reporting documents; and • CWCB staff correspondence.
Method/Procedure:
• Compiling organization documents; • Processing invoices for payment; • Preparing and compiling activity reports; • Coordination between Colorado Corn, CWCB, South Platte Basin Roundtable, and contractors
Grantee Deliverable: (Describe the deliverable the grantee expects from this task)
• Submittal of contracting documents; • Submittal of invoices for reimbursement; • Confirmation that all grant conditions have been met with each invoice; and • Progress Report submittal at least once every 6 months.
CWCB Deliverable: (Describe the deliverable the grantee will provide CWCB documenting the completion of this task)
A Final Report indicating that the project has been completed will be submitted to the CWCB. Report documentation may include: • Summarizes the project and how the project was completed. • Description of obstacles encountered, and how these obstacles were overcome. • Confirmation that all matching commitments have been fulfilled.

Last Update: January 9, 2018

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 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.

COLORADO
Colorado Water Conservation Board
Department of Natural Resources

Colorado Water Conservation Board

Water Supply Reserve Fund

EXHIBIT B - BUDGET AND SCHEDULE - Direct & Indirect (Administrative) Costs

Date: February 1, 2019: Amended June 6, 2019

Water Activity Name: Historical Analysis of South Platte River Salinity to Identify Severity, Trends, and Potential Sources

Grantee Name: Colorado Corn Administrative Committee

Task No.[1]	Description	Start Date[2]	End Date	Matching Funds (cash & in-kind)[3]	WSRF Funds (Basin & Statewide combined)[3]	Total
	ORIGINAL BUDGET					
1	Water-quality Sampling	--	--	$15,000	$0	$15,000
2	Data Compilation & Evaluation	5/1/2019	6/30/2019	$2,500	$10,000	$12,500
3	Data Analysis	7/1/2019	8/31/2019	$0	$20,000	$20,000
4	Final Report	9/1/2019	10/31/2019	$0	$6,500	$6,500
6	Grant Administration	5/1/2019	10/31/2019	$0	$2,500	$2,500
			subtotals	$17,500	$39,000	$56,500
	ADDITIONAL REQUEST					
1	Water-quality Sampling	--	--	$0	$0	$0
2	Data Compilation & Evaluation	5/1/2019	6/30/2019	$0	$11,040	$11,040
3	Data Analysis	7/1/2019	8/31/2019	$0	$13,420	$13,420
4	Final Report	9/1/2019	10/31/2019	$0	$4,080	$4,080
5	Salinity Impact Demonstration	6/1/2019	10/31/2019	$0	$2,000	$2,000
6	Grant Administration	5/1/2019	10/31/2019	$0	$0	$0
			subtotals	$0	$30,540	$30,540
			Totals	$17,500	$69,540	$87,040

(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.

• 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

• Standard contracting proceedures dictate that the Expiration Date of the contract shall be 5 years from the Effective Date.

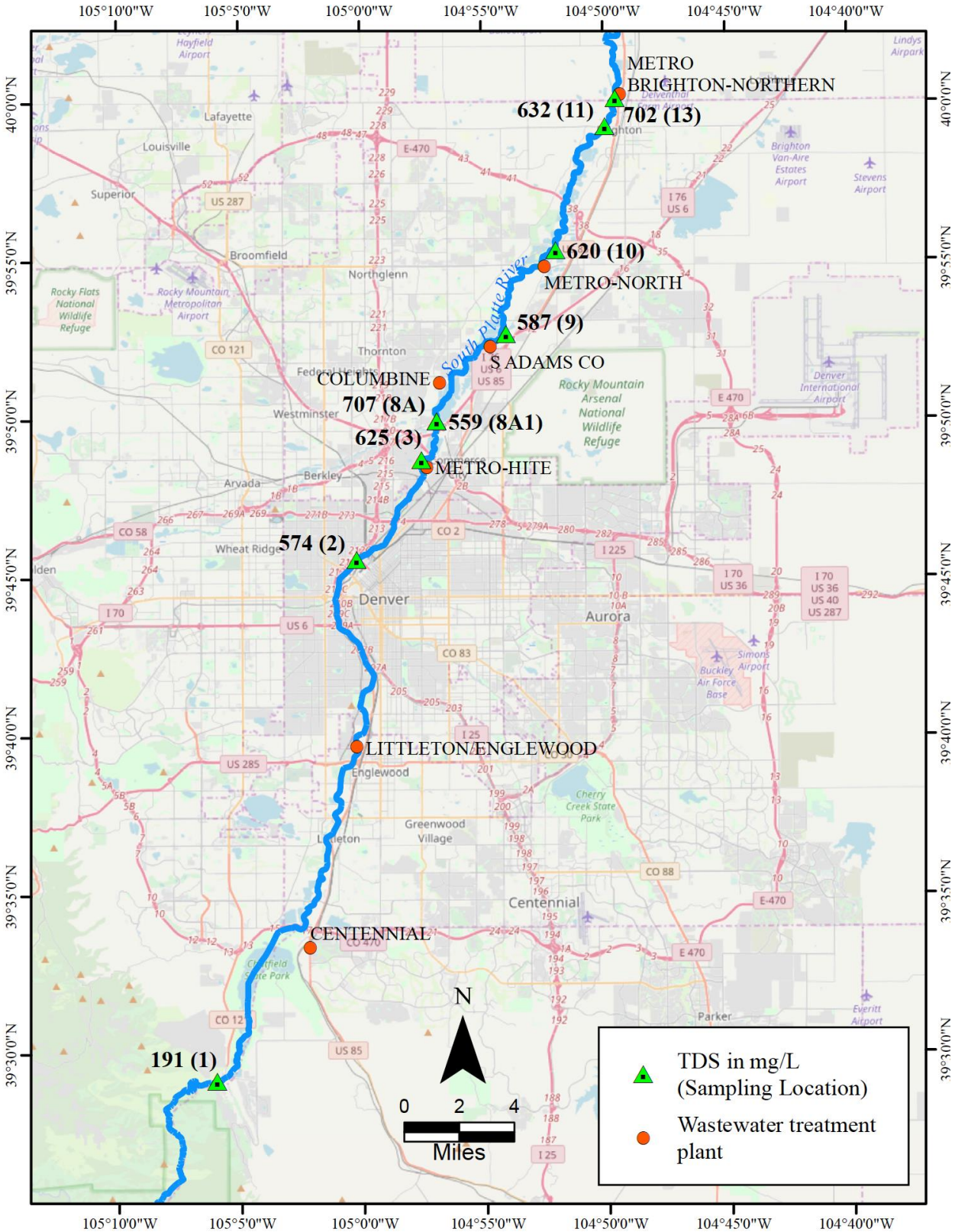

Figure 1. South Platte River total dissolved solids concentrations measured in the Denver Metro area (September, 2018)

Table 1. Sample site descriptions and measured TDS

Site	Description	Field[1]	Laboratory[2]
		Total Dissolved Solids (mg/l)	Total Dissolved Solids (mg/l)
1	SPR AT WATERTON CANYON	162	191
2	SPR-AT 19th ST, USGS GAGE, DENVER	580	574
3	SPR-NEAR CCWCD MD01	626	625
8A	SPR-DS 74Th AVE	707	
8A1	SPR-DS 74TH AVE	562	559
9	FULTON DITCH NEAR SPR	587	
10	SPR AT HENDERSON 124TH AVE	620	
11	SPR-DS BRIGHTON PONDS AT HWY 7	638	632
13	SPR-BRIGHTON NORTHERN WWTF	724	702
17	SPR-DS HWY 52	654	643
20A	SPR AT CR 325	691	702
22	SVR AT CR 34	734	733
23	SVR-USGS GAGE AT CR 38	750	744
27A	EVANS DITCH	849	
27A1	BTR-CR 396	867	849
28	SPR-US OF BTR CONFLUENCE	757	
29	SPR-US OF HWY 85 NEAR LASALLE	701	
29-Ditch	SPR AT LATHAM DITCH NEAR	761	688
33A	CLP-US OF SPR CONFLUENCE	802	728
34A	SPR-DS CLP CONFLUENCE	749	751
35A	SPR AT CR 61	772	788
37	SPR NEAR PLAMASCO	817	
38	SPR AT CR 19 NEAR ORCHARD	756	831
39A	SPR AT CR 9 NEAR WELDONA	877	
41	SPR AT CO 52 NEAR FORT MORGAN	909	912
42A	SPR AT CR 24 DODD BRIDGE	979	976
47A	SPR-DS STERLING BRAVO WILDLIFE	1209	1210
50	SPR DS CO 385 NEAR JULESBURG	1310	1275
52A	CLP-US CO 68 NEAR TIMNATH	475	508
52A-pond	STORAGE POND-AT SPR US CO 68	396	
53	SPR AT COLLEGE AVE (HWY 287) FORT	100	
54	CLP AT OVERLAND TRAIL FORT	121	125

[1] Measured in the field with an In-situ smarTROLL Multiparameter Handheld

[2] Water sample analyzed by Ward Laboratory, Inc.

Abbreviations: SPR: SOUTH PLATTE RIVER; CLP: CACHE LA POUDRE RIVER; SVR: SAINT VRAIN RIVER; BTR: BIG THOMPSON RIVER; DS: DOWN STREAM; US: UPSTREAM; CR: COUNTY ROAD CO: COLORADO HIGHWAY; HWY: HIGHWAY

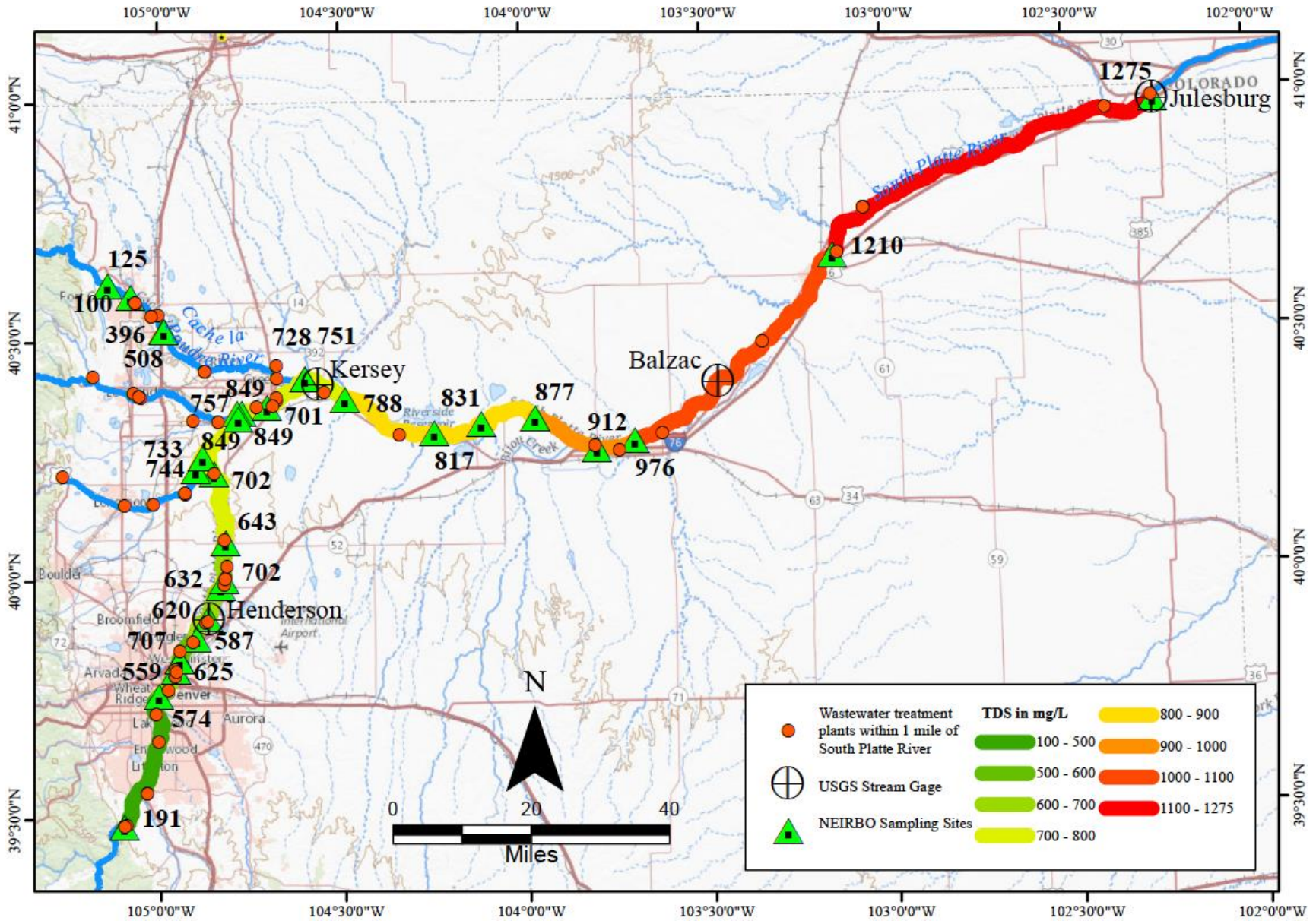

Figure 2. South Platte River total dissolved solids concentrations measured in September, 2018

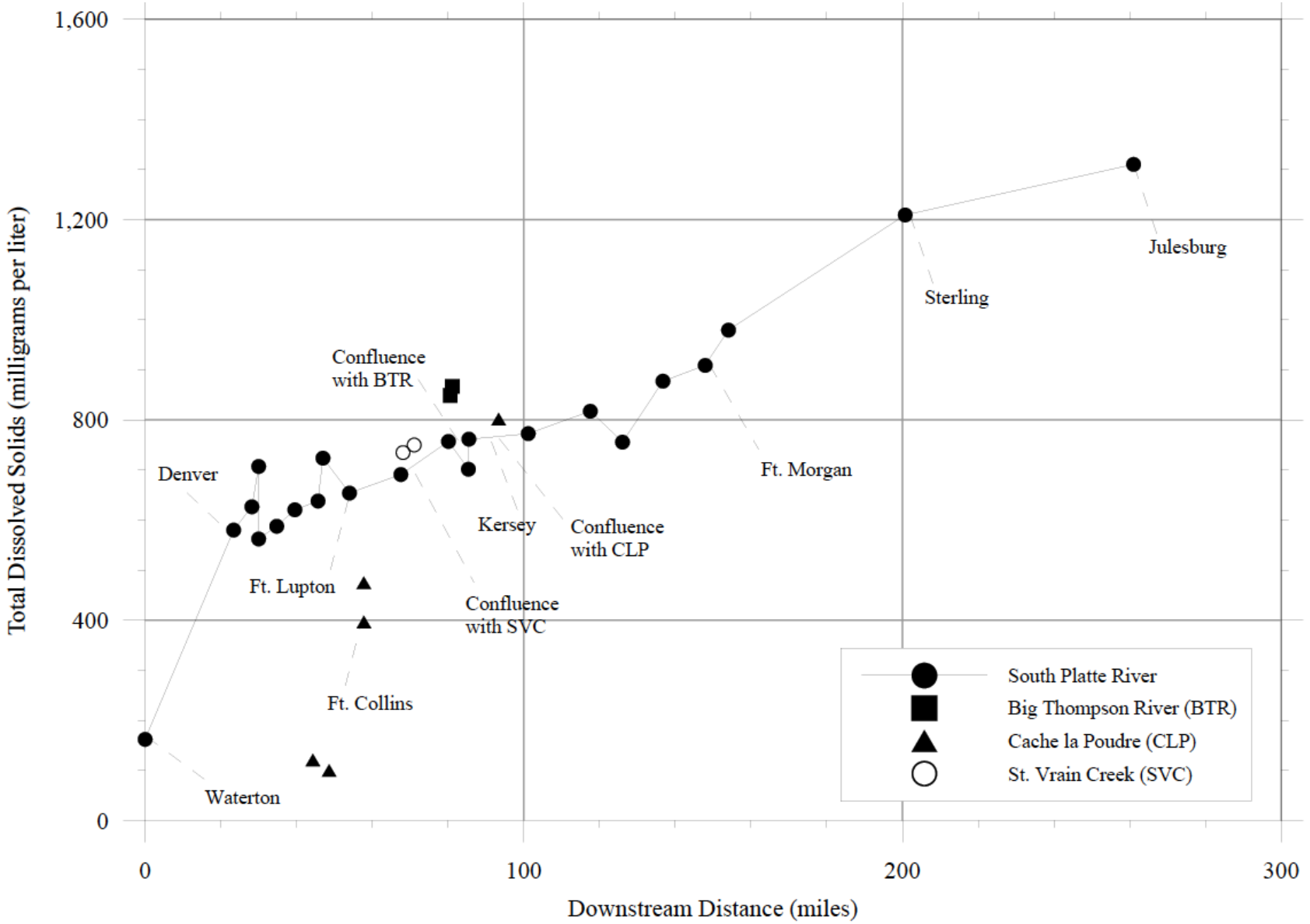

Figure 3. Changes in Total Dissolved Solids concentrations with distance along the Sourth Platte River

Administrative Committee
127 22nd Street
Greeley, CO 80631
Phone: (970) 351-8201
FAX: (970) 351-8203
www.coloradocorn.com

February 11, 2019

Grady O'Brien, Principal
NEIRBO Hydrogeology
231 S Howes St
Fort Collins, CO 80521

Subject: Salinity Project Funding

Dear Mr. O'Brien,

The Colorado Corn Administrative Committee Research Action Team authorized funding in the amount of $15,000 for NEIRBO to investigate salinity in the South Platte River.

Your technical contact for this project is Mark Sponsler, Chief Executive Officer for Colorado Corn (msponsler@coloradocorn.com).

Mark Sponsler
Executive Officer
Colorado Corn
127 22nd Street
Greeley, CO 80631
(970) 351-8201 office
(970) 380-1604 mobile

CENTRAL COLORADO WATER CONSERVANCY DISTRICT
3209 W 28 STREET | GREELEY, CO 80634 | WWW.CCWCD.ORG
LOCAL: 970-330-4540 | METRO: 303-825-0474 | FAX: 970-330-4546

Mr. Grady O'Brien, P.G.
Principal Hydrogeologist
Neirbo Hydrogeology
231 S. Howes Street
Fort Collins, CO 80521

December 18, 2018

Dear Mr. O'Brien,

On November 20, 2018, the Central Colorado Water Conservancy District's Board of Directors approved a $2,500 dedication of matching funds for the requested WSRF grant. As a project partner, Central eagerly awaits the final report and believes the findings of this study will greatly benefit Central's membership and the agricultural community in the South Platte Basin. As reuse in the South Platte Basin increases, irrigators in the South Platte Basin will rely on the findings of this investigation to guide cropping and irrigation methodologies to respond to changing water quality conditions. If desired, Central is willing to assist with data collection and water quality sampling in addition to the $2,500 dedication.

Sincerely,

William Mihelich, P.E.
District Engineer