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Colorado Water Conservation Board
Department of Natural Resources

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TO: Colorado Water Conservation Board Members

FROM: Linda Bassi, Section Chief
Kaylea White, Senior Water Resource Specialist
Stream and Lake Protection Section

DATE: November 18-19, 2020 Board Meeting

AGENDA ITEM: 23. Plan for Augmentation to Augment Stream Flows on the Cache la Poudre River (Water Division 1)

Introduction

Water users of the Cache la Poudre River have requested assistance from the CWCB and Colorado Water Trust ("CWT") to develop a mechanism by which to dedicate water rights to the stream to preserve and improve the natural environment along a portion of the Cache La Poudre River. After extensive discussion about potential mechanisms over several years, this year's legislative action provided direction under which CWCB and co-applicants may file a water court application for a plan for augmentation to augment stream flows. HB20-1037, codified at sections 37-92-102(4.5) and 37-92-305(8)(c), C.R.S. (2020), See **Exhibit PF1**. The Cache la Poudre River augmentation plan ("Poudre Flows Plan" or "Plan") represents the first application proposed to be filed under section 37-92-102(4.5). The Board's consideration of the Poudre Flows Plan at this meeting constitutes the Board's initial look at the plan for augmentation to augment stream flows through a section of the Cache la Poudre River from the canyon mouth to its confluence with the South Platte River. Three additional companion memos describe offers from three area municipalities of "Seed Water Rights" as the initial sources of augmentation water to be included in the Poudre Flows Plan. Two maps are attached as **Exhibits PF2-1 and PF2-2** showing the general area, the stream segments to be augmented, and locations of use for the seed water rights.

Staff Recommendation

The Board's consideration of this proposal at this meeting will initiate a 120-day period for Board review. **No formal action is required at this time.** Staff believes that the proposed plan for augmentation to augment stream flows is a creative solution to a long-standing challenge that will preserve and improve the natural environment of the Cache la Poudre River to a reasonable degree, and represents a successful partnership with various water users on the river. This initial presentation provides an opportunity for the Board and the public to identify questions or concerns for Staff, the Attorney General's Office, CWT, and other Poudre Flows partners to address at this or a subsequent meeting.

Background

Over the past few years, a working group called the "Poudre Runs Through It," ("PRTI"), facilitated by the Colorado Water Institute at Colorado State University, has been exploring options to improve portions of the Cache la Poudre River as a healthy, working river. The PRTI group formed a "FLOWS committee" to seek innovative ways to increase river flows at critical times and places along the river without harming private property rights. From that group, a partnership emerged as "Poudre Flows," which has introduced the concept of a plan for augmentation to augment stream flows to preserve and improve the natural environment of the Cache la Poudre River. Augmentation supplies to help fulfill the stream flow needs in the Cache La Poudre River have been offered by three of the Poudre Flows municipal partners: Fort Collins, Thornton, and Greeley. The water rights offered will constitute "Seed Water Rights," as the first water rights to be used in the stream augmentation plan. These municipal partners, along with Northern Colorado Water Conservancy District ("Northern Water"), have also contributed significant financial support for this project.

The reach of the Cache la Poudre to be augmented extends from the mouth of the Poudre Canyon to its confluence with the South Platte River, a distance of approximately 55 miles ("Subject Reach"). Colorado Parks and Wildlife ("CPW") has recommended seasonal flow rates to preserve and improve the natural environment in the six river segments representing different stream habitats and flow regimes, as shown **Exhibit PF2-1**, as analyzed in CPW's "Flow Quantification Report for the Cache la Poudre River in Larimer and Weld Counties," CPW October 2020, ("CPW Flow Quantification Report"), attached as **Exhibit PF3**.

The Poudre Flows engineering consultant (Spronk Water Engineers, Inc., "SWE") has created a point-flow model for the Subject Reach of the Cache la Poudre River to estimate the stream flow patterns and to identify needs in the river. SWE developed the point flow model using historical hydrological records, stream gages, diversion records, and return flow records for the years 2002 through 2019. Once SWE developed and calibrated the model, they combined CPW's recommended seasonal flow rates in the six specific river segments with the historical period in order to estimate the stream areas and times of year when the river would likely experience a gap between actual estimated flow conditions and the recommended stream flow rates. The point-flow model shows that in every year type (wet, dry, and average), the estimated stream flow in certain segments of the subject reach falls short of the recommended rates to preserve and improve the natural environment to a reasonable degree. The shortages vary by location, season of year, and type of year. See SWE's "Preliminary Engineering Poudre Flows Augmentation Plan," SWE November 2020, attached as **Exhibit PF4.** The model analysis, which SWE first presented in 2017, bolstered the commitment and encouraged the efforts of the Poudre Flows partners to continue to move forward to find a way to create a plan of augmentation plan to augment stream flows in the Cache la Poudre River.

As the efforts moved forward, the CWCB entered into a partnership agreement with water users, including Northern Water, the Cache la Poudre Water Users Association ("Association"),

the Cities of Fort Collins, Greeley and Thornton, and the Colorado Water Trust ("CWT") through a Memorandum of Agreement for Phase II of the Cache la Poudre River Instream Flow Augmentation Plan ("Phase II MOA"), dated February 8, 2020. See **Exhibit PF5.** The Phase II MOA continues the efforts set forth in the earlier Agreement Regarding Phase I (Development) of a Multi-phase Plan for an Instream Flow Augmentation Plan on the Cache la Poudre River ("Phase I MOU"), to which the CWCB was not a party.

The CWCB's Role in the Poudre Flows Plan

Pursuant to section 37-92-102(4.5), and under the Phase II MOA, the CWCB and its partners would file a joint application in water court to request approval of the Poudre Flows Plan to be captioned "Application for Approval of a Plan for Augmentation to Augment Stream Flows Pursuant to section 37-92-102(4.5) on the Cache la Poudre River." The water court application would include a detailed description of the plan, and a description of the each of the offered Seed Water Rights. The water court application would include a process to add augmentation supplies into the Poudre Flows Plan after the decree is entered, pursuant to section 37-92-305(8)(c).

Each new water right to be added to the Plan would be brought to the CWCB Board under its Rule 6 acquisitions procedure. As required by the new augmentation statute, section 37-92-102(4.5), the water rights to be used in the Poudre Flows Plan must have already been changed to augmentation use and the historical consumptive use must have been quantified in water court. Once approved by the Board and after entering into Water Delivery Agreements, water users would make water available to the CWCB for use in the Subject Reach up to the rates as specified by the Board. The CWCB would request administration as necessary to protect the flows from diversion by others in the reach of stream extending from the point of delivery within the subject reach to the end of the reach, or to the point of re-diversion or re-use, whichever is higher on the system. The water right owner may then bring about the beneficial use of the water downstream of the augmented portion of the Cache la Poudre River. This subsequent use of the delivered water would be authorized by the Poudre Flows Plan water court decree or the underlying decrees for the augmentation supplies.

Upon the Board's final action on this proposal, the CWCB and its partners would proceed to file the joint water court application and would add appropriate terms and conditions to the proposed decree as needed to protect water users from injury. See draft water court application, captioned "Application for Approval of a Plan for Augmentation to Augment Stream Flows on the Cache la Poudre River Pursuant to C.R.S § 37-92-102(4.5)," attached as **Exhibit PF6**.

The Board's Water Acquisition Procedures

Rule 6 of the Rules Concerning the Colorado Instream Flow and Natural Lake Level Program ("ISF Rules") sets forth the Board's procedures for acquisition of water, water rights, or interests in water for instream flow ("ISF") purposes. This proposed Poudre Flows Plan would include a portfolio of acquired interests in water rights under Rule 6, starting with the seed

water rights that the municipal Poudre Flows partners offer to the Board today. Section 37-92-102(3) provides 120 days for the Board to determine any terms and conditions it will accept for the acquisition Water Delivery Agreement for water, water rights, or interests in water to preserve or improve the natural environment. ISF Rule 6 requires a minimum of two Board meetings to allow for public input prior to the Board taking final action on a proposed acquisition. Therefore, the Board's initial consideration of the Poudre Flows Plan at this Board meeting initiates the 120-day time period for the Board to consider this proposal. Final action on the proposal could occur at the January 2021 Board meeting. ISF Rule 6m (4) provides that any person may request the Board to hold a hearing on the proposed acquisition, and that such a request must be filed within twenty days of this Board meeting.

ISF Rules 6e and 6f require the Board to evaluate the appropriateness of an acquisition and determine how best to utilize the acquired water rights to preserve or improve the natural environment. The ISF Rules list several factors the Board may consider in its evaluation of the acquisitions. Each of the water rights currently considered for the Poudre Flows Plan will be evaluated using the factors, and an analysis applying the factors for each of the water rights is covered in the separate Seed Water Right memos. This memo addresses the factors as necessary to evaluate the overall Poudre Flows Plan as a plan for augmentation to augment stream flows.

Pursuant to statute, Staff has requested recommendations from Colorado Parks and Wildlife ("CPW"), the U.S. Department of Agriculture, and the U.S. Department of Interior. Pursuant to ISF Rule 6m(1), Staff has provided notice of the proposed Poudre Flows Plan and the proposed acquisition of interest in the Seed Water Rights to all persons included on the appropriate ISF Subscription Mailing Lists and to the State Engineer's Substitute Supply Plan Notification List. Staff has requested a biological analysis from CPW pursuant to Rule 6f(2). CPW will address the Board regarding the Poudre Flows Plan at the Board meeting. CPW's written recommendation is attached as **Exhibit PF7.**

Summary of Proposed Poudre Flows Plan

Pursuant to section 37-92-102(4.5), and under the Phase II MOA, the CWCB would be a co-applicant in water court to secure a water court decree that approves the Poudre Flows Plan and use of the Seed Water to augment stream flows, as well as a procedure to add water rights as future sources of augmentation for the Plan. Once accepted into the Plan, and via individual Water Delivery Agreements, the CWCB would protect water delivered into the Subject Reach, through the individually specified segments for each water right, up to the maximum rates as approved by the CWCB Board, and as set forth in the water court decree. The Subject Reach to be augmented is segmented into six segments (A-F) representing different biological and hydrological conditions, as shown below.

Table 1
Segment Upper and Lower Termini

Segment	Upper Terminus	Lower Terminus
A	Canyon Gage	Larimer and Weld Canal Diversion
B	Larimer and Weld Canal Diversion	Spring Creek Confluence

C	Spring Creek Confluence	New Cache la Poudre Ditch Diversion
D	New Cache la Poudre Ditch Diversion	County Road 17 Crossing
E	County Road 17 Crossing	59th Avenue Bridge
F	59th Avenue Bridge	South Platte River Confluence

Based on the CPW Flow Quantification Report, the CWCB will use water provided under the Poudre Flows Plan to augment stream flow to preserve and improve the natural environment to a reasonable degree by maintaining flows up to the rates specified in the following table.

Table 2
CPW Flow Quantification Seasonal Recommendations

Segment	Winter (Nov – March) Preserve (cfs)	Winter (Nov – March) Improve (cfs)	Summer (Apr – Oct) Preserve (cfs)	Summer (Apr – Oct) Improve (cfs)
A	Up to 80	80 -150	Up to 114	114 - 260
B	Up to 80	80 - 150	Up to114	114 - 260
C	Up to 30	30 - 54	Up to 40	40 - 54
D	Up to 10	10 - 35	Up to 10	10 - 40
E	Up to 15	15 - 30	Up to 15	15 - 30
F	Up to 15	15 - 30	Up to 15	15 - 30

Existing Instream Flow Water Rights

CWCB does not currently hold any instream flow water rights in the Subject Reach of the Cache la Poudre River, or downstream of the Subject Reach on the South Platte River. CWCB's appropriated instream flow water rights upstream of the Subject Reach on the Cache la Poudre River will be unaffected by this plan.

Existing Natural Environment

The Subject Reach of the Cache la Poudre River supports both native and non-native fish species, as well as macroinvertebrate and riparian communities. Over the 55-mile reach, the composition of the fishery changes from a cold-water dominated fishery in the upper portions to a transitional cool- to –warm-water fishery surrounding the City of Fort Collins to a warm-water fishery in the lower portions. The Poudre River has undergone significant changes with a number of major agricultural, municipal, and industrial diversions representing a major anthropogenic change to the watershed. The Cache la Poudre is still a snowmelt-driven system, but water developments have significantly altered the natural flow regime resulting in severely depleted flow regime with multiple points of dry up. River flows fluctuate naturally on a diurnal and seasonal pattern, and are influenced by transbasin inflows, upstream reservoir operations, river diversions, and return flows from various uses. CPW describes the natural environment with more detail in the CPW Flow Quantification Report (**Exhibit PF3)**.

The upper reaches of the Cache la Poudre River as it emerges from Poudre Canyon are typical cold water trout habitat supporting both rainbow and brown trout populations. As the river flows eastward through Fort Collins, the fishery transitions from one that is dominated by cold-water species to a more diverse cold water/cool water/warm water fishery. The transition zone provides important habitat for cold-water species seasonally coming down from the canyon, as well as plains species that move up from the low gradient plains zone. The Poudre River transition zone provides aquatic habitat conditions that support an array of species, including important native species with varying temperature and habitat preferences that can be unique to transition zones. This assemblage includes native minnow, sucker, and darter species, as well as the plains topminnow (Tier 1 Species of Greatest Conservation Need, CPW State Wildlife Action Plan (2015)). East of I-25, the fishery is mainly warm-water and is dominated by species in the darter, minnow, and sucker families.

Proposed Use of the Augmentation Water

The Board would use the augmentation water to preserve and improve the natural environment to a reasonable degree in the Cache la Poudre River between mouth of the Cache la Poudre canyon through the cities of Fort Collins and Greeley to the confluence with the South Platte River, a distance of approximately 55 miles. The CWCB would use the augmentation water to maintain stream flows up to the amounts specified in **Table 2** above as ultimately decreed in the proposed Poudre Flows Plan. The CWCB will request administration to protect the Seed Water deliveries from diversion, including exchange to the extent allowed under section 37-92-102(4.5)(b)(VII), by other water users from the point of delivery to and through the identified stream segments to the end of the Subject Reach or to the point of re-diversion of re-use, whichever is higher on the stream. Downstream of the identified stream segment, the water may be re-used, or may be relinquished back to waters of the State of Colorado available for diversion by others for any legal beneficial use. The Poudre Flows partnership has established a management committee comprised of water users with diverse interests to coordinate timing for water deliveries into the augmentation plan. The committee would meet regularly and closely coordinate with the Division of Water Resources, particularly the water commissioner.

Potential Benefits of this Proposal

The proposed Poudre Flows Plan will establish a framework to augment stream flows through an adjudicated plan for augmentation for the Subject Reach of the Cache la Poudre River. The added flows resulting from the Poudre Flows Plan will improve connectivity and reduce fragmentation of habitat in the Subject Reach that results from seasonal diversions and natural low flow conditions. The Poudre Flows Plan, including the Seed Water Rights, is a first step toward achieving the goal of maintaining healthy stream flows in the Cache la Poudre River without injury to other water rights. Staff anticipates bringing additional water acquisitions into the Poudre Flows Plan with Board approval and using a decreed process for adding augmentation water. Other potential benefits of this proposal include:

- Potential increase in the amount of time the Subject Reach carries sufficient flows to maintain a fishery, and in the quality of the instream habitats currently associated with these segments of the Cache la Poudre River.
- Secondary benefit of assisting diversions by adding a base flow and bringing up the river stage.
- Secondary benefits to recreation and fishing, water quality, and temperature improvements.
- Providing a community-based multi-party solution for a complex situation.

Potential Injury to Existing Rights

Section 37-92-102(4.5) provides direction for the type of water rights that can be used in a plan for augmentation to augment stream flows under this statute, and also imposes various types of terms and conditions to prevent injury to other water rights, including existing undecreed exchanges.

- Pursuant to section 37-92-102(4.5)(III), the augmentation water rights to be used in the Poudre Flows Plan must have already been judicially approved for a change of water rights to include any augmentation use, and the historical consumptive use must have already been quantified.
- Pursuant to section 37-92-102(4.5)(V), the use of augmentation water in the Poudre Flows Plan is subject to the terms and conditions of any applicable decree to which that water is subject.
- Pursuant to section 37-92-102(4.5)(b)(VI), additional terms and conditions must be imposed as necessary to prevent injury to other water rights, including "terms and conditions to prevent injury to other water rights that result from any change in the time, place, or amount of water available for diversion or exchange to the extent that other appropriators have relied upon the stream conditions that resulted from the historical use of the augmentation water rights …before their use in the plan for augmentation of stream flows."
- Section 37-92-102(4.5)(b)(VII) requires that "an applicant must prove that the plan for augmentation to augment stream flows will not injure other water users' undecreed existing exchanges of water to the extent the undecreed existing exchanges of water have been administratively approved before the date of the filing of the application for approval of the plan for augmentation to augment stream flows."
- Section 37-92-102(4.5)(b)(IX) requires that "if operation of a plan for augmentation requires the use of, or making of physical modifications to, an existing diversion structure . . . the operator of the plan must have consent from the owner of the existing structure and bear all reasonable construction costs … and all reasonable operational and maintenance costs …"

Because stream flow protection under this proposal will be achieved with existing quantified water rights that are already decreed for augmentation, no injury should result from such use. Moreover, use of the water rights in the Poudre Flows Plan can only be made under the terms and conditions of the new Poudre Flows Plan augmentation decree and the terms and conditions of the underlying decrees. The plan is to introduce water that has not otherwise been present or available to other water users in the stream segments. The water court decree implementing the Poudre Flows Plan will contain terms and conditions to assure that no water rights on any of the segments will be injured as a result of the augmentation use in the Plan, as required by 37-92-102(4.5) C.R.S.

Administrability

The Poudre Flows partners have been, and will continue, coordinating with the State and Division Engineers regarding the administrability of this proposal. Based upon preliminary discussions, the Division Engineer for Water Division 1 has indicated that this proposal appears to be administrable provided that: (1) the water court decree will contain appropriate terms and conditions to prevent injury; (2) applicants ensure adequate measurement, recording and reporting as required to facilitate proper administration; (3) any necessary infrastructure modifications will be in place to allow the subject augmentation water to pass through the subject stream reach; and (4) communication protocols will be established so that the water commissioner is aware of plan operations and water user expectations on a real-time basis.

Maximum Utilization of the Waters of the State and Availability of the Delivered Water for Subsequent Use Downstream

The water rights to be used in the Poudre Flows Plan are existing water rights offered by water users in a voluntary market-based environment. The CWCB would beneficially use the augmentation water to augment stream flows in accordance with section 37-92-102(4.5), the augmentation plan decree, and individual Water Delivery Agreements. Depending on decree terms and individual agreements, downstream of the lower terminus, the water may be further used by either (1) re-use and successive use by the water right owner by re-diversion or to maintain downstream obligations to others, or (2) potential reversion back to waters of the State of Colorado available for diversion for any legal beneficial use. This proposal will promote maximum utilization of the waters of the state because the augmentation water will not only be used in the Poudre Flows Plan to augment stream flows in the Cache la Poudre River, but also may be used for downstream beneficial purposes.

Effect of Proposed Acquisition on Any Relevant Interstate Compact Issue

It is anticipated that this water will be used via storage, direct application, or by exchange either by the water rights owners or by water users downstream once the augmentation water has satisfied its intended beneficial use in the Subject Reach of the Cache la Poudre River. Existing quantified water rights already changed for augmentation use will be used for streamflow protection under this plan and those water rights are subject to the terms and

conditions of their underlying decrees. Additionally, the subject water rights and uses are located in Water District 3 and the South Platte River Compact primarily affects District 64 on the lower end of the South Platte River. Based upon the foregoing, it does not appear that this acquisition will raise any compact issues.

Costs to Complete the Transaction, and Other Associated Costs

There are various costs associated with completing this proposed augmentation plan, but no direct expenditures to purchase or lease any of the Seed Water Rights. The Seed Water Rights holders are donating the interests in water rights to be used in this plan. Financial contributions by Fort Collins, Greeley, Thornton and NCWCD, and fundraising efforts by CWT are significant and are expected to be sufficient to pay for CWT project support through the water court application process, and to pay for SWE's engineering work. The CWCB's indirect costs include Staff and Attorney General's Office time dedicated to participation as a co-applicant in the water court proceeding, and participation in a management committee that will coordinate planning, recording, reporting, and guidance on day-to-day operations. Later, as new augmentation water rights become available to add to this plan, some of the water rights owners may request funding from the Board to lease or purchase interests in the water rights to be used.

Exhibits

Exhibit PF1: House Bill 20-1037
Exhibit PF2-1: Location Map
Exhibit PF2-2: Seed Water Map
Exhibit PF3: CPW Flow Quantification Report
Exhibit PF4: SWE Preliminary Engineering
Exhibit PF5: Phase II MOA
Exhibit PF6: Draft Water Court Application
Exhibit PF7: CPW Recommendation Letter

EXHIBITS

HOUSE BILL 20-1037

BY REPRESENTATIVE(S) Arndt, Bird, Buentello, Cutter, Esgar, Exum, Holtorf, Jackson, Kennedy, Kipp, McCluskie, McLachlan, Melton, Michaelson Jenet, Roberts, Snyder, Soper, Titone, Valdez D., Will, Wilson, Young, Becker;
also SENATOR(S) Coram, Bridges, Hansen, Moreno, Rodriguez, Scott, Tate, Zenzinger, Garcia.

CONCERNING THE COLORADO WATER CONSERVATION BOARD'S AUTHORITY TO AUGMENT STREAM FLOWS WITH ACQUIRED WATER RIGHTS THAT HAVE BEEN PREVIOUSLY DECREED FOR AUGMENTATION USE.

Be it enacted by the General Assembly of the State of Colorado:

SECTION 1. In Colorado Revised Statutes, 37-92-102, **add** (4.5) as follows:

37-92-102. Legislative declaration - basic tenets of Colorado water law. (4.5) **Plan for augmentation to augment stream flows.** (a) **Legislative declaration.** THE GENERAL ASSEMBLY HEREBY FINDS, DETERMINES, AND DECLARES THAT THE COLORADO WATER CONSERVATION BOARD WOULD BENEFIT FROM DIRECTION WITH REGARD TO WATER COURT APPLICATIONS FOR PLANS FOR AUGMENTATIONTO AUGMENT STREAM FLOWS,

Exhibit PF1
Agenda Item 23
Nov18-19,2020

Capital letters or bold & italic numbers indicate new material added to existing law; dashes through words or numbers indicate deletions from existing law and such material is not part of the act.

AS IDENTIFIED IN SUBSECTION (3) OF THIS SECTION.

(b) **Plan approval.** TO OBTAIN A DECREED PLAN FOR AUGMENTATION, THE BOARD, EITHER AS SOLE APPLICANT OR TOGETHER WITH AN OWNER OF A DECREED WATER RIGHT FOR WHICH A CHANGE OF WATER RIGHTS TO INCLUDE ANY AUGMENTATION USE HAS BEEN JUDICIALLY APPROVED, MUST FILE AN APPLICATION WITH THE WATER COURT FOR APPROVAL OF A PLAN FOR AUGMENTATION TO AUGMENT STREAM FLOWS AND PROTECT AUGMENTATION DELIVERIES MADE PURSUANT TO THE PLAN FOR AUGMENTATION WITHIN A SPECIFIC STREAM REACH OR REACHES, AT RATES THE BOARD DETERMINES ARE APPROPRIATE TO PRESERVE OR IMPROVE THE NATURAL ENVIRONMENT TO A REASONABLE DEGREE. THE APPLICATION AND APPROVAL PROCESS FOR A PLAN FOR AUGMENTATION TO AUGMENT STREAM FLOWS ARE SUBJECT TO THE FOLLOWING PRINCIPLES AND LIMITATIONS:

(I) THE BOARD MAY FILE AN APPLICATION ONLY IF THE OWNER OF THE WATER RIGHT THAT IS DECREED FOR AUGMENTATION USE IS IDENTIFIED IN THE APPLICATION AND CONSENTS TO THE APPLICATION.

(II) THE PROCEDURES, STANDARDS, AND REQUIREMENTS OF THIS ARTICLE 92 FOR PLANS FOR AUGMENTATION APPLY TO APPLICATIONS FILED UNDER THIS SUBSECTION (4.5).

(III) A PLAN FILED UNDER THIS SUBSECTION (4.5) MUST USE, FOR AUGMENTATION ONLY, WATER RIGHTS:

(A) FOR WHICH THE HISTORICAL CONSUMPTIVE USE HAS BEEN QUANTIFIED; AND

(B) FOR WHICH A CHANGE OF WATER RIGHTS TO INCLUDE ANY AUGMENTATION USE HAS BEEN JUDICIALLY APPROVED.

(IV) IF THE AUGMENTATION WATER RIGHT MEETS THE REQUIREMENTS OF SUBSECTION (4.5)(b)(III) OF THIS SECTION, NO FURTHER CHANGE OF THAT AUGMENTATION WATER RIGHT IS REQUIRED.

(V) THE USE OF WATER AS PART OF A PLAN FOR AUGMENTATION TO AUGMENT STREAM FLOWS IS SUBJECT TO THE TERMS AND CONDITIONS OF ANY APPLICABLE DECREE TO WHICH THAT WATER IS SUBJECT.

(VI) ADDITIONAL TERMS AND CONDITIONS MUST BE IMPOSED ON THE USE OF WATER AS PART OF A PLAN FOR AUGMENTATION TO AUGMENT STREAM FLOWS AS NECESSARY TO PREVENT INJURY TO THE OWNERS OF VESTED WATER RIGHTS OR DECREED CONDITIONAL WATER RIGHTS. THE TERMS AND CONDITIONS MUST INCLUDE TERMS AND CONDITIONS TO PREVENT INJURY TO OTHER WATER RIGHTS THAT RESULT FROM ANY CHANGE IN THE TIME, PLACE, OR AMOUNT OF WATER AVAILABLE FOR DIVERSION OR EXCHANGE TO THE EXTENT THAT OTHER APPROPRIATORS HAVE RELIED UPON THE STREAM CONDITIONS THAT RESULTED FROM THE HISTORICAL USE OF THE AUGMENTATION WATER RIGHTS DESCRIBED IN SUBSECTION (4.5)(b)(III) OF THIS SECTION OR ADDED PURSUANT TO SECTION 37-92-305 (8)(c) BEFORE THEIR USE IN THE PLAN FOR AUGMENTATION OF STREAM FLOWS. A JUNIOR APPROPRIATOR IS ENTITLED TO THE CONTINUATION OF STREAM CONDITIONS AS THE CONDITIONS EXISTED AT THE TIME OF THE JUNIOR APPROPRIATOR'S APPROPRIATION.

(VII) AN APPLICANT MUST PROVE THAT THE PLAN FOR AUGMENTATION TO AUGMENT STREAM FLOWS WILL NOT INJURE OTHER WATER USERS' UNDECREED EXISTING EXCHANGES OF WATER TO THE EXTENT THE UNDECREED EXISTING EXCHANGES OF WATER HAVE BEEN ADMINISTRATIVELY APPROVED BEFORE THE DATE OF THE FILING OF THE APPLICATION FOR APPROVAL OF THE PLAN FOR AUGMENTATION TO AUGMENT STREAM FLOWS.

(VIII) THE AUGMENTATION WATER USED TO AUGMENT STREAM FLOWS IN A PLAN FOR AUGMENTATION TO AUGMENT STREAM FLOWS SHALL NOT BE DIVERTED WITHIN THE SPECIFIC STREAM REACH BY AN EXCHANGE, PLAN FOR SUBSTITUTION, PLAN FOR AUGMENTATION, OR OTHER MEANS THAT CAUSE A REDUCTION OF THE AUGMENTATION WATER ADDED TO THAT STREAM REACH. THE AUGMENTATION WATER IS SUBJECT TO SUCH REASONABLE TRANSIT LOSSES AS MAY BE IMPOSED BY THE WATER COURT OR THE STATE AND DIVISION ENGINEERS.

(IX) IF OPERATION OF A PLAN FOR AUGMENTATION REQUIRES THE USE OF, OR MAKING OF PHYSICAL MODIFICATIONS TO, AN EXISTING DIVERSION STRUCTURE WITHIN A STREAM REACH TO ALLOW THE AUGMENTATION WATER TO BYPASS THE STRUCTURE, THE OPERATOR OF THE PLAN MUST HAVE CONSENT FROM THE OWNER OF THE EXISTING STRUCTURE AND BEAR ALL REASONABLE CONSTRUCTION COSTS ASSOCIATED WITH ANY PHYSICAL MODIFICATIONS AND ALL REASONABLE OPERATIONAL AND

MAINTENANCE COSTS INCURRED BY THE OWNER OF THE STRUCTURE THAT WOULD NOT HAVE BEEN INCURRED IN THE ABSENCE OF THE PHYSICAL MODIFICATIONS TO THE STRUCTURE.

(c) **Saving clause.** THIS SUBSECTION (4.5):

(I) DOES NOT IMPAIR OR IN ANY WAY AFFECT ANY WATER COURT DECREE, ADMINISTRATIVE AUTHORIZATION, OR AGREEMENT THAT ALLOWS WATER DECREED FOR ENVIRONMENTAL, PISCATORIAL, WATER QUALITY, RECREATIONAL, OR OTHER IN-CHANNEL PURPOSES TO BE USED IN THE NATURAL STREAM CHANNEL FOR THE DECREED PURPOSES;

(II) IS NOT INTENDED TO BE THE EXCLUSIVE MEANS OF AUTHORIZING WATER DECREED FOR AUGMENTATION PURPOSES TO BE USED FOR ENVIRONMENTAL, PISCATORIAL, WATER QUALITY, RECREATIONAL, OR OTHER IN-CHANNEL PURPOSES, INCLUDING THE MAINTENANCE OF DOMINION AND CONTROL OVER THE WATER RELEASED FROM A SPECIFIC RESERVOIR;

(III) DOES NOT AUTHORIZE, RESTRICT, OR PRECLUDE FUTURE WATER RIGHTS APPROPRIATIONS, ADMINISTRATIVE AUTHORIZATIONS, OR OTHER AGREEMENTS FOR THE PURPOSES LISTED IN THIS SUBSECTION (4.5); AND

(IV) DOES NOT AFFECT APPLICATIONS BY THE COLORADO WATER CONSERVATION BOARD FOR PLANS FOR AUGMENTATION NOT DESCRIBED IN THIS SUBSECTION (4.5).

SECTION 2. In Colorado Revised Statutes, 37-92-305, **amend** (8)(c) as follows:

37-92-305. Standards with respect to rulings of the referee and decisions of the water judge - definitions. (8) (c) A plan for augmentation ~~shall~~ MUST be sufficient to permit the continuation of diversions when curtailment would otherwise be required to meet a valid senior call for water, to the extent that the applicant shall provide replacement water necessary to meet the lawful requirements of a senior diverter at the time and location and to the extent the senior DIVERTER would be deprived of ~~his or her~~ THE SENIOR DIVERTER'S lawful entitlement by the applicant's diversion. A proposed plan for augmentation that relies upon a supply of augmentation water that, by contract or otherwise, is limited in duration shall not be denied solely upon the ground that the supply of augmentation

water is limited in duration, if the terms and conditions of the plan prevent injury to vested water rights. ~~Said~~ THE terms and conditions ~~shall~~ MUST require replacement of out-of-priority depletions that occur after any groundwater diversions cease. Decrees approving plans for augmentation ~~shall~~ MUST require that the state engineer curtail all out-of-priority diversions, the depletions from which are not so replaced as to prevent injury to vested water rights. A plan for augmentation, INCLUDING A COLORADO WATER CONSERVATION BOARD PLAN TO AUGMENT STREAM FLOWS PURSUANT TO SECTION 37-92-102, may provide procedures to allow additional or alternative sources of AUGMENTATION OR replacement water, including water leased on a yearly or less frequent basis, to be used in the plan after the initial decree is entered if the use of ~~said~~ THE additional or alternative sources is part of a substitute water supply plan approved pursuant to section 37-92-308 or if such sources are decreed for such use.

SECTION 3. Act subject to petition - effective date. This act takes effect at 12:01 a.m. on the day following the expiration of the ninety-day period after final adjournment of the general assembly (August 5, 2020, if adjournment sine die is on May 6, 2020); except that, if a referendum petition is filed pursuant to section 1 (3) of article V of the state constitution against this act or an item, section, or part of this act within such period, then the act, item, section, or part will not take effect unless

approved by the people at the general election to be held in November 2020 and, in such case, will take effect on the date of the official declaration of the vote thereon by the governor.

KC Becker
SPEAKER OF THE HOUSE
OF REPRESENTATIVES

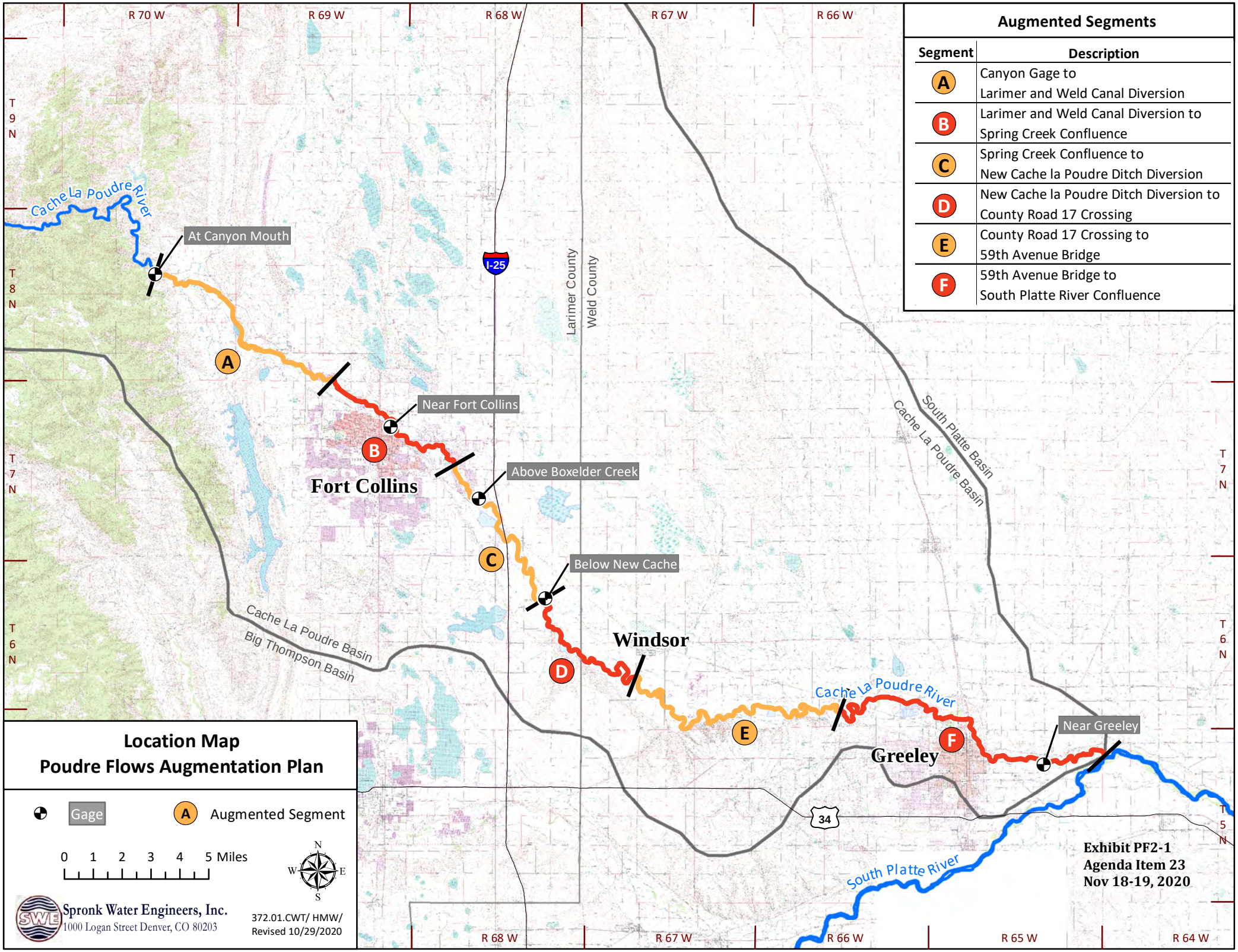
Leroy M. Garcia
PRESIDENT OF
THE SENATE

Robin Jones
CHIEF CLERK OF THE HOUSE
OF REPRESENTATIVES

Cindi L. Markwell
SECRETARY OF
THE SENATE

APPROVED March 24, 2020 at 4:30pm
(Date and Time)

Jared S. Polis
GOVERNOR OF THE STATE OF COLORADO



Augmented Segments

Segment	Description
A	Canyon Gage to Larimer and Weld Canal Diversion
B	Larimer and Weld Canal Diversion to Spring Creek Confluence
C	Spring Creek Confluence to New Cache la Poudre Ditch Diversion
D	New Cache la Poudre Ditch Diversion to County Road 17 Crossing
E	County Road 17 Crossing to 59th Avenue Bridge
F	59th Avenue Bridge to South Platte River Confluence

Location Map
Poudre Flows Augmentation Plan

Gage

A Augmented Segment

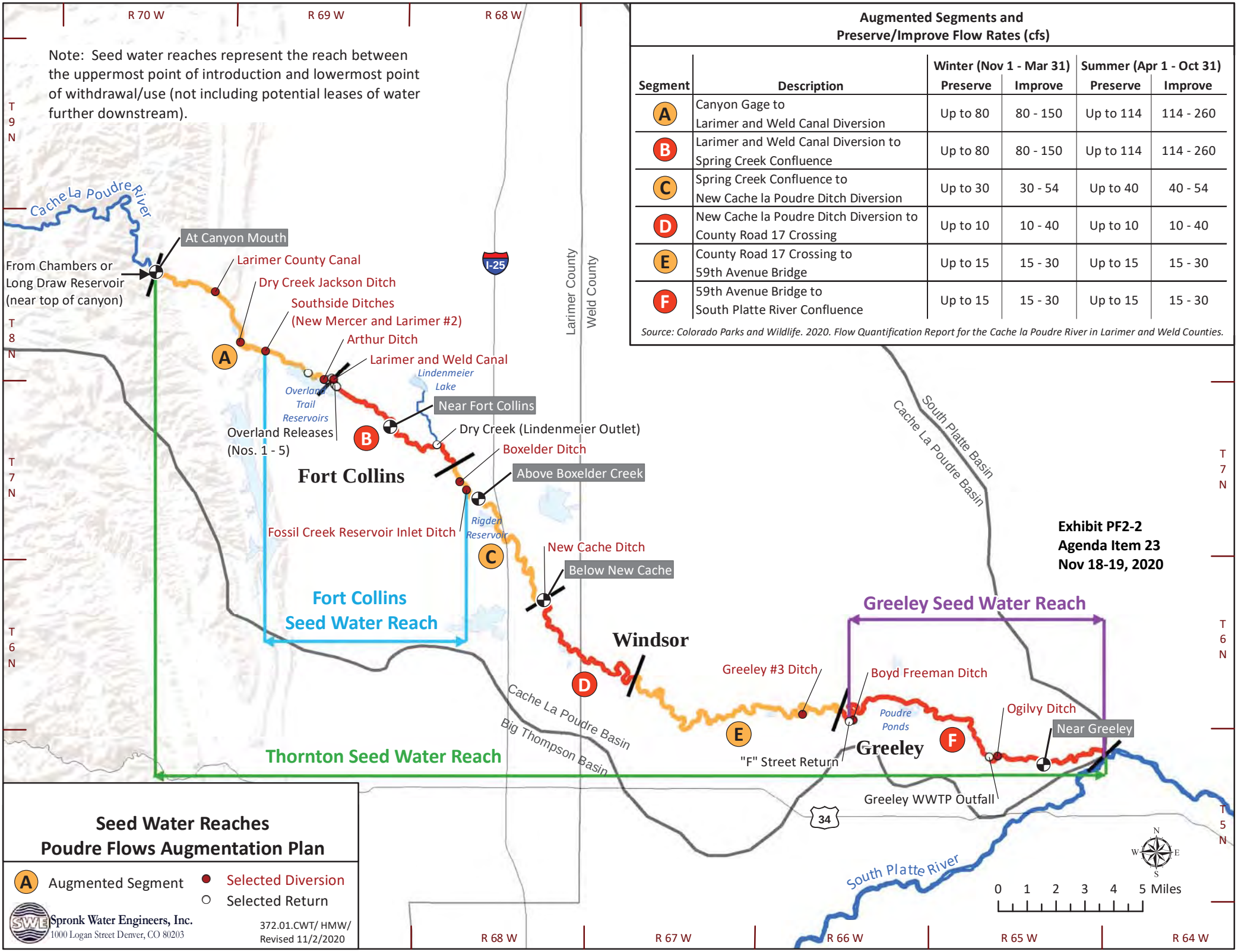
0 1 2 3 4 5 Miles

N W E S

Spronk Water Engineers, Inc.
1000 Logan Street Denver, CO 80203

372.01.CWT/ HMW/
Revised 10/29/2020

Exhibit PF2-1
Agenda Item 23
Nov 18-19, 2020



Augmented Segments and Preserve/Improve Flow Rates (cfs)

Segment	Description	Winter (Nov 1 - Mar 31) Preserve	Winter (Nov 1 - Mar 31) Improve	Summer (Apr 1 - Oct 31) Preserve	Summer (Apr 1 - Oct 31) Improve
A	Canyon Gage to Larimer and Weld Canal Diversion	Up to 80	80 - 150	Up to 114	114 - 260
B	Larimer and Weld Canal Diversion to Spring Creek Confluence	Up to 80	80 - 150	Up to 114	114 - 260
C	Spring Creek Confluence to New Cache la Poudre Ditch Diversion	Up to 30	30 - 54	Up to 40	40 - 54
D	New Cache la Poudre Ditch Diversion to County Road 17 Crossing	Up to 10	10 - 40	Up to 10	10 - 40
E	County Road 17 Crossing to 59th Avenue Bridge	Up to 15	15 - 30	Up to 15	15 - 30
F	59th Avenue Bridge to South Platte River Confluence	Up to 15	15 - 30	Up to 15	15 - 30

Source: Colorado Parks and Wildlife. 2020. Flow Quantification Report for the Cache la Poudre River in Larimer and Weld Counties.

Exhibit PF2-2
Agenda Item 23
Nov 18-19, 2020

Seed Water Reaches
Poudre Flows Augmentation Plan

A Augmented Segment
Selected Diversion
Selected Return

Spronk Water Engineers, Inc.
1000 Logan Street Denver, CO 80203

372.01.CWT/ HMW/
Revised 11/2/2020

Flow Quantification Report for the

Cache la Poudre River in Larimer and Weld Counties

Prepared by Colorado Parks and Wildlife to Support the

Poudre River Flow Augmentation Plan

October 2020

Exhibit PF3
Agenda Item 23
Nov 18-19, 2020

Introduction

Stream flows in the Cache la Poudre River above and through the City of Fort Collins have been an issue for many decades. There have been many attempts to address this issue with little success; in the late 1980s, the City of Fort Collins approached the state to investigate the possibility of a CWCB instream flow water right. The state quickly concluded that significant complex water availability issues precluded such an approach. Currently, there exists a new opportunity to address seasonal low flows in the Poudre corridor. A group of local stakeholders, water users, and state agencies have assembled to explore a new approach to the improvement of flows in the Poudre from the mouth of Poudre Canyon down to the confluence with the South Platte River near Greeley. The Poudre River flow augmentation stakeholders asked Colorado Parks and Wildlife (CPW) to assemble and analyze all existing biological and hydraulic data and to develop instream flow recommendations to be used as flow targets for water acquisitions in this reach of the river. Recently, the Poudre flow augmentation plan was assigned a name; it is now called the "Poudre Flows Project".

This report explains CPW's analysis and rationale for the flow recommendations. In general, CPW used a combination of R2CROSS and PHABSIM data collected and published by a variety of parties over a period of ten years. The R2CROSS data was collected by CPW, the City of Fort Collins, and the Colorado Water Conservation Board (CWCB); other data was collected and analyzed by several consulting firms working on various aspects of the Northern Integrated Supply Project (NISP). In a separate effort, Spronk Water Engineers entered into a contract with the Colorado Water Trust (CWT) to examine spatial and temporal water availability trends in the Poudre River corridor. Spronk developed a point flow model for the flow augmentation plan project; after this model was developed, CWT directed Spronk to incorporate CPW's preliminary segment-specific flow recommendations into the model to assist the stakeholders in identifying locations on the river where water acquisitions would improve existing flow conditions. Spronk's work relative to this project will be described in a separate engineering report. CPW's final segment-specific flow recommendations to preserve and improve the natural environment are discussed in detail in this report and are then summarized in a table at the end.

Background

One set of current events that provided a platform for collaboration around the Poudre Flows Project is the simultaneous evaluation of several water projects that involve water from the Poudre River basin – namely, the NISP project and the cooperative project being developed by the Cities of Fort Collins and Greeley (the Halligan/Seaman Project). The concurrent evaluation and development of these major water supply development projects prompted the development of what was termed a "Common Technical Platform" (CTP) of data and information to evaluate impacts and identify mitigation and enhancement opportunities associated with these projects. The CTP was a component of a Supplemental EIS prepared for the NISP Project. The CTP included a means by which habitat-flow relationships in the Poudre River could be evaluated throughout the reach of river described above.

In 2012 and 2013, CPW started working with the Larimer County Open Space Department and the City of Fort Collins Natural Areas Program on a number of instream flow (ISF) and natural lake level proposals on lands owned or controlled by these local governments. The Poudre River through Fort Collins was one place where, at the request of the City, we initiated field quantification efforts; this work was initially planned for the fall of 2013, but the widespread flooding that occurred on Colorado's front-range delayed these efforts until the following year. In 2014, CPW, CWCB, and Natural Areas staff

collected R2CROSS data at six sites within the city limits. CPW utilized these data sets to initiate discussions relating to flows necessary to preserve the natural environment through the City of Fort Collins; these discussions started with the thought of recommending ISFs to the CWCB for appropriation. This effort was temporarily put on hold to allow time for the Poudre River flow augmentation group's work on the flow augmentation concept to take shape. The six R2CROSS sites were located on the Poudre River between Lions Park (in the northwest corner of Fort Collins) and the point at which the river passes under I-25 (in the southeast corner of the City).

In addition to the R2CROSS effort, CPW relied upon the following published documents for the flow recommendations contained in this report:

- Two Dimensional Hydraulic Modeling Report Cache la Poudre Mainstem for Northern Integrated Supply Project and Halligan/Seaman Water Supply Projects, ERO Resources Corporation, Western EcoSystems Technology, Inc., and Anderson Consulting Engineers, December, 2011. (Herein after referred to as "Anderson" or "Anderson, 2011")
- Common Technical Platform Aquatic Biological Resources Baseline Report, NISP and Halligan/Seaman EIS, GEI Consultants, Inc., Ecological Division, February, 2013. (Herein after referred to as "GEI" or "GEI, 2013")

The Anderson, 2011 report contains only the River 2D hydraulic modeling results for six sites on the Poudre River from the mouth of the canyon down to the confluence with the South Platte River near Greeley. This report describes in detail how the sites were selected, surveyed, measured, and modeled. The report provides detailed descriptions of the hydraulic model's development, calibration, and simulations. The hydraulic simulations were then provided to GEI Consultants who then utilized Physical Habitat Simulation software (PHABSIM) to develop habitat versus flow relationships for the fish species (and life stages thereof) present at the six sites on the Poudre mainstem. PHABSIM is a widely accepted ISF methodology that was developed by the U.S. Fish and Wildlife Service several decades ago; the most current documentation of PHABSIM is described in PHABSIM for Windows (User's manual and exercises, Midcontinent Ecological Sciences Center, U.S. Geological Survey (USGS) Open File Report 01-340, 2001). The GEI, 2013 report is the source for the flow versus habitat relationships that are used in this report. GEI, 2013 is a comprehensive report on aquatic resources for the NISP Supplemental EIS and the CTP. The GEI report was somewhat of a "summary report" that compiled all relevant aquatic information for the CTP (not just flow-related information); GEI summarized habitat, hydrology, water quality, temperature, fish, macroinvertebrate, and nuisance species data for the entire Poudre River corridor. Although this data was collected, analyzed and reported upon by December, 2011, it was not made available to CPW for uses other than the NISP Supplemental EIS until 2016. It is important to note that the upper three PHABSIM sites align geographically with the six R2CROSS sites (described above).

In this report, CPW utilizes both data sets together when developing the flow recommendations contained herein. CPW and CWCB have used combined R2CROSS and PHABSIM data sets for the development of flow recommendations many times in the past – specifically, in the late 1980s on the Blue River in Summit and Grand County, in 2008 for the Colorado River in Grand and Eagle Counties, in 2013 on the San Miguel River in Montrose County, and in 2015 on the Dolores River in Montrose and Mesa Counties.

Methods and Approach

R2CROSS

R2CROSS is the most commonly used method for quantifying ISFs in Colorado; it has been the "workhorse model" for the Instream Flow Program since the program's inception in 1973. The methodology and computer software are available on the CWCB website.

The R2CROSS data for the Poudre River was, as stated above, collected at six locations within the City of Fort Collins. Figure 1 is a map showing the locations of these data collection sites. The uppermost site was located at Lyons Park and the farthest downstream site was located on the city's Poe property near the point where the Poudre River passes under Interstate-25 (I-25). The four in-town R2CROSS sites (from upstream to downstream) are Shields Avenue, Linden Avenue (near downtown Fort Collins), River Bend Ponds, and Cottonwood Hollow. The R2CROSS data was collected at riffle cross sections to model low flow habitat characteristics in this critical habitat type; this is a typical and recognized application of the R2CROSS method. Data was collected and analyzed utilizing the CWCB/CPW standard methodology – cross section geometry and water surface slopes were surveyed using a level and survey rod, and water discharge was measured using a Sontek Flowtracker. Data was then entered into the R2CROSS Microsoft Excel spreadsheet; it was evaluated for errors by CPW and CWCB personnel, and the resulting staging tables were analyzed by CPW to develop typical seasonal (winter/low flow and summer/high flow) ISF recommendations. Again, this task was completed utilizing the CWCB/CPW standard approach as described in Espegren (1996) focusing on flows necessary to retain certain hydraulic characteristics – average water depth, average water velocity, and wetted perimeter expressed as a percentage of bankfull wetted perimeter.

Flow recommendations from R2CROSS are either accepted or rejected based on whether they fall within the range of accuracy for the estimation of channel roughness; flow recommendations must fall between 40% of the measured flow and 250% of the measured flow to be reliable. The R2CROSS-based flow recommendations are summarized in Table 1 (below) and the staging tables are attached in APPENDIX A. As described in Espergen (1996), winter flow recommendations are based on the flow that meets two of the hydraulic criteria. Summer flow recommendations are based on the flow that meets three of the hydraulic criteria. The in-range seasonal flow recommendations from the six R2CROSS sites on the Poudre River are summarized in Table 2.

River 2D and PHABSIM

As stated above, the River 2D and PHABSIM data sets were collected, analyzed, and reported upon by a number of outside technical consultants – ERO Resources, Western Ecosystems Technology, Anderson Consulting Engineers, and GEI. River 2D is the hydraulic model (water depths, velocity, and water surface elevations) and PHABSIM is the physical habitat simulation (where species- and life stage-specific variables are integrated with the hydraulics to produce habitat-flow relationships). CPW personnel were consulted during the collection and analysis of these data sets; CPW was also involved in reviewing the results. It is important to note that the overall River 2D and PHABSIM effort was designed to be an independent effort to evaluate the cumulative impacts of the Poudre River water development projects described above. The six River 2D sites are shown on the map in Figure 2 and are described in Table 2. As stated above, the three upper most River 2D sites (Watson Lake, Martinez Park, and Archery

Site) roughly correspond with the six CPW R2CROSS sites. It is important to note that the Poudre River east of I-25 is a very different riverine environment. Here the hydraulic and habitat characteristics of the river change as a result of a flatter slope and historic flow alterations that have altered the stream channel geometry. In general, the hydraulics of flatter river segments are more accurately described by River 2D; R2CROSS works better in rivers with steeper slopes. Furthermore, the fish species assemblages present in the Poudre east of I-25 utilize habitat types (large pools and lower gradient run/glide habitat types) that are more accurately described with River 2D and PHABSIM. The PHABSIM results are discussed and displayed below as well as in APPENDIX B.

General Approach

For the portion of the Poudre River where both R2CROSS and PHABSIM data was available, CPW utilized the results from both methods to develop flow recommendations. R2CROSS is particularly useful in this exercise because the method (as documented and historically utilized by CPW and CWCB) is a "standard setting" technique that points the recommending agency to a specific flow recommendation (in cfs). PHABSIM data, on the other hand, is an "incremental technique" that is useful in determining how physical habitat (measured in Weighted Usable Area per 1000 feet of stream) changes with flow. Additionally, PHABSIM results are also species- and life stage-specific and thus give a recommending agency the ability to look at seasonal flow vs. habitat relationships relative to individual species' life history requirements (i.e. spawning season, fry emergence and growth, juvenile and adult habitat, etc.). PHABSIM data is also very useful in determining ranges of flow where habitat is increasing and/or declining or ranges of flow where the levels of habitat remain relatively stable. PHABSIM is also useful in identifying the flow or flows at which habitat is maximized. These aspects of PHABSIM data make this type of data very useful in developing both numerical ISF recommendations and flow ranges or targets for future water management decisions. Due to the species-specific nature of PHABSIM data, it also has utility in looking at fisheries management alternatives (i.e. management for some species of trout vs. management focus on native species). This incremental characteristic of PHABSIM data makes it very useful in determining how habitat conditions might improve under various alternative water management scenarios.

Specifically, as it relates to the Poudre Flows Project, the PHABSIM data will allow the stakeholders to evaluate individual water acquisition proposals that might come to light as the Poudre Flows Project operates in the future. The information contained in this report is intended to be used in the evaluation of incremental water acquisition transactions that may change the stream flow to meet conditions needed to "preserve the natural environment" or, alternatively, to evaluate flow augmentation proposals that might incrementally "improve the natural environment". This report contains flow recommendations that establish both the amount needed to "preserve the natural environment" and the upper limits of flow augmentation that will result in an "improvement of the natural environment."

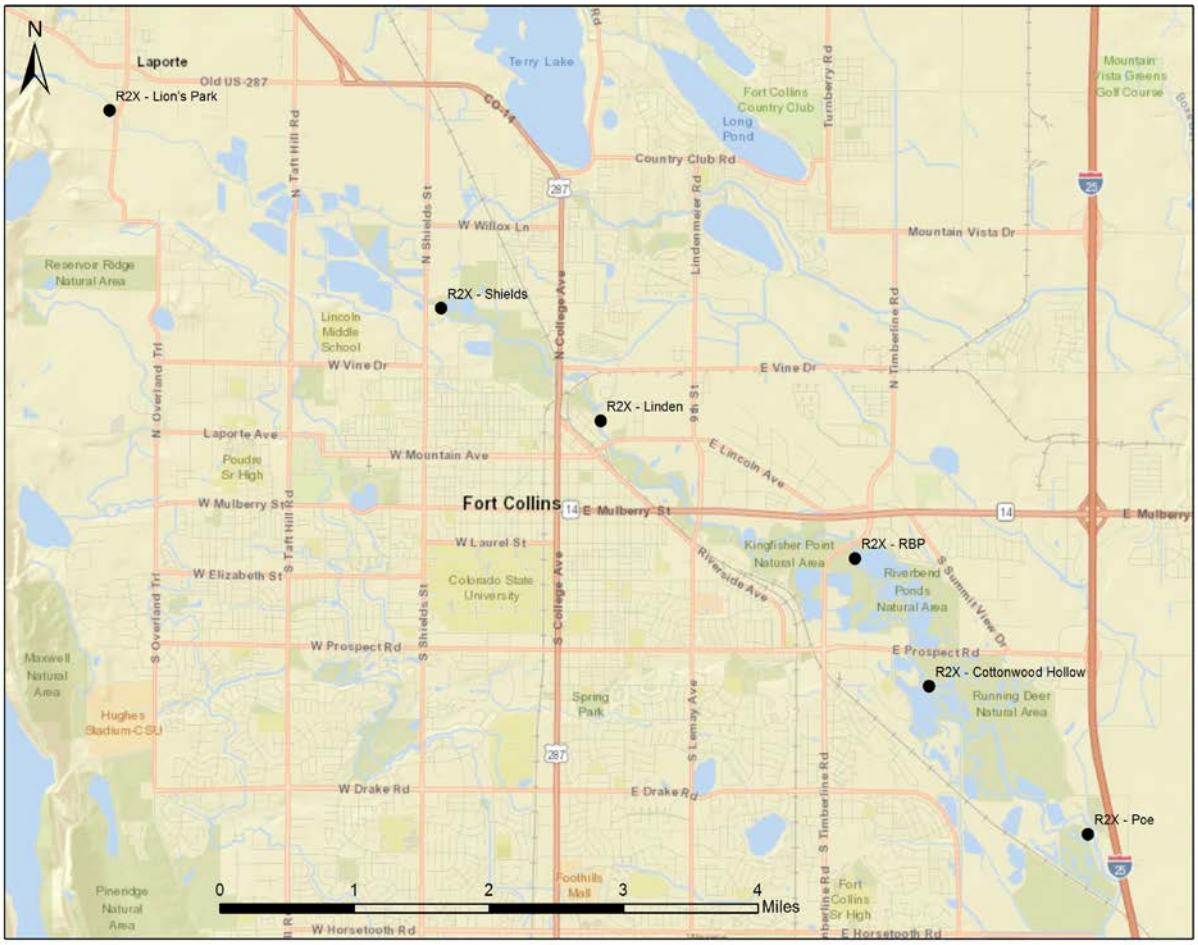


Figure 1 – Map showing the location of CPW's 2014 R2CROSS sites

Table 1 – R2CROSS-Based Flow Recommendations					
R2X Site	**Measured Flow Q (cfs)**	**40% - 250% Range of Reliability (cfs)**	**Q at which velocity criterion met (cfs)**	**Q at which depth criterion met (cfs)**	**Q at which Wetted Perimeter (WP) criterion met (cfs) (WP/WP at bankfull*100)**
Lyons Park	163	65 – 407	5.9 *	209	98 (70%)
Shields	140	56 – 351	37 *	82	172 (70%)
Linden Street	146	58 – 365	7 *	117	29 (70%) *
Riverbend Ponds	101.5	41 – 254	13 *	54	86 (70%)
Cottonwood Hollow	52.5	21 – 131	3 *	54	21 (60%)
Poe	105	42 – 261	12 *	74	6 (70%) *

Table 2 – Seasonal In-Range R2CROSS Flow Recommendations		
R2X Site	**Winter Flow Recommendation (cfs)**	**Summer Flow Recommendation (cfs)**
Lyons Park	98	209
Shields	82	172
Linden Street	*	117
Riverbend Ponds	54	86
Cottonwood Hollow	21	54
Poe	*	74

*Flow recommendations from R2CROSS must fall in range relative to the estimate of Manning's n Roughness coefficient. Values marked with an asterisk are out of range and are therefore not considered in the development of seasonal flow recommendations.

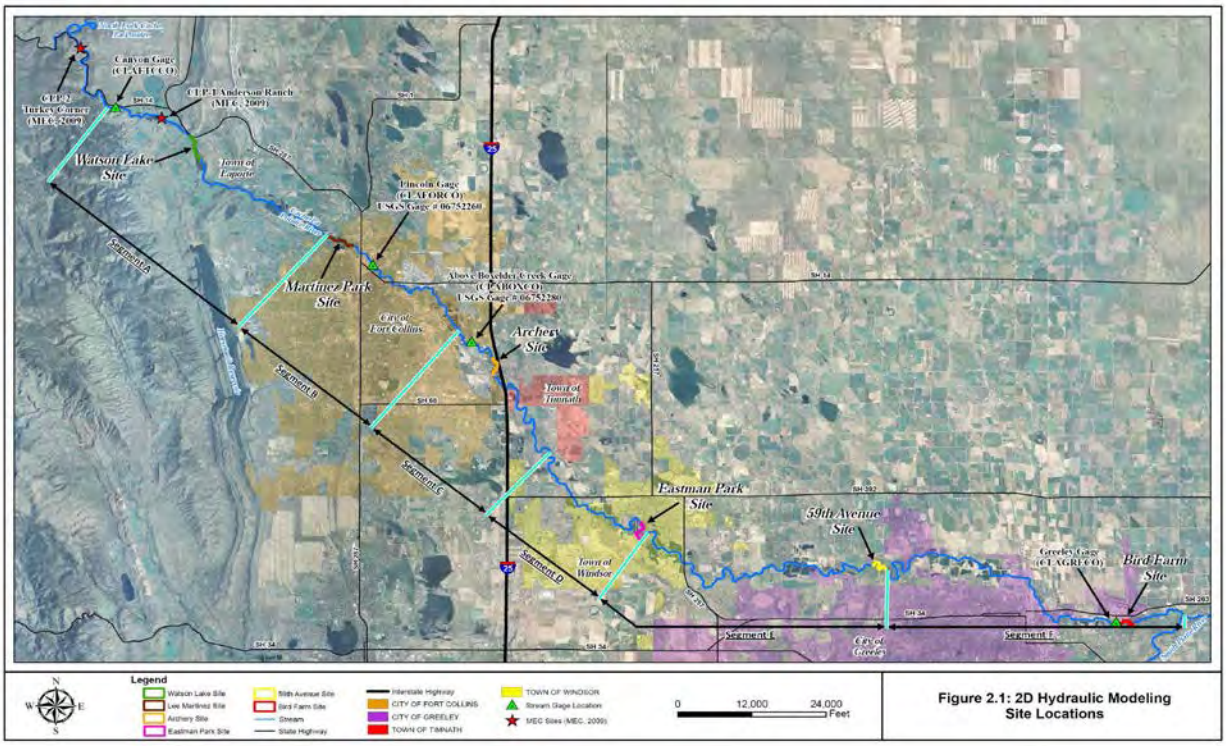


Figure 2.1: 2D Hydraulic Modeling Site Locations

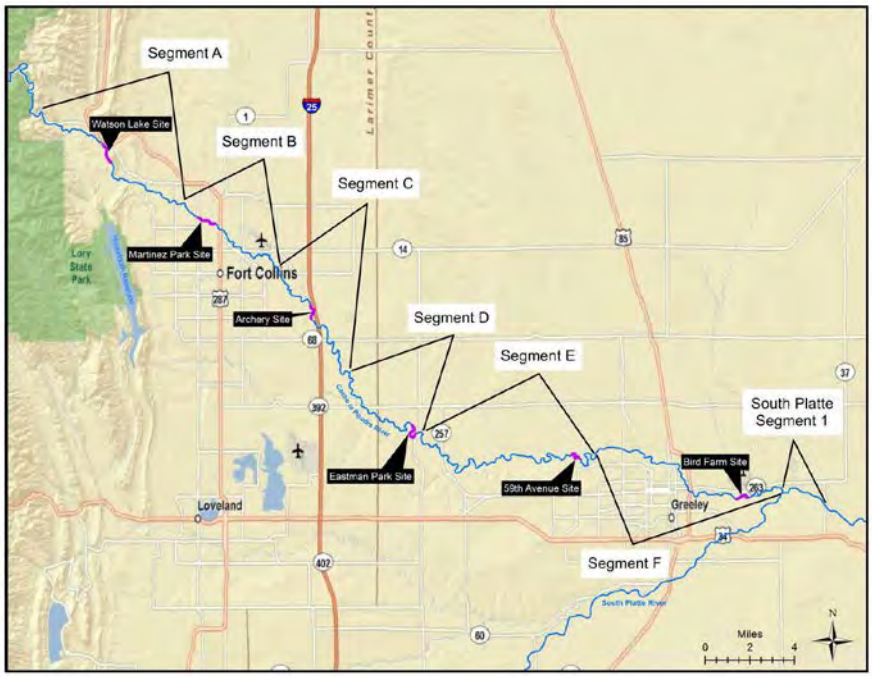


Figure 2 – Map Showing River 2D and PHABSIM Sites (Anderson, 2011 (top), GEI, 2013 (bottom)

Table 3 – River 2D/PHABSIM Modeling Locations (from Anderson, 2011)			
Site Name	**General Site Location**	**Site Length (ft)**	**Slope**
Watson Lake	West of Laporte	5000	0.0044
Martinez Park	Western Fort Collins	5200	0.0033
Archery Site	East of Fort Collins	3600	0.0024
Eastman Park	Central Windsor	5200	0.0012
59th Avenue	Western Greeley	4600	0.0006
Bird Farm	East of Greeley	4200	0.0010

Natural Environment

One of the key components in any ISF recommendation to the CWCB is a discussion of the natural environment to be preserved. The ISF statutes require that the CWCB make a finding that a natural environment exists and that that natural environment can be preserved to a reasonable degree by the flows appropriated. Although not required here (because this project does not include an ISF appropriation but rather an acquisition of water to augment flows needed to preserve or improve the natural environment), it is still important to document the biological community (the natural environment) that exists in the Poudre River. This information about the natural environment is an important component in the Poudre Flows Project because it provides a basis for the CWCB's findings that certain flow rates are appropriate to preserve and improve the natural environment.

The natural environment in the Poudre River is a somewhat diverse fishery consisting of both native and non-native species. The upper reaches of the Poudre River as it emerges from Poudre Canyon are typical cold water trout habitat (rainbow and brown trout); as the river flows eastward through Fort Collins the slope becomes flatter, water temperatures rise and flows are impacted by diversions. The fishery transitions to a mixed cold water/cool water/warm water fishery. Trout occur regularly in the Poudre River down to approximately Prospect Avenue, but persist down to approximately the highway crossing at I-25; however, they are limited by low flows, reduced habitat, and higher water temperatures. Fish species diversity increases as the river flows through Fort Collins, where native minnow, sucker, and darter species, as well as the Plains Topminnow (Tier 1 SGCN; CPW State Wildlife Action Plan) start to show up in fish sampling efforts. East of I-25, the fishery is dominated by species in the darter, minnow, and sucker families. Correspondingly, in the lower river, CPW's management focus shifts from cold water species to other species; currently the management focus in the lower river is on the native darters that exist in the system. The GEI report did an excellent job of characterizing the fishery and its transition from the canyon mouth down to Greeley. A summary of historic and current fishery data throughout the Poudre River corridor is attached in APPENDIX C. Fish sampling locations are shown on the map in Figure 3 (below); the map illustrates the fact that the Poudre River's fish community has, over the years, been extensively sampled and monitored.

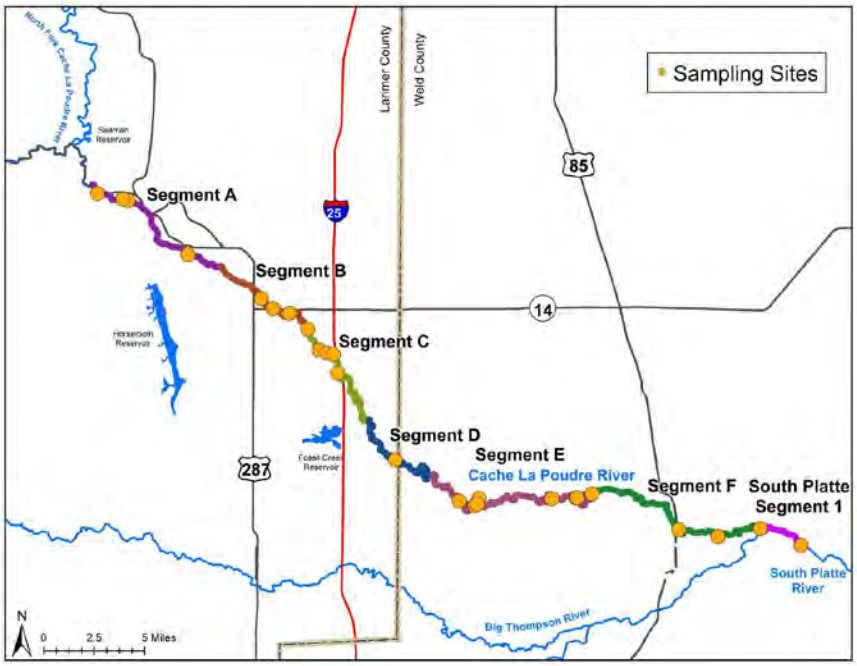


Figure 3 – Map of Historic CPW Fish Sampling Sites (from GEI, 2013)

Segmentation of the Cache la Poudre

As alluded to in the Introduction, the Poudre Flows Project is a program that addresses seasonal and segment-specific low flow conditions by creating a water court approved mechanism whereby water, water rights or interests in water can be permanently or temporarily dedicated to ISF uses (utilizing market-driven processes and existing CWCB authorities to accept acquired water). In order to accomplish these objectives, CWCB and the Poudre Flows stakeholders have requested flow recommendations (also known as flow targets) from CPW to serve as a basis for CWCB's findings relating to acquisitions of water and to provide on-going biological guidance to the operational framework for the plan. As stated in the introduction to this report, CPW utilized the PHABSIM data created for NISP and the CTP in combination with R2CROSS data to develop flow recommendations for the Poudre River. The CTP PHABSIM and CPW R2CROSS data were used as a basis for segmentation decisions and, when data similarities dictated, the consolidation of segments. The end result of this exercise is a habitat- and/or fish community structure-driven subdivision of the Poudre River into functionally unique ISF segments, each having segment-specific, resource-based flow recommendations to be used in the Poudre Flows Project.

As stated above, CPW considered PHABSIM data for the entire reach of the Poudre River from the canyon mouth to Greeley (6 sites) and R2CROSS data from six sites covering the urban reach of the Poudre through Fort Collins down to I-25. CPW and Spronk Water Engineers collaborated on the identification of functional segments of the Poudre River. This segmentation was based on outputs of R2CROSS and PHABSIM, hydrologic data from five stream gages, water diversion records from about 20 water diversion structures, estimated return flow patterns, and CPW's knowledge of the fish communities. The end result of this early collaboration was the identification of unique segments

existing on the river. Figure 4 and Table 3 (below) illustrate the results of this early collaboration between CPW and Spronk Water Engineers:

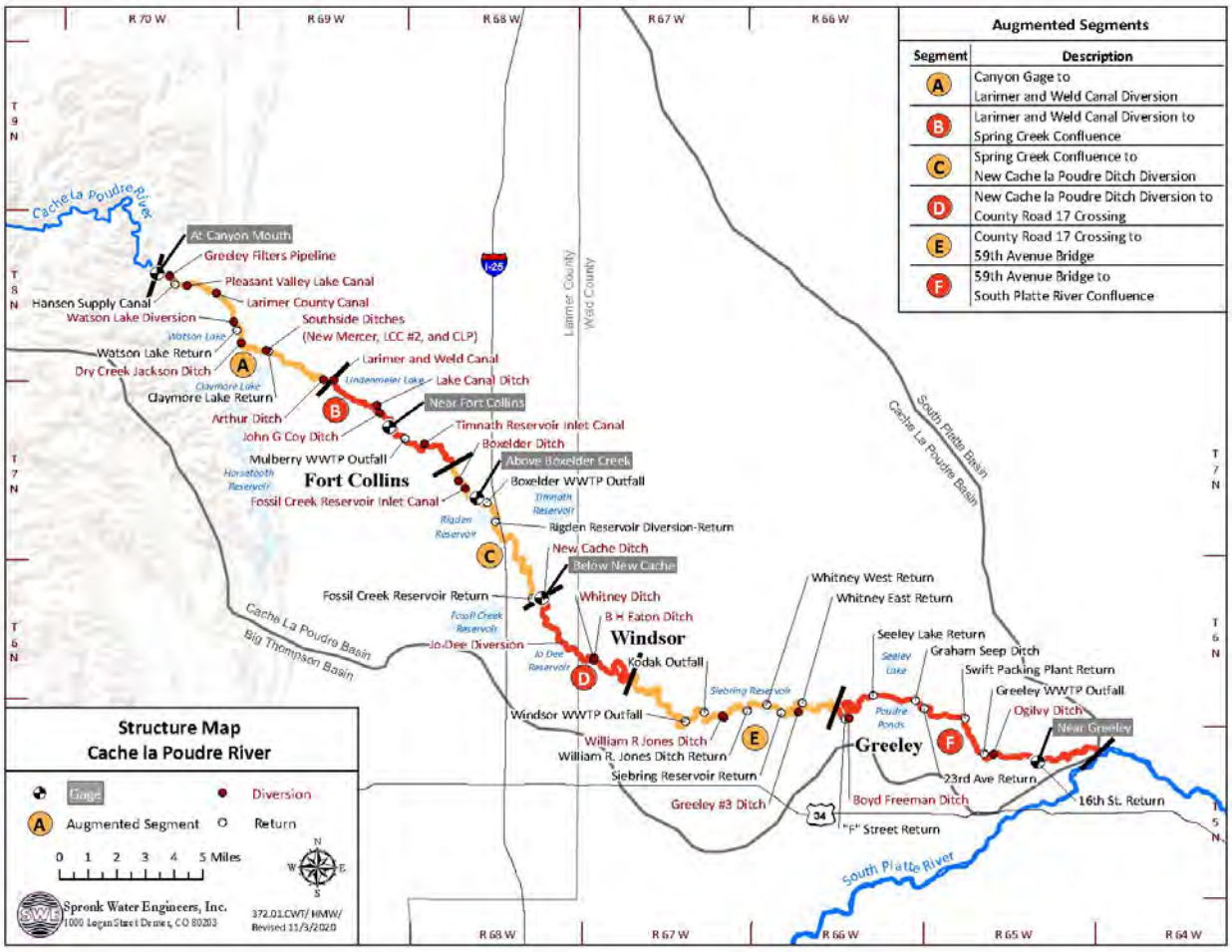


Figure 4 – Map Illustrating CPW and Spronk Water Engineers' Analytical Segments

Table 4 – CPW and Spronk Water Engineers' Cache la Poudre Segmentation for Poudre Flows Project		
Segment	**Upper Terminus**	**Lower Terminus**
A	Canyon Gage	Larimer/Weld Canal Diversion
B	Larimer/Weld Canal Diversion	Spring Creek Confluence
C	Spring Creek Confluence	New Cache la Poudre Diversion
D	New Cache la Poudre Diversion	County Road 17 Crossing
E	County Road 17 Crossing	59th Avenue Bridge (Greeley)
F	59th Avenue Bridge (Greeley)	South Platte Confluence

CPW Flow Recommendations by Segment

The following sections of the report describe the data and rationale utilized to develop flow recommendations for each segment. It is important to note here that when a seasonal flow range is identified (whether from R2CROSS information or from PHABSIM), the lower limit for the range can be considered to be the amount needed to *preserve the natural environment to a reasonable degree* and any flow over and above that lower range limit (up to the upper limit of the identified flow range) can be considered as a range of flows where the data can be relied upon to assist in the CWCB finding that flows in this range can be used beneficially *to improve the natural environment*. The evaluation of flows needed to achieve the *preserve* target and to operate in the *improve* range can be incremental in nature as water acquisition proposals are evaluated individually. In Water Division III (see "The Alamosa River Flow Restoration – Alamosa River-Keeper Project"), CPW and CWCB utilized an incremental approach to flow restoration in the Alamosa River where a series of individual water acquisitions have been accepted by the CWCB working toward *a preserve and/or improve the natural environment* project goal.

Segments A and B

For a variety of reasons, CPW combined Segments A and B. First, they have similar fish communities in that they are both essentially cold water habitat with reasonably good populations of rainbow and brown trout. Second, the R2CROSS data and resulting flow recommendations generated from them are quite similar which is indicative of similarities in stream channel geometry at the three sites that fall within Segments A and B (Lyons Park, Shields Avenue and Linden Avenue). And third, the PHABSIM results for these two segments are also quite similar.

The R2CROSS data for the three sites within Segments A and B yield an average flow recommendation of 165 cfs during the summer months and 90 cfs during the winter months. In general, R2CROSS flow recommendations should fall in the sub-optimal range, providing habitat conditions that are sufficient, but not optimal. After comparing the PHABSIM results of optimal weighted usable area (WUA) to standard results from R2CROSS, R2CROSS results in Segments A and B often surpass optimal levels of habitat. CPW believes that the channel geometry measured at the three R2CROSS sites was significantly altered as a result of the 2013 floods, and we conclude that the winter season flow recommendations appear somewhat reliable but require some refinements using the PHABSIM data. The channel alterations seem to have a greater impact on the summer season flow recommendations (due primarily to the bankfull channel indicators); we will therefore rely more heavily on the PHABSIM data for the summer season flow recommendations.

Below (Figure 5 and Figure 6) are the PHABSIM WUA vs. flow relationships, referred to as WUA curves, for the Watson Lake site (Segment A) and the Martinez Park site (Segment B):

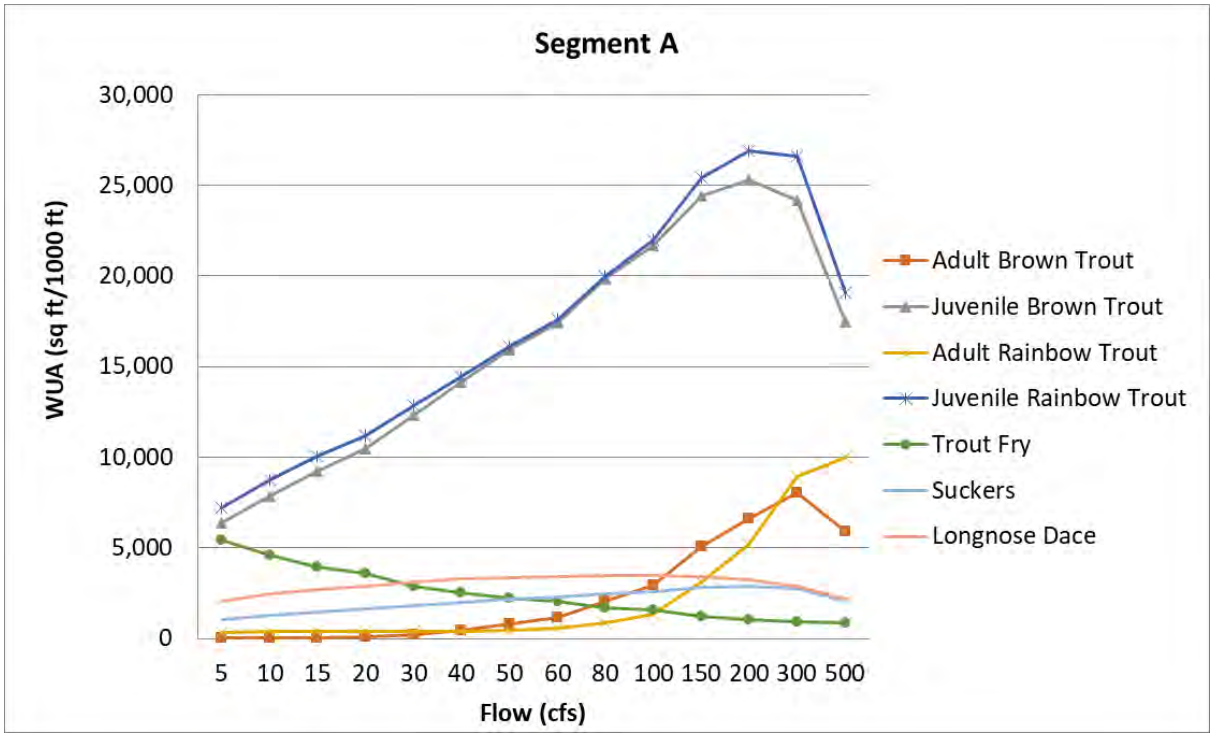


Figure 5. WUA Curves for Segment A (Watson Lake Site) Source: GEI, 2013

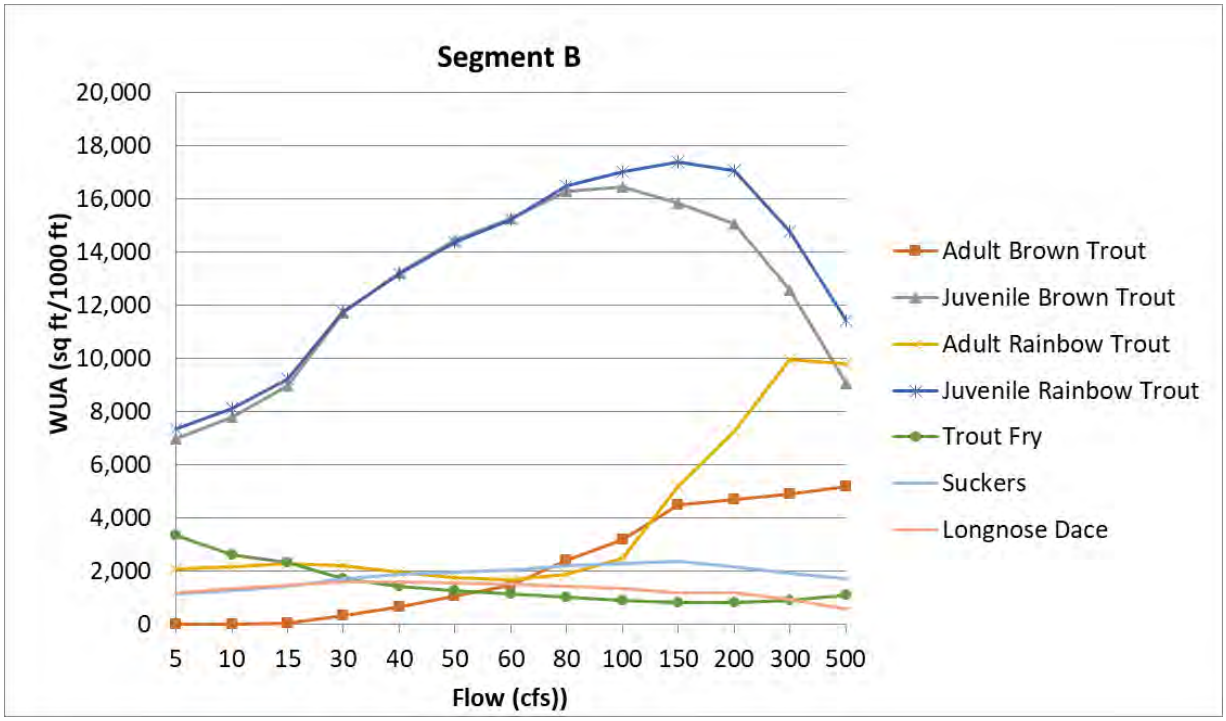


Figure 6. WUA Curves for Segment B (Martinez Park Site) Source: GEI, 2013

We believe that it is useful to discuss some differences and similarities that are evident in the PHABSIM results. First, note the similarities of the juvenile curves at both sites. Both rainbow and brown trout

juvenile habitat curves follow the same pattern at both sites. The adult brown trout curves also follow similar patterns from site to site, but the Martinez Park site appears to have better brown trout habitat from 150 cfs to 500 cfs. The adult rainbow curves are also quite similar from site to site. The major difference in all of these curves is the flow at which habitat is maximized (the optimum flow) and the slight differences at which habitat increases within certain ranges of flow. Due to all of these similarities from site to site and due to the fact that at any given time, both adult and juvenile life stages are present in the river, it is reasonable to combine the two PHABSIM sites and to also combine the species into two general categories – "all adult trout" and "all juvenile trout".

CPW did not consider the "Trout Fry" curve in the development of flow recommendations for the CLP. Trout fry, in general, seek out low velocity areas near the margins of any stream or river and it tends to be relatively stable irrespective of the flow; fry habitat decreases at higher flows as the overall quantity of low velocity habitat decrease. Therefore, adult and juvenile trout were the primary drivers of the flow recommendations.

For our analysis, CPW calculated the flows at which 90% and 50% of the optimum level of habitat occurs; all of this data was used to develop and/or refine the "preserve" flow recommendations. The 90 cfs R2CROSS winter flow recommendation appears to be a little high when one looks at the optimum or near optimum (90%) flows for juvenile trout. We therefore recommend a slightly lower flow (80 cfs) for the winter season to preserve the natural environment. 80 cfs is the mid-point between the 50% optimal flow for juveniles (20 cfs) and the 50% optimal flow for adults (140 cfs). For the summer season "preserve" flow, we recommend 114 cfs; this flow is the mid-point of the 90% flow for juvenile trout (87 cfs) and the 50% flow for adult trout (140 cfs). CPW is of the opinion that 80 cfs in the winter season and 114 cfs in the summer season are the flow targets to preserve the natural environment to a reasonable degree in the Fort Collins reach of the CLP River. In general, trout habitat is stable or increasing in this range of flows in the CLP.

When flows increase above 80 cfs in the winter and 114 cfs in the summer, this is the hydrologic range where habitat is, in general, rapidly increasing and approaching optimum levels. This is, by definition, the range of flows where "improvement to the natural environment" is possible. In general, optimum habitat for adult trout is reached in the 300 to 500 cfs range but that needs to be balanced with the fact that juvenile trout habitat is maximized at flows in the 100 to 200 cfs range (flows above this range are actually detrimental to this critical life stage). This balancing act is largely an issue of professional judgment. CPW believes that during the winter months, improvement of the natural environment can be realized in the range of flows from 80 cfs up to 150 cfs; 150 cfs represents the mid-point of the optimum flow for juvenile trout for both species at the two PHABSIM sites. Similarly, during the summer months, CPW is of the opinion that flows from 114 cfs up to 260 cfs are flows where a significant improvement is possible. 260 cfs represents the mid-point between the average adult trout optimum (370 cfs) and the average juvenile optimum (150 cfs) for both species at both sites. In summary, for Segments A and B, CPW recommends:

WINTER:

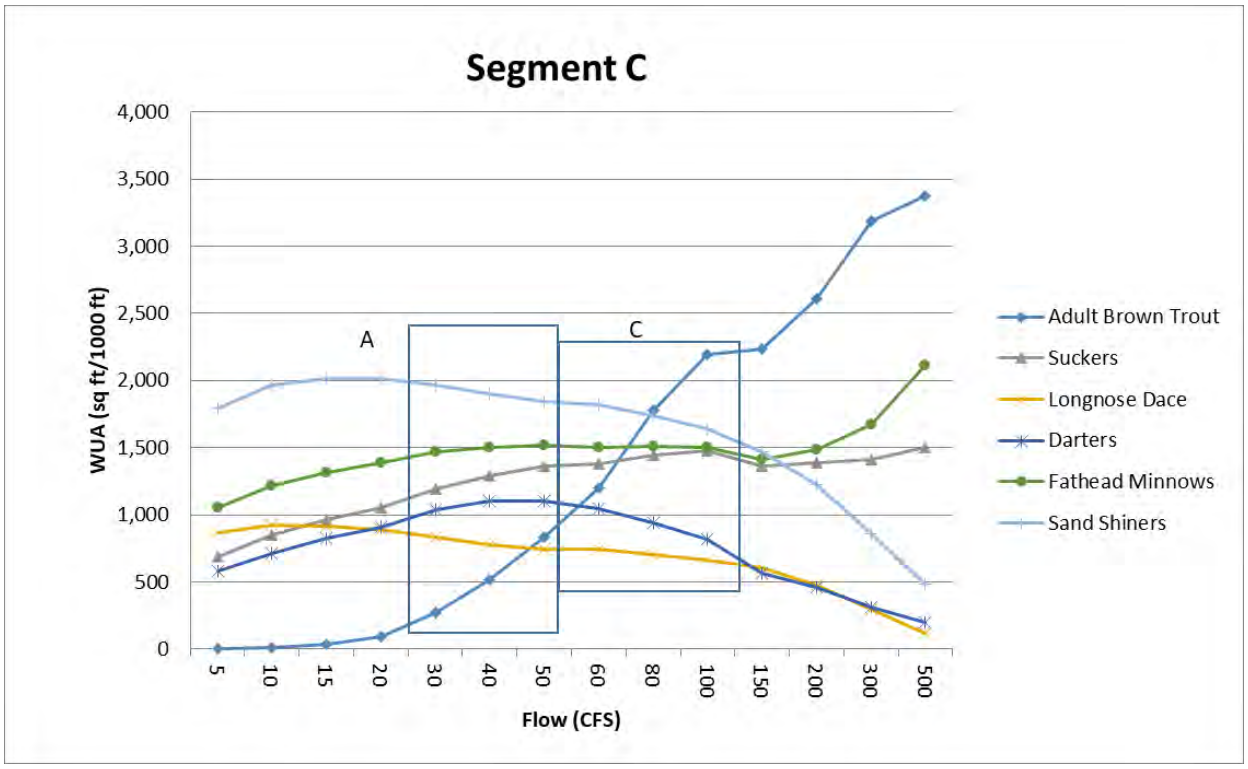
- Flows up to 80 cfs to *preserve* the natural environment
- Flows up to 150 cfs to *improve* the natural environment

SUMMER:

- Flows up to 114 cfs to *preserve* the natural environment
- Flows up to 260 cfs to *improve* the natural environment

Segment C

CPW is of the opinion that Segment C represents the lower limit of cold water (trout) habitat in the Poudre River. The remaining three R2CROSS sites (River Bend Ponds, Cottonwood Hollow, and Poe) are in this segment. The R2CROSS results for these 3 cross sections yield an average winter flow recommendation of 38 cfs and a summer season flow recommendation of 71 cfs. The most likely reason that the R2CROSS flows for Segment C are less than the results for Segments A and B, is that the channel geometry has adjusted to channelization and the altered hydrology that occurs in this section of the Poudre River corridor. The PHABSIM data for Segment C provides additional species and life-stage specific information that is useful for refinement of flow recommendations to preserve and improve the natural environment for this segment. The PHABSIM results for the Archery Range Site (Segment C) are displayed in Figure 7 below.



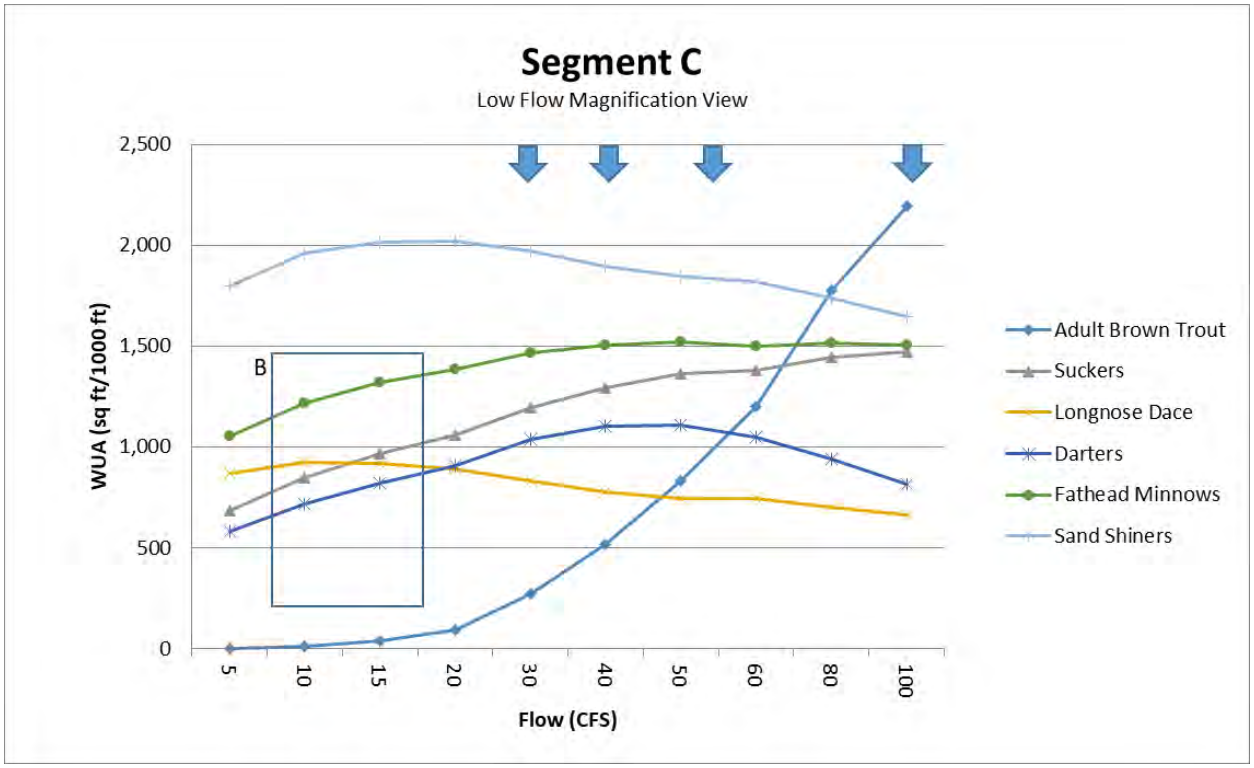


Figure 7. WUA Curves for Segment C (Archery Range Site) Top: Full Flow Range Bottom: Higher Resolution for Low Flow Range (GEI, 2013)

In general, Segment C is more suitable as brown trout habitat due to their tolerance for higher water temperatures (in contrast to rainbow trout); CPW therefore will rely upon the brown trout PHABSIM data for this segment. The WUA curves above show that brown trout adult habitat increases at any level of flow greater than 30 cfs (Box A). Fathead minnow, sand shiner, darter and sucker habitat all approach optimal habitat in the 15 – 40 cfs range; the longnosed dace peak is somewhat lower in the 10 – 15 cfs range (Box B). Taking all species into account in this segment, a winter flow of 30 cfs is protective of all species and is therefore the flow necessary to preserve the natural environment in Segment C. Similarly, during the summer months, a flow of 40 cfs is protective of the fish community and is therefore the amount needed to preserve the natural environment. The flows needed to improve the natural environment are somwhat more complicated and are dependent upon CPW's management objectives for Segment C. In general, flow enhancement up to 54 cfs during any season will result in improvement to the natural environment for most of the fish species present in this segment of the Poudre River with the exception of brown trout; for brown trout adults, the above data shows improving habitat conditions up to a minor plateau on the WUA curve that occurs between approximately 80 and 100 cfs (Box C). Refer to the arrows at 30, 40, 54 and 100 cfs on the WUA curves. CPW's primary focus in Segment C is on native species conservation, therefore flow recommendations are as follows:

WINTER:

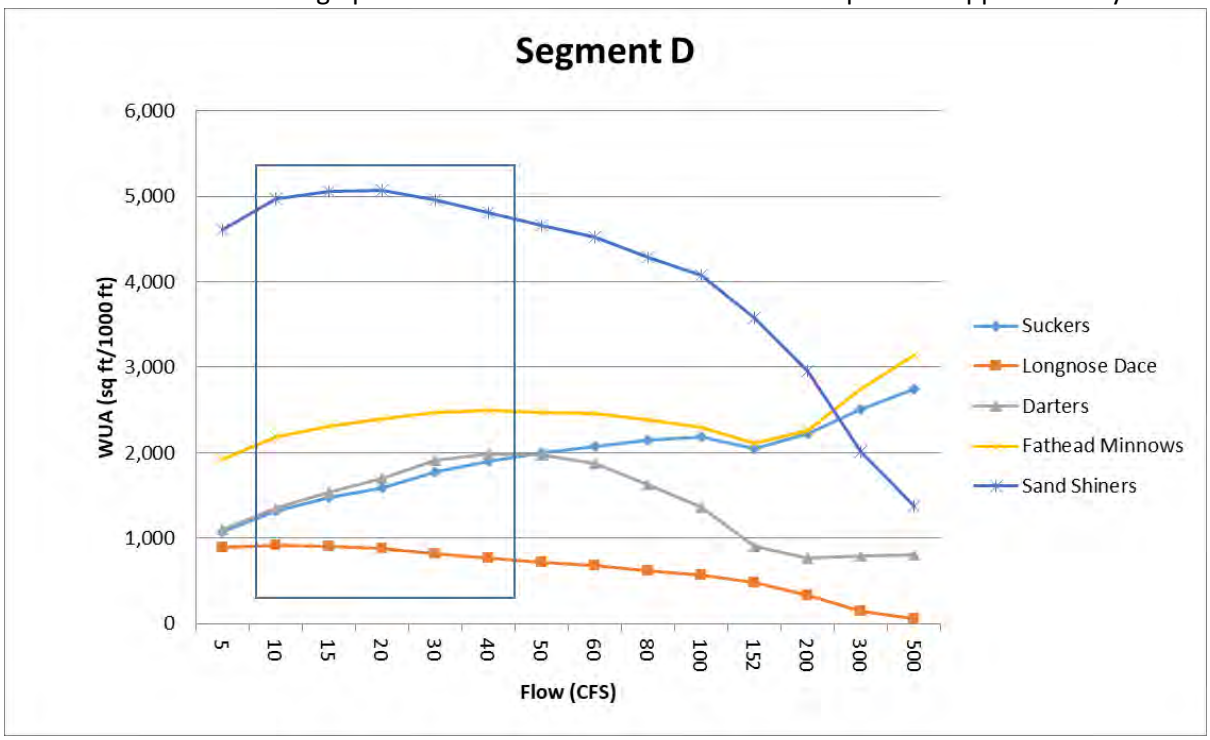
- Flows up to 30 cfs to *preserve* the natural environment
- Flows up to 54 cfs to *improve* the natural environment

SUMMER:

- Flows up to 40 cfs to *preserve* the natural environment
- Flows up to 54 cfs to *improve* the natural environment

Segment D

Segment D's fish community differs significantly from that which exists in all of the upstream segments. The PHABSIM analysis used sand shiners, fathead minnows, longnose dace, suckers and darters as the representative fish species present; trout are no longer part of the overall fishery (although they are occasionally captured in sampling efforts). CPW's management focus in Segment D is for native fish, especially the native darters. All five species that were modeled at Segment D (Eastman near Windsor) exhibit WUA curves (Figure 8, below) that show an adequate level of habitat availability starting at about 10 cfs and increasing up to about 40 cfs. The darter WUA curve peaks at approximately 40 cfs.



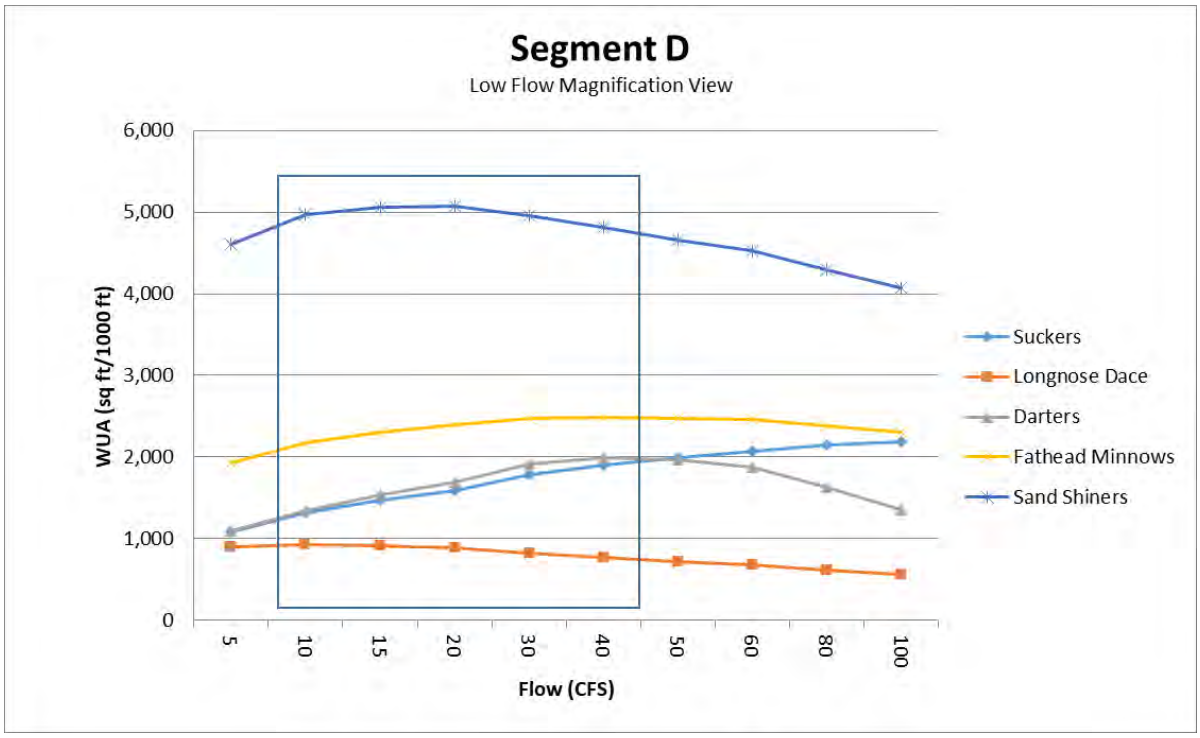


Figure 8. WUA Curves for Segment D (Eastman near Windsor Site) Top: Full Flow Range Bottom: Higher Resolution for Low Flow Range (GEI, 2013)

Since CPW's management target (darters) species' curve peaks at 40 cfs, CPW believes that any flow enhancements up to 40 cfs would result in an *improvement* to the natural environment. In summary, for Segment D, CPW recommends:

- Year-round flows up to 10 cfs to *preserve* the natural environment
- Year-round flows up to 40 cfs to *improve* the natural environment

Segments E and F

Segments E and F were combined due to the uniformity of the existing fish community in this section of the Poudre River and due to the similarities of the PHABSIM results. The WUA curves for Segment E (59th Avenue Site) and F (Bird Farm Site) are nearly identical. Figure 9 and 10 (below) are the PHABSIM results for Segments E and F.

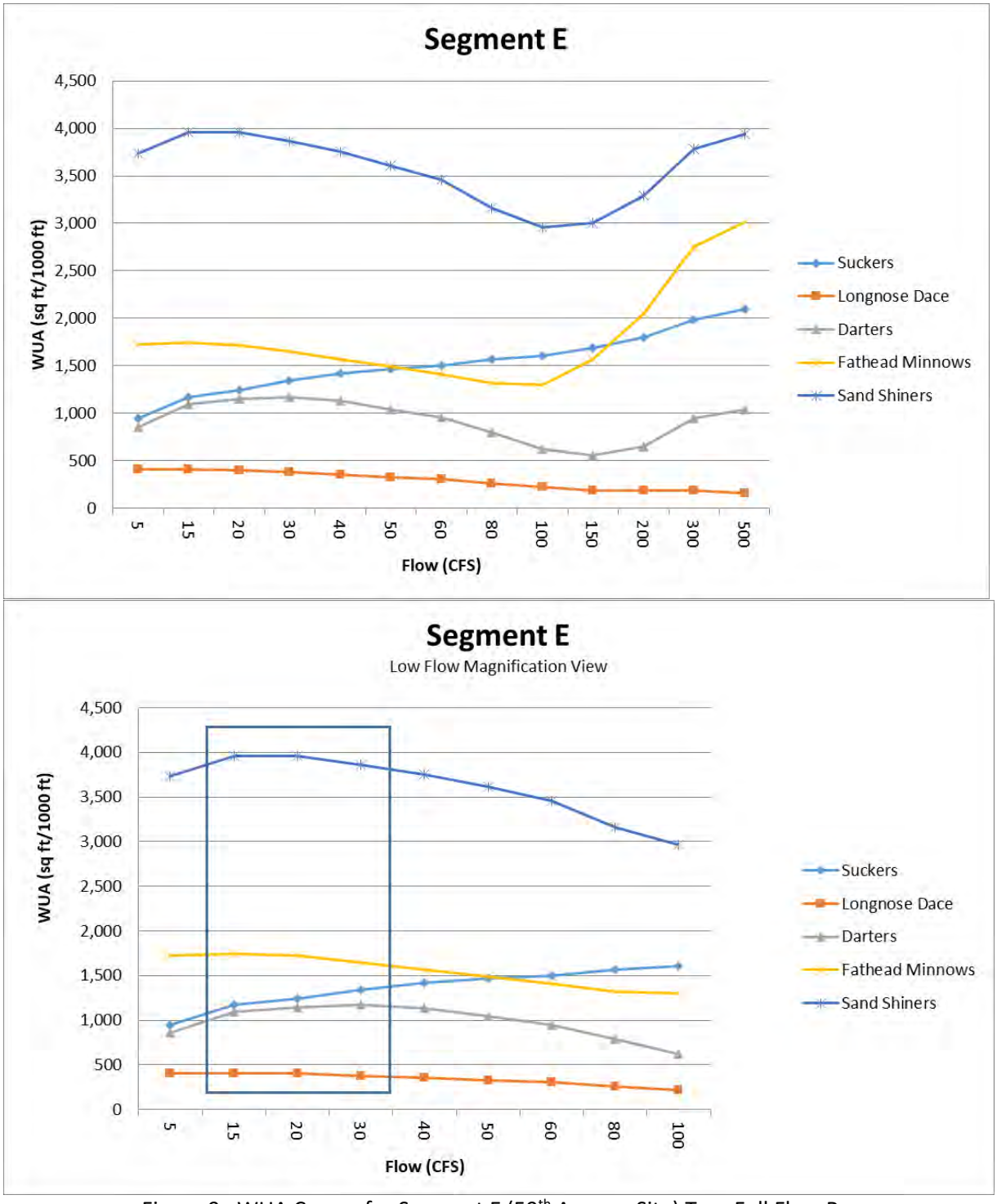


Figure 9. WUA Curves for Segment E (59th Avenue Site) Top: Full Flow Range Bottom: Higher Resolution for Low Flow Range (GEI, 2013)

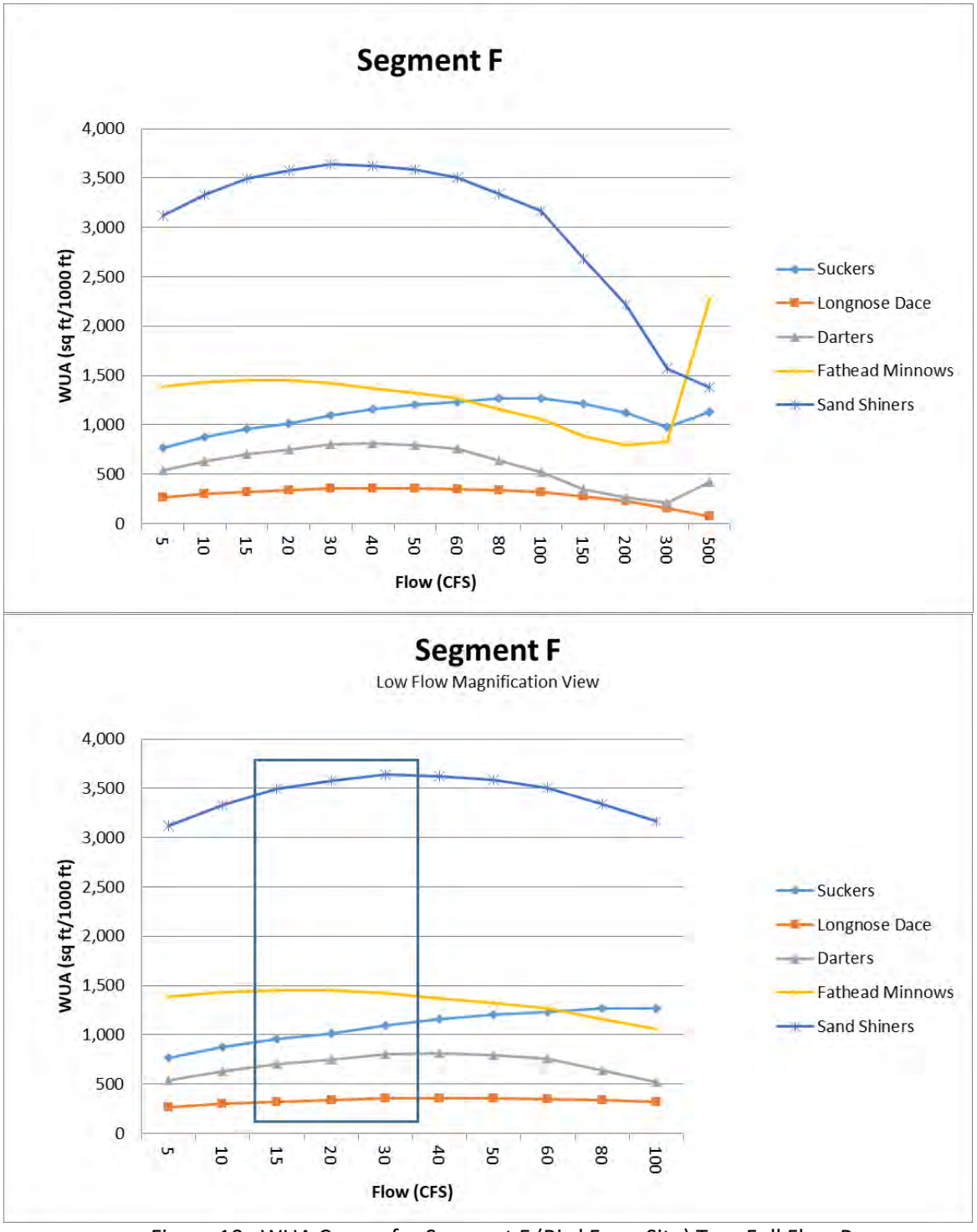


Figure 10. WUA Curves for Segment F (Bird Farm Site) Top: Full Flow Range Bottom: Higher Resolution for Low Flow Range (GEI, 2013)

As stated above, the model results for the five species at these two sites are nearly identical for flows from 0 to 100 cfs; sand shiner habitat is the only exception where the optimum level of habitat for this species occurs at a slightly higher flow in Segment F. 15 cfs provides an adequate level of habitat for all species at both sites (and optimum or near optimum levels of habitat for a few species). In general, slight increases in habitat occur as flows increase from 15 cfs up to 30 cfs. It is important to note that for most of the species modeled at these two PHABSIM sites, flows in excess of 30 cfs result in a reduction in overall habitat. Therefore, CPW recommends:

- Year-round flows up to 15 to *preserve* the natural environment
- Year-round flows up to 30 cfs to *improve* the natural environment

Summary Table of Flow CPW Recommendations

Due to the consolidation of the NISP CTP segments A, B, E and F, the following table has been developed in anticipation of CWCB Board actions and the development of a water court application for the Poudre Flows Project – Analytical Segments A and B; Analytical Segment C; Analytical Segment D; and Analytical Segments E and F. The analytical segment delineation (A through F) should be maintained for future reference to maintain consistency and continuity with the underlying data sources.

Summary of CPW Flow Recommendations				
Analytical Segment(s)	**Winter Season "Preserve" Flow**	**Winter Season "Improve" Flow**	**Summer Season "Preserve" Flow**	**Summer Season "Improve" Flow**
A and B	Up to 80 cfs	80 – 150 cfs	Up to 114 cfs	114 - 260 cfs
C	Up to 30 cfs	30 – 54 cfs	Up to 40 cfs	40 – 54 cfs
D	Up to 10 cfs	10 – 40 cfs	Up to 10 cfs	10 – 40 cfs
E and F	Up to 15 cfs	15 –30 cfs	Up to 15 cfs	15 –30 cfs

The Poudre River from the canyon mouth to the confluence of the South Platte River is considered an important transition zone fishery. Transition zones provide aquatic habitat conditions that support an array of species, including important native species with varying temperature and habitat preferences that can be unique to transition zones. Conditions within transition zones are not static and may shift seasonally or from year-to-year. The flow recommendations summarized in this report are based on physical habitat, but do not include habitat assessments for all native species and no direct temperature considerations were made. Future investigations to the relationship between habitat, flow, and thermal regime may be incorporated into CPW's preferred flow targets to ensure favorable habitat and thermal conditions for native warm-water species using the transition zone.

APPENDIX A

R2CROSS Staging Tables

STREAM NAME: Poudre
XS LOCATION: Lyons
XS NUMBER: 0

Constant Manning's n

STAGING TABLE

GL = lowest Grassline elevation corrected for sag
WL = Waterline corrected for variations in field measured water surface elevations and sag

	DIST TO WATER (FT)	TOP WIDTH (FT)	AVG. DEPTH (FT)	MAX. DEPTH (FT)	AREA (SQ FT)	WETTED PERIM. (FT)	PERCENT WET PERIM (%)	HYDR RADIUS (FT)	FLOW (CFS)	AVG. VELOCITY (FT/SEC)
GL	5.40	106.27	2.65	4.00	281.94	107.34	100.0%	2.63	1099.48	3.90
	5.40	98.87	1.82	3.00	179.62	99.66	92.8%	1.80	544.91	3.03
	5.45	98.44	1.77	2.95	174.69	99.22	92.4%	1.76	521.74	2.99
	5.50	98.01	1.73	2.90	169.77	98.78	92.0%	1.72	499.00	2.94
	5.55	97.58	1.69	2.85	164.88	98.34	91.6%	1.68	476.70	2.89
	5.60	97.15	1.65	2.80	160.02	97.90	91.2%	1.63	454.84	2.84
	5.65	96.72	1.60	2.75	155.17	97.45	90.8%	1.59	433.42	2.79
	5.70	96.29	1.56	2.70	150.35	97.01	90.4%	1.55	412.44	2.74
	5.75	95.86	1.52	2.65	145.54	96.57	90.0%	1.51	391.90	2.69
	5.80	95.54	1.47	2.60	140.76	96.24	89.7%	1.46	371.51	2.64
	5.85	95.23	1.43	2.55	135.99	95.91	89.4%	1.42	351.56	2.59
	5.90	94.92	1.38	2.50	131.23	95.59	89.0%	1.37	332.07	2.53
	5.95	94.61	1.34	2.45	126.50	95.26	88.7%	1.33	313.04	2.47
	6.00	94.30	1.29	2.40	121.77	94.94	88.4%	1.28	294.47	2.42
	6.05	94.00	1.25	2.35	117.07	94.61	88.1%	1.24	276.38	2.36
	6.10	93.69	1.20	2.30	112.37	94.29	87.8%	1.19	258.76	2.30
	6.15	93.38	1.15	2.25	107.70	93.96	87.5%	1.15	241.61	2.24
	6.20	93.07	1.11	2.20	103.04	93.64	87.2%	1.10	224.96	2.18
	6.25	92.59	1.06	2.15	98.39	93.14	86.8%	1.06	209.05	2.12
	6.30	91.97	1.02	2.10	93.78	92.51	86.2%	1.01	193.85	2.07
	6.35	91.34	0.98	2.05	89.20	91.87	85.6%	0.97	179.15	2.01
WL	6.40	86.97	0.97	2.00	84.73	87.49	81.5%	0.97	169.90	2.01
	6.45	82.34	0.98	1.95	80.50	82.85	77.2%	0.97	161.76	2.01
	6.50	80.99	0.94	1.90	76.42	81.48	75.9%	0.94	149.99	1.96
	6.55	79.67	0.91	1.85	72.40	80.35	74.9%	0.90	138.35	1.91
	6.60	78.74	0.87	1.80	68.43	79.21	73.8%	0.86	127.16	1.86
	6.65	77.61	0.83	1.75	64.53	78.07	72.7%	0.83	116.40	1.80
	6.70	76.02	0.80	1.70	60.68	76.47	71.2%	0.79	106.55	1.76
	6.75	74.39	0.77	1.65	56.92	74.83	69.7%	0.76	97.17	1.71
	6.80	73.70	0.72	1.60	53.22	74.13	69.1%	0.72	87.42	1.64
	6.85	73.07	0.68	1.55	49.55	73.49	68.5%	0.67	78.05	1.58
	6.90	72.44	0.63	1.50	45.92	72.85	67.9%	0.63	69.14	1.51
	6.95	66.44	0.64	1.45	42.50	66.82	62.2%	0.64	64.40	1.52
	7.00	63.26	0.62	1.40	39.26	63.62	59.3%	0.62	58.30	1.48
	7.05	60.08	0.60	1.35	36.18	60.42	56.3%	0.60	52.65	1.46
	7.10	54.80	0.61	1.30	33.30	55.12	51.4%	0.60	48.75	1.46
	7.15	52.88	0.58	1.25	30.62	53.18	49.5%	0.58	43.40	1.42
	7.20	51.20	0.55	1.20	28.01	51.49	48.0%	0.54	38.25	1.37
	7.25	49.68	0.51	1.15	25.49	49.95	46.5%	0.51	33.35	1.31
	7.30	47.94	0.48	1.10	23.05	48.18	44.9%	0.48	28.88	1.25
	7.35	46.18	0.45	1.05	20.70	46.41	43.2%	0.45	24.75	1.20
	7.40	42.08	0.44	1.00	18.49	42.29	39.4%	0.44	21.81	1.18
	7.45	39.04	0.42	0.95	16.46	39.23	36.5%	0.42	18.90	1.15
	7.50	37.08	0.39	0.90	14.56	37.25	34.7%	0.39	15.95	1.10
	7.55	33.32	0.38	0.85	12.80	33.48	31.2%	0.38	13.81	1.08
	7.60	31.88	0.35	0.80	11.17	32.02	29.8%	0.35	11.34	1.02
	7.65	30.62	0.31	0.75	9.61	30.74	28.6%	0.31	9.07	0.94
	7.70	22.77	0.36	0.70	8.26	22.88	21.3%	0.36	8.58	1.04
	7.75	20.08	0.36	0.65	7.20	20.18	18.8%	0.36	7.42	1.03
	7.80	17.78	0.35	0.60	6.26	17.86	16.6%	0.35	6.37	1.02
	7.85	16.81	0.32	0.55	5.39	16.89	15.7%	0.32	5.16	0.96
	7.90	15.93	0.29	0.50	4.57	16.01	14.9%	0.29	4.08	0.89
	7.95	11.98	0.32	0.45	3.87	12.04	11.2%	0.32	3.72	0.96
	8.00	11.07	0.30	0.40	3.30	11.13	10.4%	0.30	3.01	0.91
	8.05	10.39	0.27	0.35	2.76	10.44	9.7%	0.26	2.33	0.84
	8.10	9.72	0.23	0.30	2.26	9.76	9.1%	0.23	1.75	0.77
	8.15	9.04	0.20	0.25	1.79	9.08	8.5%	0.20	1.24	0.69

STREAM NAME: Poudre
XS LOCATION: Sheilds
XS NUMBER: 0

Constant Manning's n

STAGING TABLE

"GL" = lowest Grassline elevation corrected for sag
"WL" = Waterline corrected for variations in field measured water surface elevations and sag

	DIST TO WATER (FT)	TOP WIDTH (FT)	AVG. DEPTH (FT)	MAX. DEPTH (FT)	AREA (SQ FT)	WETTED PERIM. (FT)	PERCENT WET PERIM (%)	HYDR RADIUS (FT)	FLOW (CFS)	AVG. VELOCITY (FT/SEC)
"GL"	3.30	77.99	2.44	3.90	190.05	79.17	100.0%	2.40	876.80	4.61
	4.28	72.40	1.61	2.92	116.52	73.12	92.4%	1.59	408.02	3.51
	4.33	71.73	1.57	2.87	112.91	72.44	91.5%	1.56	390.61	3.46
	4.38	71.06	1.54	2.82	109.34	71.75	90.6%	1.52	372.60	3.41
	4.43	70.39	1.50	2.77	105.81	71.06	89.8%	1.49	355.00	3.36
	4.48	69.73	1.47	2.72	102.30	70.38	88.9%	1.45	337.80	3.30
	4.53	69.06	1.43	2.67	98.84	69.69	88.0%	1.42	321.02	3.25
	4.58	68.18	1.40	2.62	95.40	68.80	86.9%	1.39	305.25	3.20
	4.63	67.17	1.37	2.57	92.02	67.79	85.6%	1.36	290.28	3.15
	4.68	66.16	1.34	2.52	88.69	66.77	84.3%	1.33	275.73	3.11
	4.73	65.15	1.31	2.47	85.40	65.76	83.1%	1.30	261.59	3.06
	4.78	64.06	1.28	2.42	82.17	64.67	81.7%	1.27	248.05	3.02
	4.83	62.94	1.26	2.37	79.00	63.54	80.3%	1.24	235.03	2.98
	4.88	61.81	1.23	2.32	75.88	62.40	78.8%	1.22	222.42	2.93
	4.93	60.68	1.20	2.27	72.82	61.27	77.4%	1.19	210.21	2.89
	4.98	59.56	1.17	2.22	69.81	60.14	76.0%	1.16	198.40	2.84
	5.03	58.00	1.15	2.17	66.87	58.58	74.0%	1.14	187.91	2.81
	5.08	56.18	1.14	2.12	64.01	56.76	71.7%	1.13	178.47	2.79
	5.13	54.35	1.13	2.07	61.25	54.93	69.4%	1.12	169.47	2.77
	5.18	52.53	1.12	2.02	58.58	53.10	67.1%	1.10	160.92	2.75
	5.23	51.05	1.10	1.97	55.99	51.61	65.2%	1.08	152.10	2.72
"WL"	5.28	50.62	1.06	1.92	53.45	51.17	64.6%	1.04	141.58	2.65
	5.33	50.18	1.01	1.87	50.93	50.72	64.1%	1.00	131.39	2.58
	5.38	49.75	0.97	1.82	48.43	50.28	63.5%	0.96	121.54	2.51
	5.43	49.40	0.93	1.77	45.95	49.91	63.0%	0.92	111.90	2.44
	5.48	49.10	0.89	1.72	43.49	49.59	62.6%	0.88	102.52	2.36
	5.53	48.79	0.84	1.67	41.04	49.27	62.2%	0.83	93.49	2.28
	5.58	48.49	0.80	1.62	38.61	48.95	61.8%	0.79	84.81	2.20
	5.63	48.18	0.75	1.57	36.19	48.63	61.4%	0.74	76.48	2.11
	5.68	47.88	0.71	1.52	33.79	48.31	61.0%	0.70	68.51	2.03
	5.73	47.58	0.66	1.47	31.40	47.99	60.6%	0.65	60.91	1.94
	5.78	47.27	0.61	1.42	29.03	47.67	60.2%	0.61	53.68	1.85
	5.83	46.97	0.57	1.37	26.68	47.35	59.8%	0.56	46.83	1.76
	5.88	44.22	0.55	1.32	24.37	44.58	56.3%	0.55	41.94	1.72
	5.93	38.38	0.58	1.27	22.29	38.72	48.9%	0.58	39.70	1.78
	5.98	35.36	0.58	1.22	20.49	35.69	45.1%	0.57	36.41	1.78
	6.03	34.74	0.54	1.17	18.73	35.05	44.3%	0.53	31.75	1.69
	6.08	34.06	0.50	1.12	17.01	34.36	43.4%	0.50	27.40	1.61
	6.13	32.91	0.47	1.07	15.34	33.20	41.9%	0.46	23.58	1.54
	6.18	31.49	0.44	1.02	13.73	31.76	40.1%	0.43	20.19	1.47
	6.23	30.06	0.41	0.97	12.19	30.32	38.3%	0.40	17.08	1.40
	6.28	26.74	0.40	0.92	10.78	26.98	34.1%	0.40	15.04	1.40
	6.33	25.49	0.37	0.87	9.47	25.71	32.5%	0.37	12.53	1.32
	6.38	24.23	0.34	0.82	8.23	24.43	30.9%	0.34	10.25	1.25
	6.43	22.77	0.31	0.77	7.05	22.96	29.0%	0.31	8.26	1.17
	6.48	21.08	0.28	0.72	5.96	21.25	26.8%	0.28	6.56	1.10
	6.53	18.85	0.26	0.67	4.95	19.00	24.0%	0.26	5.20	1.05
	6.58	16.11	0.25	0.62	4.08	16.26	20.5%	0.25	4.17	1.02
	6.63	14.08	0.24	0.57	3.33	14.22	18.0%	0.23	3.26	0.98
	6.68	12.57	0.21	0.52	2.66	12.70	16.0%	0.21	2.42	0.91
	6.73	11.06	0.19	0.47	2.07	11.17	14.1%	0.19	1.74	0.84
	6.78	9.54	0.16	0.42	1.56	9.64	12.2%	0.16	1.19	0.76
	6.83	8.03	0.14	0.37	1.12	8.11	10.2%	0.14	0.77	0.69
	6.88	6.21	0.12	0.32	0.76	6.27	7.9%	0.12	0.48	0.63
	6.93	4.19	0.12	0.27	0.50	4.24	5.4%	0.12	0.31	0.62
	6.98	2.99	0.11	0.22	0.33	3.03	3.8%	0.11	0.19	0.58
	7.03	2.31	0.08	0.17	0.20	2.34	3.0%	0.08	0.10	0.49

STREAM NAME: Poudre
XS LOCATION: Linden
XS NUMBER: 0

Constant Manning's n

GL = lowest Grassline elevation corrected for sag
WL = Waterline corrected for variations in field measured water surface elevations and sag

STAGING TABLE

	DIST TO WATER (FT)	TOP WIDTH (FT)	AVG. DEPTH (FT)	MAX. DEPTH (FT)	AREA (SQ FT)	WETTED PERIM. (FT)	PERCENT WET PERIM (%)	HYDR RADIUS (FT)	FLOW (CFS)	AVG. VELOCITY (FT/SEC)
GL	2.50	78.03	3.57	4.45	278.47	80.23	100.0%	3.47	1854.33	6.66
	4.87	65.98	1.62	2.09	107.07	67.02	83.5%	1.60	425.05	3.97
	4.92	65.74	1.58	2.04	103.78	66.75	83.2%	1.55	404.57	3.90
	4.97	65.61	1.53	1.99	100.50	66.58	83.0%	1.51	384.11	3.82
	5.02	65.48	1.48	1.94	97.22	66.41	82.8%	1.46	364.07	3.74
	5.07	65.35	1.44	1.89	93.95	66.25	82.6%	1.42	344.47	3.67
	5.12	65.22	1.39	1.84	90.69	66.08	82.4%	1.37	325.30	3.59
	5.17	65.08	1.34	1.79	87.43	65.91	82.2%	1.33	306.58	3.51
	5.22	64.95	1.30	1.74	84.18	65.74	81.9%	1.28	288.30	3.42
	5.27	64.82	1.25	1.69	80.93	65.58	81.7%	1.23	270.48	3.34
	5.32	64.69	1.20	1.64	77.70	65.41	81.5%	1.19	253.12	3.26
	5.37	64.56	1.15	1.59	74.46	65.24	81.3%	1.14	236.22	3.17
	5.42	64.43	1.11	1.54	71.24	65.07	81.1%	1.09	219.80	3.09
	5.47	64.29	1.06	1.49	68.02	64.91	80.9%	1.05	203.85	3.00
	5.52	64.16	1.01	1.44	64.81	64.74	80.7%	1.00	188.39	2.91
	5.57	64.03	0.96	1.39	61.61	64.57	80.5%	0.95	173.42	2.81
	5.62	63.90	0.91	1.34	58.41	64.40	80.3%	0.91	158.95	2.72
	5.67	63.77	0.87	1.29	55.22	64.24	80.1%	0.86	144.99	2.63
	5.72	63.16	0.82	1.24	52.04	63.60	79.3%	0.82	132.22	2.54
	5.77	62.07	0.79	1.19	48.91	62.50	77.9%	0.78	120.62	2.47
	5.82	61.21	0.75	1.14	45.83	61.62	76.8%	0.74	109.26	2.38
WL	5.87	60.89	0.70	1.09	42.77	61.29	76.4%	0.70	97.76	2.29
	5.92	60.57	0.66	1.04	39.74	60.95	76.0%	0.65	86.79	2.18
	5.97	60.26	0.61	0.99	36.72	60.61	75.6%	0.61	76.35	2.08
	6.02	59.94	0.56	0.94	33.71	60.27	75.1%	0.56	66.47	1.97
	6.07	59.62	0.52	0.89	30.72	59.94	74.7%	0.51	57.16	1.86
	6.12	59.30	0.47	0.84	27.75	59.60	74.3%	0.47	48.42	1.74
	6.17	58.98	0.42	0.79	24.79	59.26	73.9%	0.42	40.28	1.62
	6.22	57.97	0.38	0.74	21.86	58.23	72.6%	0.38	33.04	1.51
	6.27	55.35	0.34	0.69	19.02	55.58	69.3%	0.34	27.04	1.42
	6.32	52.73	0.31	0.64	16.32	52.94	66.0%	0.31	21.64	1.33
	6.37	46.52	0.30	0.59	13.80	46.69	58.2%	0.30	17.79	1.29
	6.42	42.35	0.27	0.54	11.59	42.49	53.0%	0.27	14.15	1.22
	6.47	39.17	0.24	0.49	9.55	39.28	49.0%	0.24	10.80	1.13
	6.52	36.37	0.21	0.44	7.67	36.47	45.5%	0.21	7.88	1.03
	6.57	34.38	0.17	0.39	5.89	34.46	43.0%	0.17	5.28	0.90
	6.62	31.54	0.13	0.34	4.24	31.60	39.4%	0.13	3.23	0.76
	6.67	26.62	0.10	0.29	2.77	26.67	33.2%	0.10	1.77	0.64
	6.72	16.54	0.10	0.24	1.66	16.58	20.7%	0.10	1.04	0.63
	6.77	11.53	0.09	0.19	0.98	11.56	14.4%	0.09	0.55	0.56
	6.82	8.55	0.05	0.14	0.47	8.57	10.7%	0.05	0.20	0.42
	6.87	4.23	0.04	0.09	0.16	4.23	5.3%	0.04	0.05	0.32
	6.92	1.35	0.02	0.04	0.02	1.35	1.7%	0.02	0.00	0.20

STREAM NAME: Poudre
XS LOCATION: River Bed Ponds (RBP)
XS NUMBER: 0

Constant Manning's n

STAGING TABLE

"GL" = lowest Grassline elevation corrected for sag
"WL" = Waterline corrected for variations in field measured water surface elevations and sag

	DIST TO WATER (FT)	TOP WIDTH (FT)	AVG. DEPTH (FT)	MAX. DEPTH (FT)	AREA (SQ FT)	WETTED PERIM (FT)	PERCENT WET PERIM (%)	HYDR RADIUS (FT)	FLOW (CFS)	AVG. VELOCITY (FT/SEC)
"GL"	3.90	70.55	2.61	3.75	184.30	72.16	94.3%	2.55	680.14	3.69
	4.99	64.72	1.71	2.66	110.62	65.80	91.2%	1.68	308.91	2.79
	5.04	64.33	1.67	2.61	107.40	65.39	90.6%	1.64	295.29	2.75
	5.09	63.93	1.63	2.56	104.19	64.97	90.0%	1.60	281.94	2.71
	5.14	63.54	1.59	2.51	101.00	64.56	89.5%	1.56	268.86	2.66
	5.19	63.15	1.55	2.46	97.84	64.14	88.9%	1.53	256.06	2.62
	5.24	62.75	1.51	2.41	94.69	63.72	88.3%	1.49	243.53	2.57
	5.29	62.36	1.47	2.36	91.56	63.31	87.7%	1.45	231.28	2.53
	5.34	61.97	1.43	2.31	88.45	62.89	87.2%	1.41	219.30	2.48
	5.39	61.57	1.39	2.26	85.37	62.48	86.6%	1.37	207.61	2.43
	5.44	61.18	1.35	2.21	82.30	62.06	86.0%	1.33	196.19	2.38
	5.49	60.78	1.30	2.16	79.25	61.64	85.4%	1.29	185.05	2.34
	5.54	60.39	1.26	2.11	76.22	61.23	84.9%	1.24	174.20	2.29
	5.59	59.36	1.23	2.06	73.22	60.18	83.4%	1.22	164.81	2.25
	5.64	58.14	1.21	2.01	70.28	58.95	81.7%	1.19	156.08	2.22
	5.69	56.92	1.18	1.96	67.41	57.71	80.0%	1.17	147.65	2.19
	5.74	55.71	1.16	1.91	64.59	56.48	78.3%	1.14	139.51	2.16
	5.79	54.49	1.13	1.86	61.84	55.25	76.6%	1.12	131.66	2.13
	5.84	53.27	1.11	1.81	59.14	54.01	74.9%	1.09	124.09	2.10
	5.89	52.05	1.09	1.76	56.51	52.78	73.1%	1.07	116.81	2.07
	5.94	50.84	1.06	1.71	53.94	51.56	71.4%	1.05	109.78	2.04
"WL"	5.99	50.41	1.02	1.66	51.41	51.09	70.8%	1.01	101.96	1.98
	6.04	50.19	0.97	1.61	48.89	50.85	70.5%	0.96	94.08	1.92
	6.09	49.98	0.93	1.56	46.39	50.61	70.1%	0.92	86.46	1.86
	6.14	49.77	0.88	1.51	43.90	50.36	69.8%	0.87	79.11	1.80
	6.19	49.55	0.84	1.46	41.41	50.12	69.5%	0.83	72.02	1.74
	6.24	49.34	0.79	1.41	38.94	49.88	69.1%	0.78	65.21	1.67
	6.29	49.13	0.74	1.36	36.48	49.64	68.8%	0.73	58.68	1.61
	6.34	48.91	0.70	1.31	34.03	49.39	68.5%	0.69	52.42	1.54
	6.39	48.70	0.65	1.26	31.59	49.15	68.1%	0.64	46.46	1.47
	6.44	48.10	0.61	1.21	29.17	48.53	67.3%	0.60	41.02	1.41
	6.49	47.39	0.57	1.16	26.78	47.79	66.2%	0.56	35.95	1.34
	6.54	46.68	0.52	1.11	24.43	47.06	65.2%	0.52	31.16	1.28
	6.59	44.81	0.49	1.06	22.13	45.16	62.6%	0.49	27.17	1.23
	6.64	42.59	0.47	1.01	19.95	42.92	59.5%	0.46	23.64	1.19
	6.69	40.38	0.44	0.96	17.87	40.68	56.4%	0.44	20.40	1.14
	6.74	38.30	0.42	0.91	15.91	38.57	53.4%	0.41	17.41	1.09
	6.79	36.25	0.39	0.86	14.04	36.49	50.6%	0.38	14.67	1.04
	6.84	34.20	0.36	0.81	12.28	34.42	47.7%	0.36	12.20	0.99
	6.89	32.54	0.33	0.76	10.62	32.73	45.4%	0.32	9.90	0.93
	6.94	30.87	0.29	0.71	9.03	31.02	43.0%	0.29	7.83	0.87
	6.99	28.41	0.27	0.66	7.54	28.53	39.5%	0.26	6.14	0.81
	7.04	25.73	0.24	0.61	6.19	25.82	35.8%	0.24	4.72	0.76
	7.09	18.87	0.27	0.56	5.09	18.92	26.2%	0.27	4.19	0.82
	7.14	14.98	0.29	0.51	4.29	15.03	20.8%	0.29	3.68	0.86
	7.19	14.18	0.25	0.46	3.56	14.22	19.7%	0.25	2.80	0.78
	7.24	12.92	0.22	0.41	2.88	12.96	18.0%	0.22	2.09	0.73
	7.29	11.52	0.20	0.36	2.27	11.55	16.0%	0.20	1.52	0.67
	7.34	10.38	0.17	0.31	1.72	10.40	14.4%	0.17	1.03	0.60
	7.39	9.31	0.13	0.26	1.23	9.33	12.9%	0.13	0.63	0.51
	7.44	8.25	0.10	0.21	0.79	8.26	11.4%	0.10	0.33	0.41
	7.49	6.08	0.07	0.16	0.43	6.09	8.4%	0.07	0.14	0.34
	7.54	3.58	0.05	0.11	0.19	3.58	5.0%	0.05	0.05	0.28
	7.59	1.85	0.03	0.06	0.06	1.85	2.6%	0.03	0.01	0.19
	7.64	0.35	0.01	0.01	0.00	0.35	0.5%	0.01	0.00	0.06

STREAM NAME: Poudre
XS LOCATION: Cottonwood Hollow
XS NUMBER: 0

Constant Manning's n

STAGING TABLE

GL = lowest Grassline elevation corrected for sag
WL = Waterline corrected for variations in field measured water surface elevations and sag

	DIST TO WATER (FT)	TOP WIDTH (FT)	AVG. DEPTH (FT)	MAX. DEPTH (FT)	AREA (SQ FT)	WETTED PERIM (FT)	PERCENT WET PERIM (%)	HYDR RADIUS (FT)	FLOW (CFS)	AVG. VELOCITY (FT/SEC)
GL	5.90	60.08	3.16	4.60	190.15	63.46	100.0%	3.00	1353.31	7.12
	8.55	43.05	1.46	1.95	62.67	43.78	69.0%	1.43	272.55	4.35
	8.60	42.83	1.41	1.90	60.52	43.54	68.6%	1.39	258.11	4.27
	8.65	42.61	1.37	1.85	58.38	43.29	68.2%	1.35	244.02	4.18
	8.70	42.39	1.33	1.80	56.26	43.05	67.8%	1.31	230.26	4.09
	8.75	42.17	1.28	1.75	54.14	42.81	67.5%	1.26	216.84	4.00
	8.80	41.95	1.24	1.70	52.04	42.56	67.1%	1.22	203.76	3.92
	8.85	41.72	1.20	1.65	49.95	42.32	66.7%	1.18	191.02	3.82
	8.90	41.47	1.15	1.60	47.87	42.05	66.3%	1.14	178.71	3.73
	8.95	41.22	1.11	1.55	45.80	41.78	65.8%	1.10	166.75	3.64
	9.00	40.97	1.07	1.50	43.75	41.51	65.4%	1.05	155.14	3.55
	9.05	40.71	1.02	1.45	41.71	41.23	65.0%	1.01	143.89	3.45
	9.10	40.46	0.98	1.40	39.68	40.96	64.5%	0.97	133.00	3.35
	9.15	40.21	0.94	1.35	37.66	40.69	64.1%	0.93	122.47	3.25
	9.20	39.96	0.89	1.30	35.66	40.42	63.7%	0.88	112.30	3.15
	9.25	39.66	0.85	1.25	33.66	40.11	63.2%	0.84	102.57	3.05
	9.30	39.31	0.81	1.20	31.69	39.75	62.6%	0.80	93.30	2.94
	9.35	38.97	0.76	1.15	29.73	39.38	62.1%	0.75	84.41	2.84
	9.40	38.62	0.72	1.10	27.79	39.02	61.5%	0.71	75.90	2.73
	9.45	38.11	0.68	1.05	25.87	38.50	60.7%	0.67	67.98	2.63
	9.50	37.53	0.64	1.00	23.98	37.92	59.7%	0.63	60.51	2.52
WL	9.55	37.04	0.60	0.95	22.12	37.40	58.9%	0.59	53.37	2.41
	9.60	36.57	0.55	0.90	20.28	36.91	58.2%	0.55	46.58	2.30
	9.65	36.10	0.51	0.85	18.46	36.42	57.4%	0.51	40.19	2.18
	9.70	35.63	0.47	0.80	16.67	35.93	56.6%	0.46	34.21	2.05
	9.75	35.16	0.42	0.75	14.90	35.44	55.8%	0.42	28.64	1.92
	9.80	33.60	0.39	0.70	13.18	33.86	53.4%	0.39	24.06	1.83
	9.85	31.42	0.37	0.65	11.55	31.65	49.9%	0.37	20.20	1.75
	9.90	29.19	0.34	0.60	10.04	29.40	46.3%	0.34	16.79	1.67
	9.95	28.52	0.30	0.55	8.60	28.70	45.2%	0.30	13.18	1.53
	10.00	25.49	0.29	0.50	7.29	25.66	40.4%	0.28	10.79	1.48
	10.05	24.43	0.25	0.45	6.04	24.58	38.7%	0.25	8.12	1.34
	10.10	22.44	0.22	0.40	4.87	22.57	35.6%	0.22	5.99	1.23
	10.15	21.76	0.17	0.35	3.76	21.88	34.5%	0.17	3.99	1.06
	10.20	19.87	0.14	0.30	2.73	19.75	31.1%	0.14	2.49	0.91
	10.25	17.45	0.10	0.25	1.80	17.50	27.6%	0.10	1.35	0.75
	10.30	12.74	0.08	0.20	1.04	12.78	20.1%	0.08	0.67	0.64
	10.35	6.93	0.09	0.15	0.59	6.94	10.9%	0.09	0.39	0.66
	10.40	5.43	0.05	0.10	0.29	5.43	8.6%	0.05	0.14	0.48
	10.45	2.86	0.03	0.05	0.08	2.86	4.5%	0.03	0.02	0.31
	10.50	0.19	0.00	0.00	0.00	0.19	0.3%	0.00	0.00	0.05

STREAM NAME: Poudre
XS LOCATION: Poe
XS NUMBER: 0

Constant Manning's n

GL = lowest Grassline elevation corrected for sag
WL = Waterline corrected for variations in field measured water surface elevations and sag

STAGING TABLE

	DIST TO WATER (FT)	TOP WIDTH (FT)	AVG. DEPTH (FT)	MAX. DEPTH (FT)	AREA (SQ FT)	WETTED PERIM. (FT)	PERCENT WET PERIM (%)	HYDR RADIUS (FT)	FLOW (CFS)	AVG. VELOCITY (FT/SEC)
GL	5.95	67.00	1.21	1.65	81.03	67.47	100.0%	1.20	200.68	2.48
	6.00	66.38	1.18	1.61	78.02	66.83	99.1%	1.17	189.63	2.43
	6.05	65.70	1.14	1.56	74.72	66.13	98.0%	1.13	177.70	2.38
	6.10	65.01	1.10	1.51	71.45	65.42	97.0%	1.09	166.12	2.32
	6.15	64.32	1.06	1.46	68.22	64.71	95.9%	1.05	154.90	2.27
	6.20	63.64	1.02	1.41	65.02	64.01	94.9%	1.02	144.03	2.22
	6.25	62.95	0.98	1.36	61.86	63.30	93.8%	0.98	133.52	2.16
	6.30	62.26	0.94	1.31	58.73	62.60	92.8%	0.94	123.37	2.10
	6.35	61.58	0.90	1.26	55.63	61.89	91.7%	0.90	113.58	2.04
	6.40	60.89	0.86	1.21	52.57	61.18	90.7%	0.86	104.15	1.98
	6.45	60.20	0.82	1.16	49.54	60.48	89.6%	0.82	95.08	1.92
	6.50	59.52	0.78	1.11	46.55	59.77	88.6%	0.78	86.37	1.86
WL	6.55	58.83	0.74	1.06	43.59	59.06	87.5%	0.74	78.03	1.79
	6.60	58.14	0.70	1.01	40.67	58.36	86.5%	0.70	70.06	1.72
	6.65	57.40	0.66	0.96	37.78	57.60	85.4%	0.66	62.51	1.65
	6.70	56.65	0.62	0.91	34.93	56.84	84.2%	0.61	55.33	1.58
	6.75	55.90	0.57	0.86	32.11	56.08	83.1%	0.57	48.54	1.51
	6.80	55.19	0.53	0.81	29.34	55.36	82.0%	0.53	42.11	1.44
	6.85	54.74	0.49	0.76	26.59	54.90	81.4%	0.48	35.94	1.35
	6.90	54.29	0.44	0.71	23.86	54.43	80.7%	0.44	30.16	1.26
	6.95	53.83	0.39	0.66	21.16	53.97	80.0%	0.39	24.84	1.17
	7.00	53.38	0.35	0.61	18.48	53.50	79.3%	0.35	19.94	1.08
	7.05	51.57	0.31	0.56	15.85	51.68	76.6%	0.31	15.80	1.00
	7.10	49.62	0.27	0.51	13.32	49.71	73.7%	0.27	12.14	0.91
	7.15	46.68	0.23	0.46	10.91	46.77	69.3%	0.23	9.06	0.83
	7.20	45.08	0.19	0.41	8.62	45.14	66.9%	0.19	6.27	0.73
	7.25	38.68	0.17	0.36	6.56	38.73	57.4%	0.17	4.40	0.67
	7.30	34.04	0.14	0.31	4.79	34.09	50.5%	0.14	2.83	0.59
	7.35	28.94	0.11	0.26	3.20	28.98	43.0%	0.11	1.62	0.50
	7.40	26.24	0.07	0.21	1.83	26.27	38.9%	0.07	0.68	0.37
	7.45	15.66	0.05	0.16	0.76	15.68	23.2%	0.05	0.22	0.29
	7.50	5.06	0.05	0.11	0.25	5.07	7.5%	0.05	0.07	0.29
	7.55	2.65	0.03	0.06	0.08	2.65	3.9%	0.03	0.02	0.20
	7.60	0.25	0.00	0.01	0.00	0.25	0.4%	0.00	0.00	0.04

STREAM NAME: Poudre
XS LOCATION: Poe Corrected
XS NUMBER: 0

Constant Manning's n

STAGING TABLE

GL = lowest Grassline elevation corrected for sag
WL = Waterline corrected for variations in field measured water surface elevations and sag

	DIST TO WATER (FT)	TOP WIDTH (FT)	AVG. DEPTH (FT)	MAX. DEPTH (FT)	AREA (SQ FT)	WETTED PERIM (FT)	PERCENT WET PERIM (%)	HYDR RADIUS (FT)	FLOW (CFS)	AVG. VELOCITY (FT/SEC)
GL	5.95	67.00	1.21	1.65	81.03	67.47	100.0%	1.20	231.55	2.86
	6.00	66.38	1.18	1.61	78.02	66.83	99.1%	1.17	218.80	2.80
	6.05	65.70	1.14	1.56	74.72	66.13	98.0%	1.13	205.04	2.74
	6.10	65.01	1.10	1.51	71.45	65.42	97.0%	1.09	191.68	2.68
	6.15	64.32	1.06	1.46	68.22	64.71	95.9%	1.05	178.73	2.62
	6.20	63.64	1.02	1.41	65.02	64.01	94.9%	1.02	166.19	2.56
	6.25	62.95	0.98	1.36	61.86	63.30	93.8%	0.98	154.07	2.49
	6.30	62.28	0.94	1.31	58.73	62.60	92.8%	0.94	142.35	2.42
	6.35	61.58	0.90	1.26	55.63	61.89	91.7%	0.90	131.05	2.36
	6.40	60.89	0.86	1.21	52.57	61.18	90.7%	0.86	120.17	2.29
	6.45	60.20	0.82	1.16	49.54	60.48	89.6%	0.82	109.70	2.21
	6.50	59.52	0.78	1.11	46.55	59.77	88.6%	0.78	99.66	2.14
WL	6.55	58.83	0.74	1.06	43.59	59.06	87.5%	0.74	90.04	2.07
	6.60	58.14	0.70	1.01	40.67	58.36	86.5%	0.70	80.84	1.99
	6.65	57.40	0.66	0.96	37.78	57.60	85.4%	0.66	72.12	1.91
	6.70	56.65	0.62	0.91	34.93	56.84	84.2%	0.61	63.85	1.83
	6.75	55.90	0.57	0.86	32.11	56.08	83.1%	0.57	56.01	1.74
	6.80	55.19	0.53	0.81	29.34	55.36	82.0%	0.53	48.59	1.66
	6.85	54.74	0.49	0.76	26.59	54.90	81.4%	0.48	41.47	1.56
	6.90	54.29	0.44	0.71	23.86	54.43	80.7%	0.44	34.83	1.46
	6.95	53.83	0.39	0.66	21.16	53.97	80.0%	0.39	28.67	1.35
	7.00	53.38	0.35	0.61	18.48	53.50	79.3%	0.35	23.00	1.25
	7.05	51.57	0.31	0.56	15.85	51.68	76.6%	0.31	18.23	1.15
	7.10	49.62	0.27	0.51	13.32	49.71	73.7%	0.27	14.00	1.05
	7.15	46.68	0.23	0.46	10.91	46.77	69.3%	0.23	10.46	0.96
	7.20	45.08	0.19	0.41	8.62	45.14	66.9%	0.19	7.23	0.84
	7.25	38.68	0.17	0.36	6.56	38.73	57.4%	0.17	5.08	0.77
	7.30	34.04	0.14	0.31	4.79	34.09	50.5%	0.14	3.27	0.68
	7.35	28.94	0.11	0.26	3.20	28.98	43.0%	0.11	1.87	0.58
	7.40	26.24	0.07	0.21	1.83	26.27	38.9%	0.07	0.78	0.43
	7.45	15.66	0.05	0.16	0.76	15.68	23.2%	0.05	0.26	0.34
	7.50	5.06	0.05	0.11	0.25	5.07	7.5%	0.05	0.08	0.34
	7.55	2.65	0.03	0.06	0.08	2.65	3.9%	0.03	0.02	0.24
	7.60	0.25	0.00	0.01	0.00	0.25	0.4%	0.00	0.00	0.05

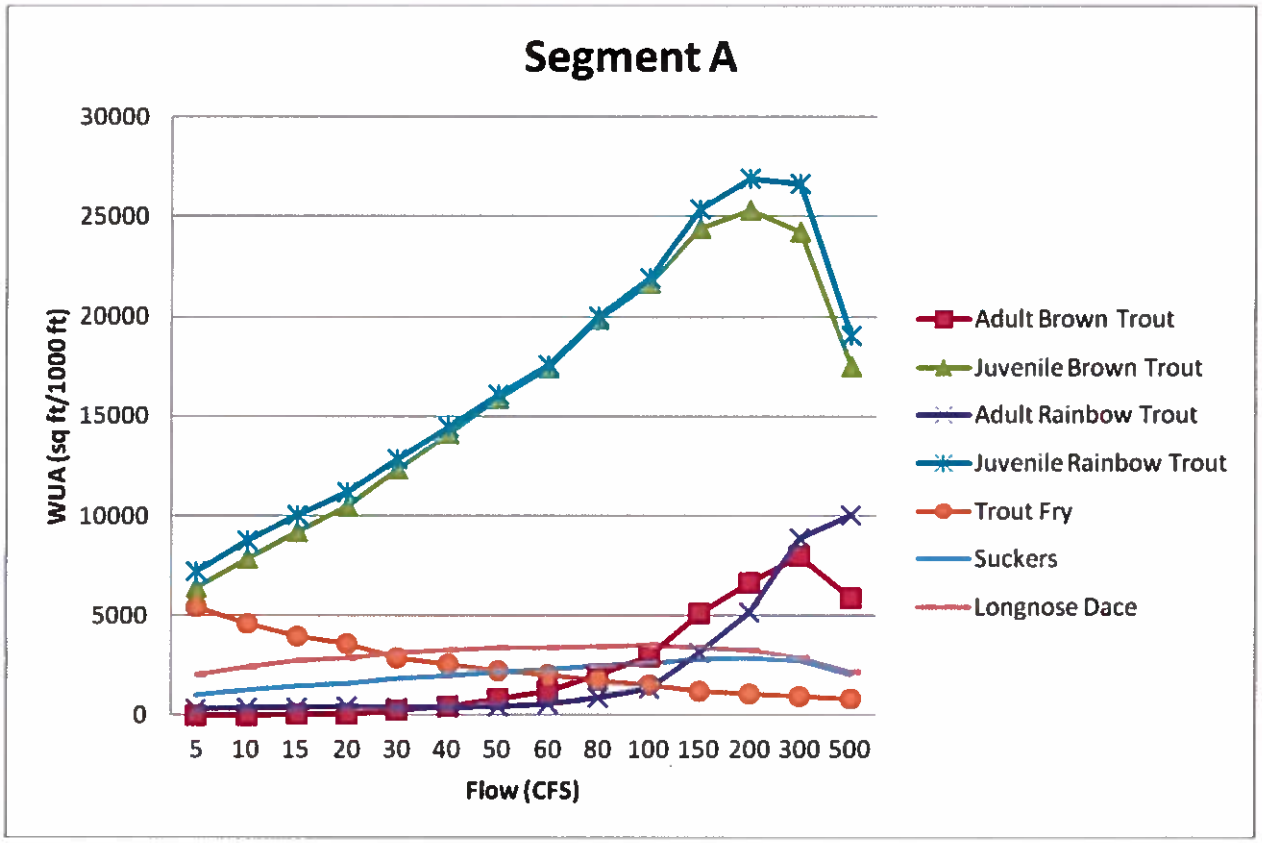
APPENDIX B

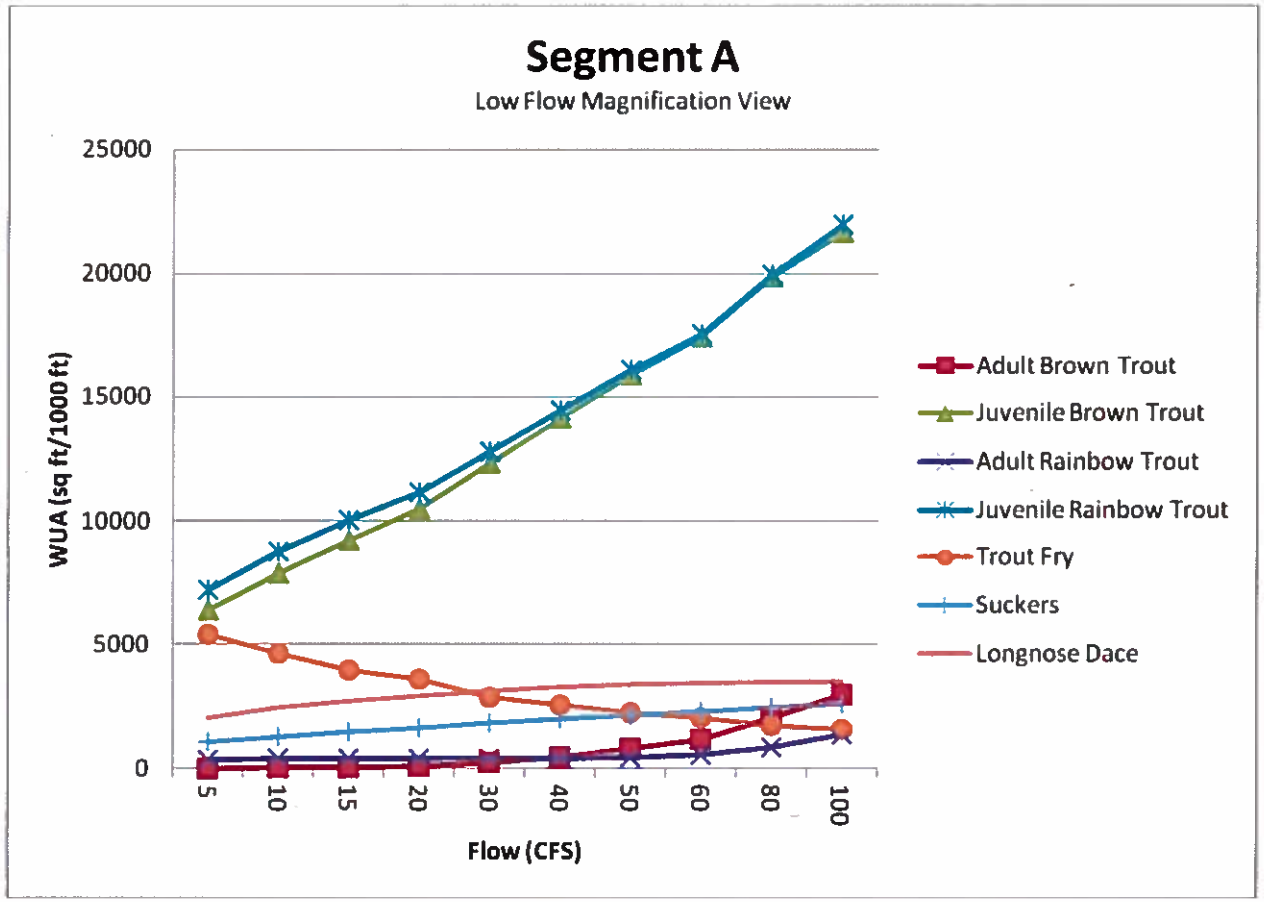
RIVER 2D/PHABSIM WUA vs. FLOW DATA

SEGMENT A

Flow (cfs)	Adult Brown Trout	Juvenile Brown Trout	Adult Rainbow Trout	Juvenile Rainbow Trout	Trout Fry
5	0.977683311	6357.144008	330.9957613	7185.364266	5399.450716
10	10.85169979	7863.409049	368.5326623	8734.306221	4608.813194
15	34.89548247	9218.437638	391.0370438	10029.78363	3960.537871
20	83.74822244	10471.22648	413.3532498	11167.68696	3567.25763
30	224.3864048	12327.96487	400.370007	12816.88505	2882.535135
40	467.3092739	14126.92986	403.620088	14438.10966	2529.685883
50	803.2447506	15911.82155	461.4461	16096.61722	2250.32013
60	1184.041522	17434.72386	561.6760968	17559.39296	2028.569385
80	2038.306595	19853.08037	879.645167	19978.71587	1714.462695
100	2959.253563	21670.11295	1361.145636	21949.60203	1553.820588
150	5097.986978	24407.88392	3120.389941	25390.93913	1212.073967
200	6620.917481	25322.62311	5185.708557	26907.1239	1053.947459
300	8011.079397	24195.00215	8906.018686	26622.71055	939.5808942
500	5888.444452	17481.39177	10021.8764	19059.78171	836.4941775
750	5331.294642	12446.08983	9752.470535	13924.43842	762.526405
1000	4743.845834	9479.706346	8000.169892	11060.38668	749.8097928
2000	2131.823551	7412.852994	3834.651678	8296.703819	1512.803889
3000	4544.204312	19347.03812	4863.832625	20548.41593	2821.663634

Flow (cfs)	Suckers	Longnose Dace
5	1038.179043	2026.22451
10	1274.651733	2449.330946
15	1458.934957	2726.316116
20	1605.579971	2899.525689
30	1818.381259	3115.213192
40	1991.040616	3270.229132
50	2146.375355	3360.388958
60	2272.033236	3411.222474
80	2464.02677	3462.105549
100	2604.633118	3489.552893
150	2811.281175	3395.723149
200	2870.203543	3232.070389
300	2763.737307	2854.253483
500	2063.790873	2192.403855
750	1717.735599	1440.978303
1000	1567.638974	920.0372255
2000	1602.329981	293.9661002
3000	2739.656131	346.4756839

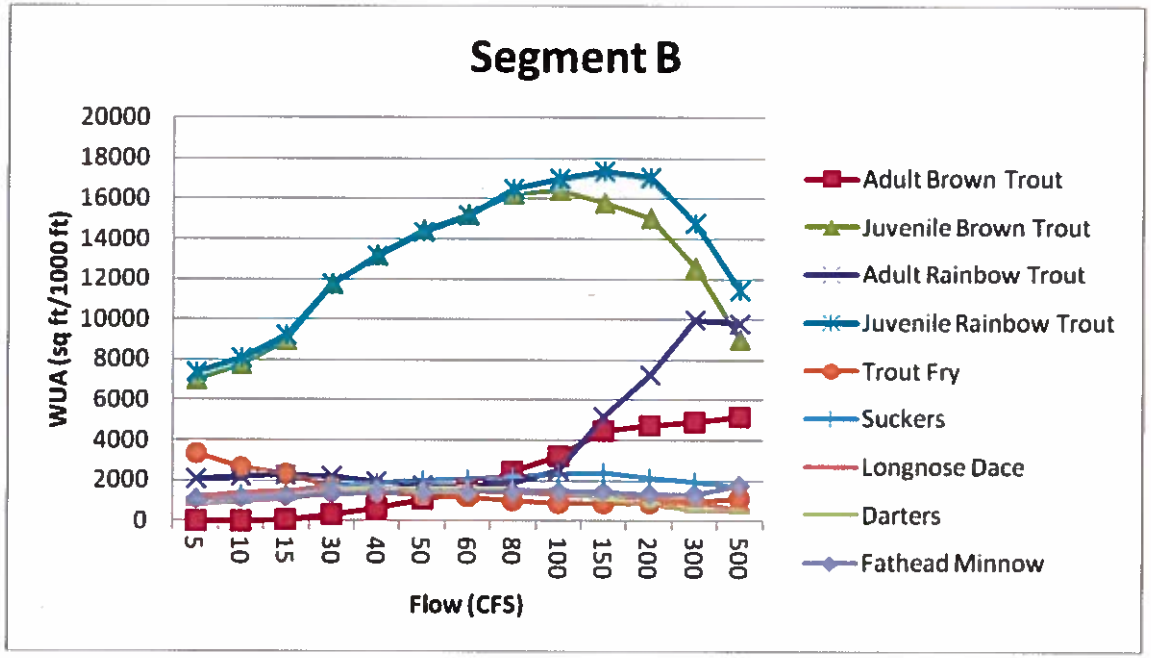

Segment A
30000
25000
20000
15000
10000
5000
0
WUA (sq ft/1000 ft)
5 10 15 20 30 40 50 60 80 100 150 200 300 500
Flow (CFS)
Adult Brown Trout
Juvenile Brown Trout
Adult Rainbow Trout
Juvenile Rainbow Trout
Trout Fry
Suckers
Longnose Dace

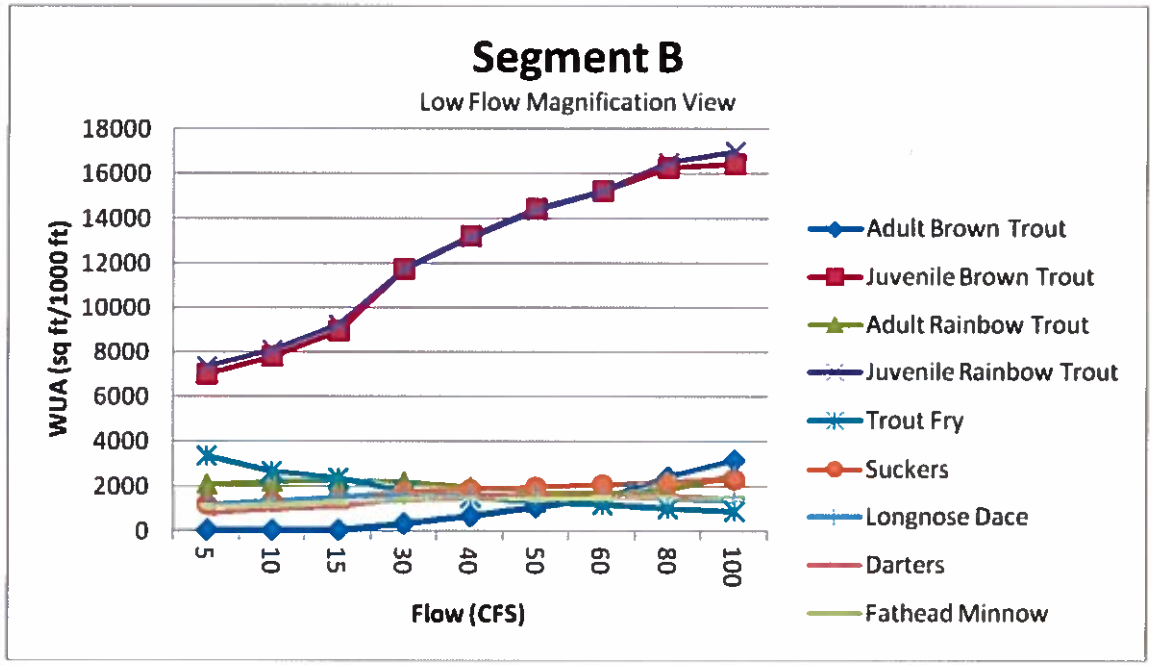

Segment A
Low Flow Magnification View
25000
20000
15000
10000
5000
0
WUA (sq ft/1000 ft)
5
10
15
20
30
40
50
60
80
100
Flow (CFS)
Adult Brown Trout
Juvenile Brown Trout
Adult Rainbow Trout
Juvenile Rainbow Trout
Trout Fry
Suckers
Longnose Dace

SEGMENT B

Flow (cfs)	Adult Brown Trout	Juvenile Brown Trout	Adult Rainbow Trout	Juvenile Rainbow Trout	Trout Fry
5	0.715302541	6996.946545	2079.380695	7353.474267	3342.079138
10	6.772739515	7779.374953	2173.858873	8102.106722	2629.512327
15	37.61114636	8963.508952	2278.531449	9207.825709	2341.779787
30	310.4816588	11726.68012	2192.970819	11757.25556	1714.012107
40	638.8698167	13225.95562	1952.993453	13169.17713	1449.385297
50	1064.628137	14450.13177	1738.79984	14376.16933	1256.708339
60	1452.281938	15244.00774	1656.121451	15196.2904	1148.647872
80	2413.511975	16258.89355	1875.953914	16471.86827	1003.489983
100	3188.824166	16447.26055	2480.835585	17015.75226	892.0872849
150	4476.342966	15822.53976	5197.693391	17382.73764	838.7078502
200	4705.433259	15071.53138	7257.27582	17060.65568	838.905047
300	4902.883107	12560.54378	9972.33834	14783.09613	911.1678879
500	5164.437552	9038.902097	9809.784838	11439.50427	1084.965001
750	4704.351448	7929.939887	7674.758425	10225.06491	1221.937388
1000	3645.964792	8565.818598	5833.252642	10374.40175	1571.808726
2000	3895.657796	56257.27669	23749.34209	61425.79048	24039.82585
4000	8059.911832	87513.28386	30979.09836	92552.87812	25098.50115
6000	25181.57526	126127.287	51127.04456	133527.5547	16760.20404

Flow (cfs)	Suckers	Longnose Dace	Darters	Fathead Minnow
5	1144.603181	1188.572201	789.4611691	1056.121772
10	1280.498155	1359.586582	916.2470881	1107.666375
15	1436.082488	1491.85851	1067.654272	1197.860693
30	1729.203531	1590.040394	1372.072639	1332.897819
40	1863.404445	1587.856982	1500.424381	1380.582795
50	1974.715194	1555.30462	1574.473294	1411.640334
60	2053.679989	1521.178701	1606.09191	1432.167781
80	2196.655019	1428.944616	1576.854625	1461.989444
100	2289.399539	1336.902094	1467.374176	1460.917389
150	2381.053903	1168.382791	1106.301612	1441.984746
200	2149.434078	1169.416686	768.3501876	1302.059784
300	1909.888579	947.1696286	562.171496	1326.470705
500	1704.301078	564.915437	501.9635305	1769.004215
750	1736.896744	326.8575483	515.3551115	2446.90887
1000	1818.564771	261.5408961	505.2933208	2778.227895
2000	6006.545124	386.7523469	3449.774359	26470.75196
4000	9407.164012	309.1613172	6661.523633	39425.92672
6000	11673.37606	230.4350767	7524.696376	35586.35137

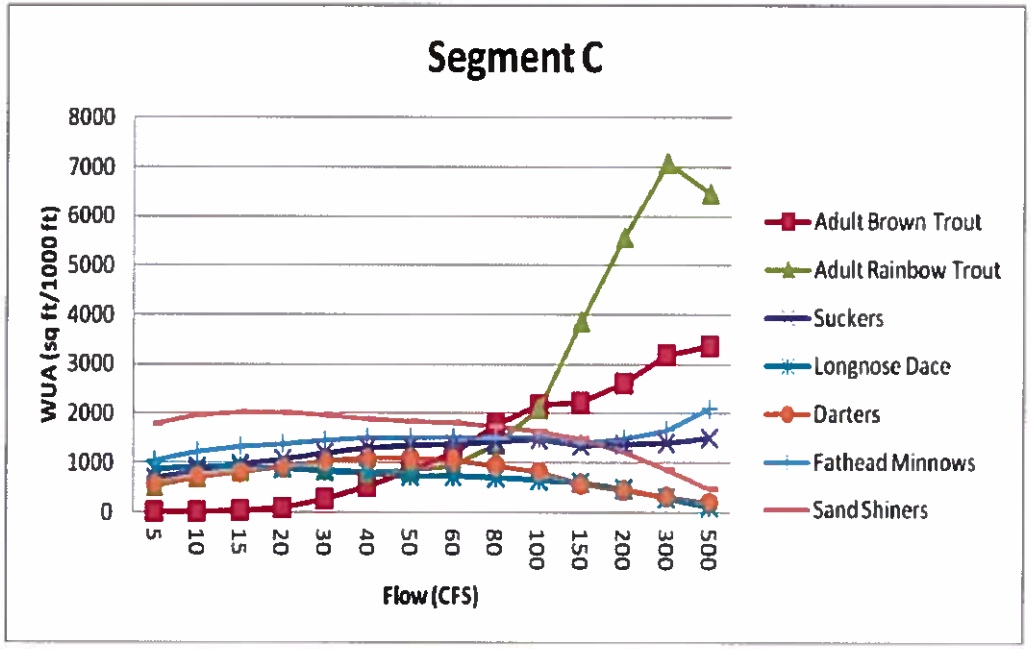

Segment B
WUA (sq ft/1000 ft)
20000
18000
16000
14000
12000
10000
8000
6000
4000
2000
0
5
10
15
30
40
50
60
80
100
150
200
300
500
Flow (CFS)
Adult Brown Trout
Juvenile Brown Trout
Adult Rainbow Trout
Juvenile Rainbow Trout
Trout Fry
Suckers
Longnose Dace
Darters
Fathead Minnow

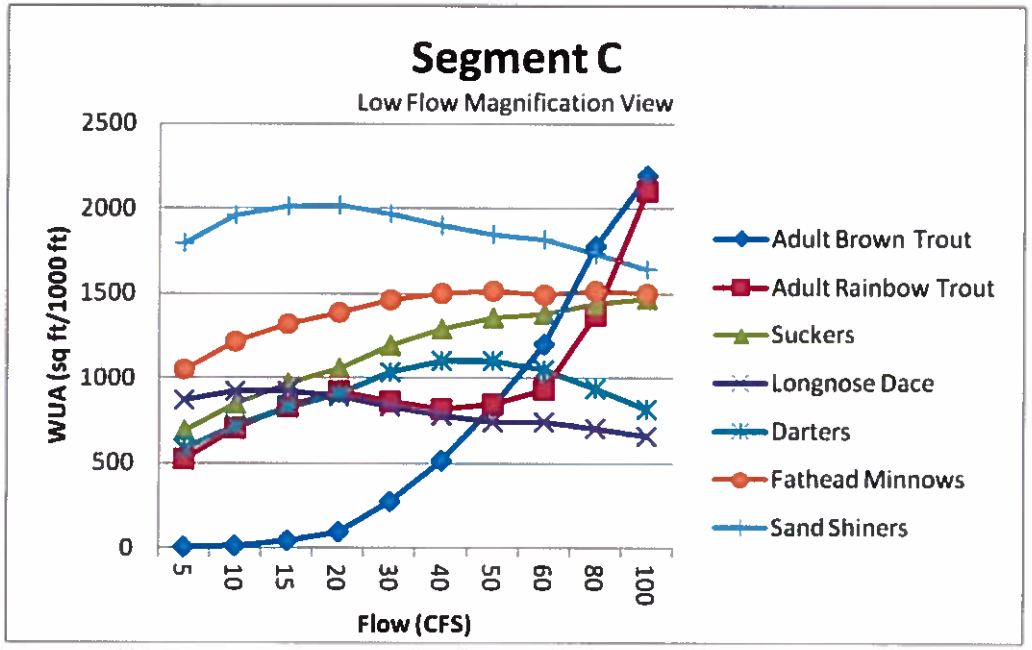

Segment B
Low Flow Magnification View
WUA (sq ft/1000 ft)
18000
16000
14000
12000
10000
8000
6000
4000
2000
0
5
10
15
30
40
50
60
80
100
Flow (CFS)
Adult Brown Trout
Juvenile Brown Trout
Adult Rainbow Trout
Juvenile Rainbow Trout
Trout Fry
Suckers
Longnose Dace
Darters
Fathead Minnow

SEGMENT C

Flow (cfs)	Adult Brown Trout	Adult Rainbow Trout	Suckers
5	0.615322255	519.0448575	684.9102014
10	9.676517897	703.0137913	848.6626564
15	38.44123131	831.7089237	965.849917
20	91.56547595	919.5624462	1056.453894
30	270.9943396	864.3283256	1195.231929
40	517.687453	815.8776316	1292.744665
50	829.6629088	843.7433011	1360.45521
60	1200.286242	931.6565947	1381.466948
80	1777.95813	1376.345053	1442.668031
100	2191.60665	2101.327958	1473.233373
150	2234.29206	3856.288844	1359.114812
200	2612.026357	5559.556437	1388.760759
300	3187.237586	7080.819552	1413.216397
500	3371.501191	6477.971332	1497.243324
750	2473.745561	4983.216594	1644.824764
1000	2249.889675	4321.685971	1792.222519
2000	4662.040504	20205.39434	4977.932549
3000	6845.346313	20939.59884	5577.910759
4000	10724.47912	22787.96746	6682.296786
6000	27370.07692	30099.4644	7106.582331

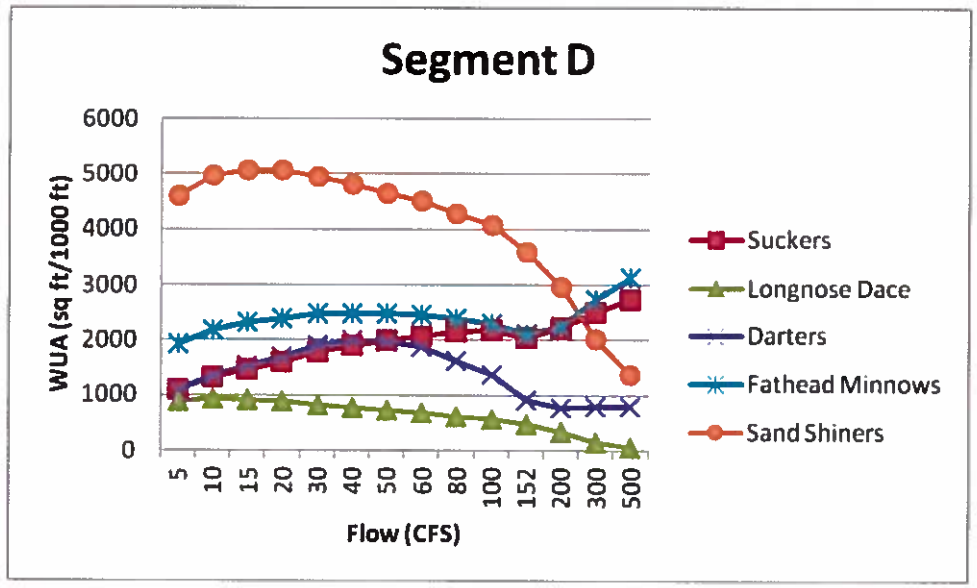
Flow (cfs)	Longnose Dace	Darters	Fathead Minnows	Sand Shiners
5	867.1928221	579.9333745	1051.392995	1795.159632
10	921.05083	715.0050437	1216.429387	1962.654445
15	918.390142	821.169498	1317.602874	2013.511174
20	892.1859573	908.9055874	1386.549067	2018.273702
30	831.0589965	1037.222703	1464.869058	1969.020699
40	777.8683073	1099.375233	1502.534276	1897.338257
50	744.1278363	1105.22655	1518.297061	1843.439095
60	741.4720159	1047.340614	1497.09112	1818.394225
80	702.1442813	938.7469532	1512.732756	1737.741238
100	660.5840366	814.1397701	1502.543577	1642.44687
150	601.7988561	567.6470977	1411.882693	1471.277055
200	476.9219127	458.9789251	1486.353586	1223.088429
300	297.3036013	315.9080817	1670.32606	856.0392644
500	112.9630094	197.5357294	2109.187186	481.1157736
750	42.37524277	133.4653758	2539.406228	308.4751065
1000	32.59179587	112.8764039	2807.888691	291.6908324
2000	67.68474583	1048.944359	8837.220213	4668.879969
3000	102.3805074	2254.500714	16251.32006	12777.92637
4000	95.36721724	3747.135411	21758.10349	17881.58907
6000	67.02356244	3168.583375	18302.81915	14882.88515

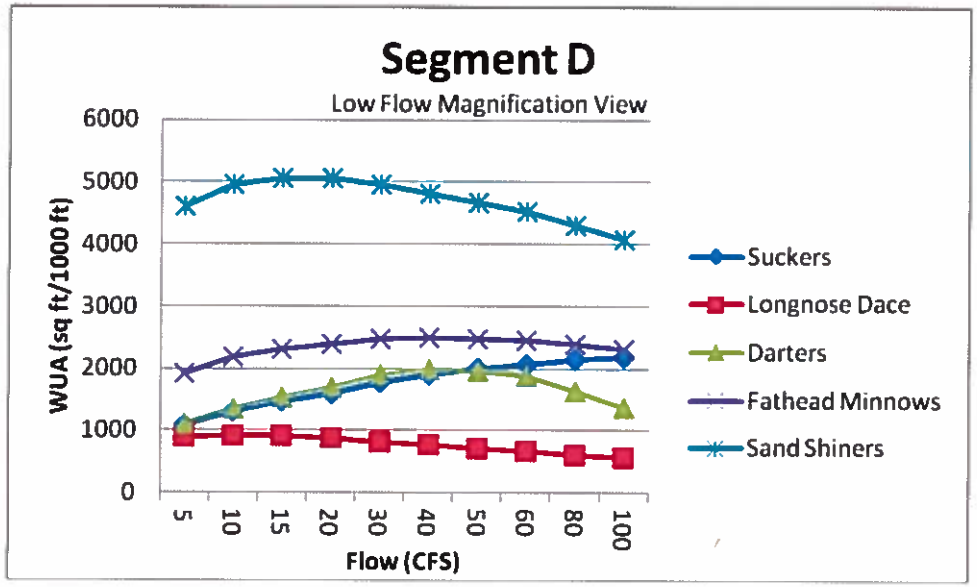

Segment C
WUA (sq ft/1000 ft)
8000
7000
6000
5000
4000
3000
2000
1000
0
5
10
15
20
30
40
50
60
80
100
150
200
300
500
Flow (CFS)
Adult Brown Trout
Adult Rainbow Trout
Suckers
Longnose Dace
Darters
Fathead Minnows
Sand Shiners


Segment C
Low Flow Magnification View
WUA (sq ft/1000 ft)
2500
2000
1500
1000
500
0
5
10
15
20
30
40
50
60
80
100
Flow (CFS)
Adult Brown Trout
Adult Rainbow Trout
Suckers
Longnose Dace
Darters
Fathead Minnows
Sand Shiners

SEGMENT ID

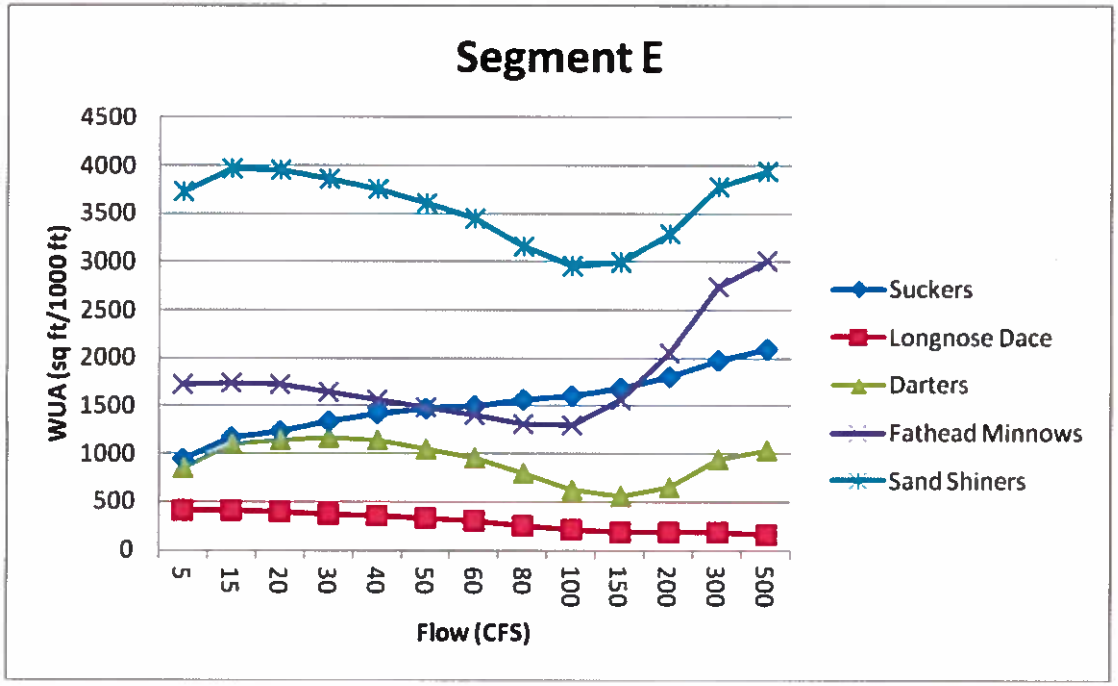
Flow (cfs)	Suckers	Longnose Dace	Darters	Fathead Minnows	Sand Shiners
5	1082.963215	896.738334	1101.178265	1925.00327	4603.99311
10	1316.467403	922.7894357	1349.921203	2178.957368	4965.612191
15	1473.392336	908.9447965	1540.204828	2308.722992	5059.253089
20	1593.633671	884.425517	1696.068905	2390.759027	5068.640225
30	1779.173328	820.0732022	1910.079954	2469.890168	4955.379016
40	1904.921994	765.7867872	1991.778588	2489.533592	4810.063602
50	1999.336193	717.5103892	1970.405651	2474.302832	4659.671075
60	2069.954557	677.4040488	1878.946521	2456.764892	4523.068975
80	2151.26229	616.7660396	1624.188778	2385.200853	4291.165405
100	2182.32582	568.9008088	1361.458841	2302.94949	4071.73811
152	2043.515089	479.9974419	902.1628166	2105.710069	3578.868452
200	2221.797918	327.3358473	766.4635487	2259.615647	2958.151435
300	2509.316024	147.867613	787.5129087	2744.6475	2016.918287
500	2741.622331	62.41640709	799.8240187	3137.728625	1383.015124
750	2675.951692	38.58690997	581.7521832	3057.596547	1080.580759
1000	2574.628737	23.09411654	376.3363925	3018.027376	855.0246053
2000	3902.29412	65.5950239	1762.97499	16824.4069	10237.1013
4000	10532.11388	178.9196649	6118.750013	30290.36937	26730.94886


Segment D
WUA (sq ft/1000 ft)
6000
5000
4000
3000
2000
1000
0
5
10
15
20
30
40
50
60
80
100
152
200
300
500
Flow (CFS)
Suckers
Longnose Dace
Darters
Fathead Minnows
Sand Shiners


Segment D
Low Flow Magnification View
WUA (sq ft/1000 ft)
6000
5000
4000
3000
2000
1000
0
5
10
15
20
30
40
50
60
80
100
Flow (CFS)
Suckers
Longnose Dace
Darters
Fathead Minnows
Sand Shiners

SEGMENT E

Flow (cfs)	Suckers	Longnose Dace	Darters	Fathead Minnows	Sand Shiners
5	946.8407033	406.3474252	855.087142	1721.514671	3732.765994
15	1168.782943	409.9646113	1096.909601	1744.001167	3962.429996
20	1239.473259	400.7541945	1146.941942	1719.676091	3956.560238
30	1344.756854	376.7387631	1168.846986	1647.474273	3863.795609
40	1415.595544	353.6832951	1134.488909	1570.979295	3755.070402
50	1469.07581	328.5291439	1042.197077	1489.884624	3611.29902
60	1498.730967	307.2331392	951.1304068	1407.425411	3454.108299
80	1570.686647	255.1979054	793.1658093	1319.398092	3159.789578
100	1608.266036	218.5742338	618.6209271	1296.386329	2959.864657
150	1690.004977	181.27907	553.1092033	1564.697562	2999.675251
200	1798.409543	182.0697884	647.2294111	2053.178662	3287.77886
300	1980.155911	186.5248477	945.0735119	2751.048358	3785.487254
500	2092.197029	153.276703	1036.179365	3013.969841	3942.717314
750	2091.43685	116.1165171	766.7503146	3210.833882	3880.394696
2000	8670.003674	196.2410729	8193.090919	41697.22509	32547.4387
3000	13390.08824	190.6103944	11312.39546	54595.74035	40027.2154
4000	16122.06911	185.0402561	11848.43365	59571.57892	41788.17863
6000	21333.73192	121.1141601	9876.547593	57414.9662	33869.44419


Segment E
WUA (sq ft/1000 ft)
4500
4000
3500
3000
2500
2000
1500
1000
500
0
5
15
20
30
40
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60
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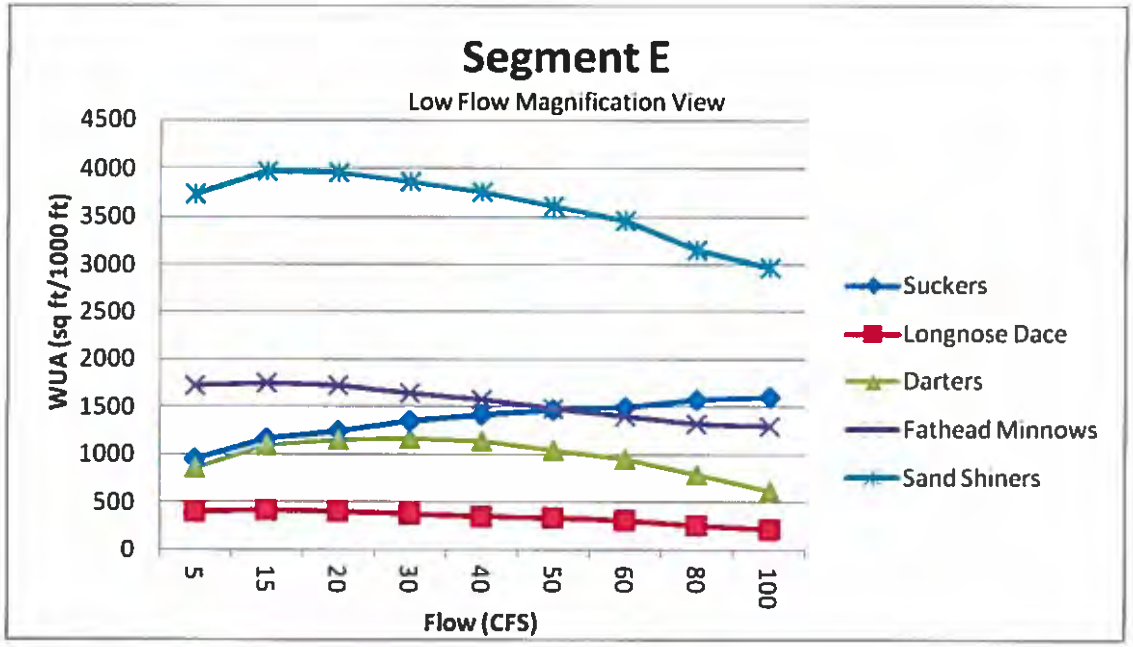
Flow (CFS)
Suckers
Longnose Dace
Darters
Fathead Minnows
Sand Shiners


Segment E
Low Flow Magnification View
WUA (sq ft/1000 ft)
4500
4000
3500
3000
2500
2000
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1000
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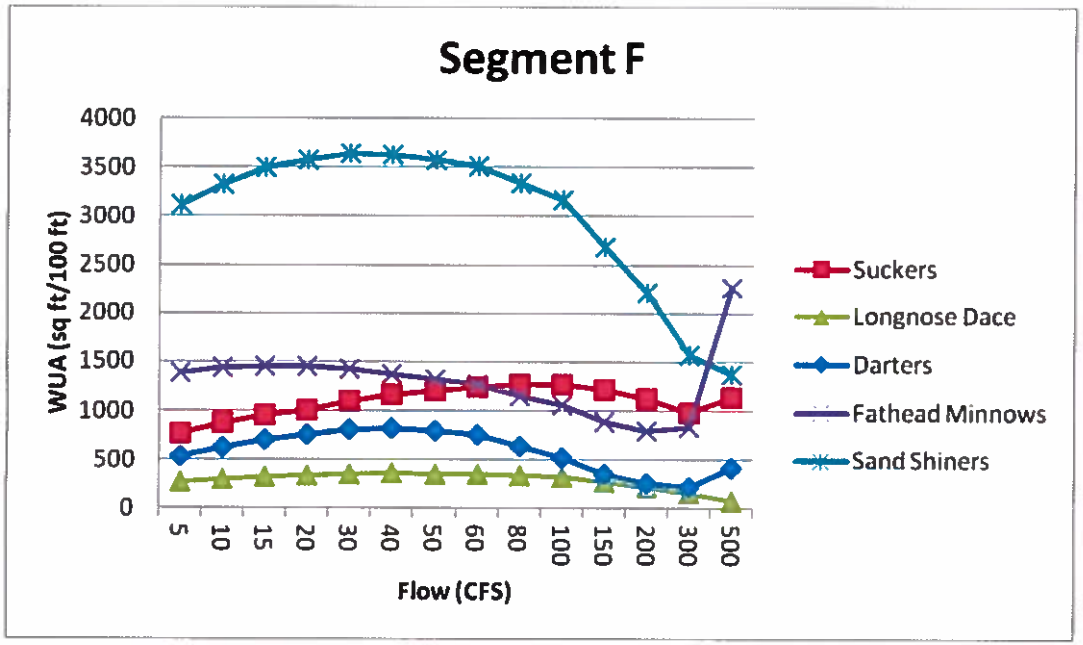
0
5
15
20
30
40
50
60
80
100
Flow (CFS)
Suckers
Longnose Dace
Darters
Fathead Minnows
Sand Shiners

SEGMENT F

Flow (cfs)	Suckers	Longnose Dace	Darters	Fathead Minnows	Sand Shiners
5	769.0983617	268.4885155	537.0025253	1385.212762	3121.780555
10	875.0182572	297.562422	627.1106992	1432.479291	3327.609276
15	956.5483803	322.4916175	701.9635418	1451.668327	3492.18878
20	1011.742068	339.5538681	750.7534	1449.184277	3572.835615
30	1098.685978	355.0376357	806.8560112	1419.913112	3643.971954
40	1158.438959	357.7479282	815.5873983	1372.574745	3626.821376
50	1203.168992	356.4149718	795.0212192	1321.224503	3582.313905
60	1235.155273	349.6464085	754.4030417	1266.251146	3505.237872
80	1267.280826	333.5786226	636.8110921	1156.005208	3339.049245
100	1265.585365	318.5407831	520.3610992	1055.793833	3163.526507
150	1211.923159	272.3271158	344.3913921	882.5110849	2679.61512
200	1125.892575	224.1255754	262.0996426	792.250543	2215.695204
300	973.2878863	150.8337611	213.4349879	833.8731935	1566.158002
500	1132.52898	70.27396416	419.8648227	2267.916729	1376.28568
1000	7324.396319	207.2003664	6342.659881	41864.62726	31601.68947
2000	17357.08881	368.3234046	16571.82197	80539.83938	66830.14686
3000	21865.11484	404.1722789	19993.81944	90270.01126	76165.29011
4000	24955.10249	3484.711832	20510.95083	90432.5897	79208.40232
6000	28058.62178	3322.434365	17100.92518	78394.82732	76425.37961


Segment F
WUA (sq ft/100 ft)
4000
3500
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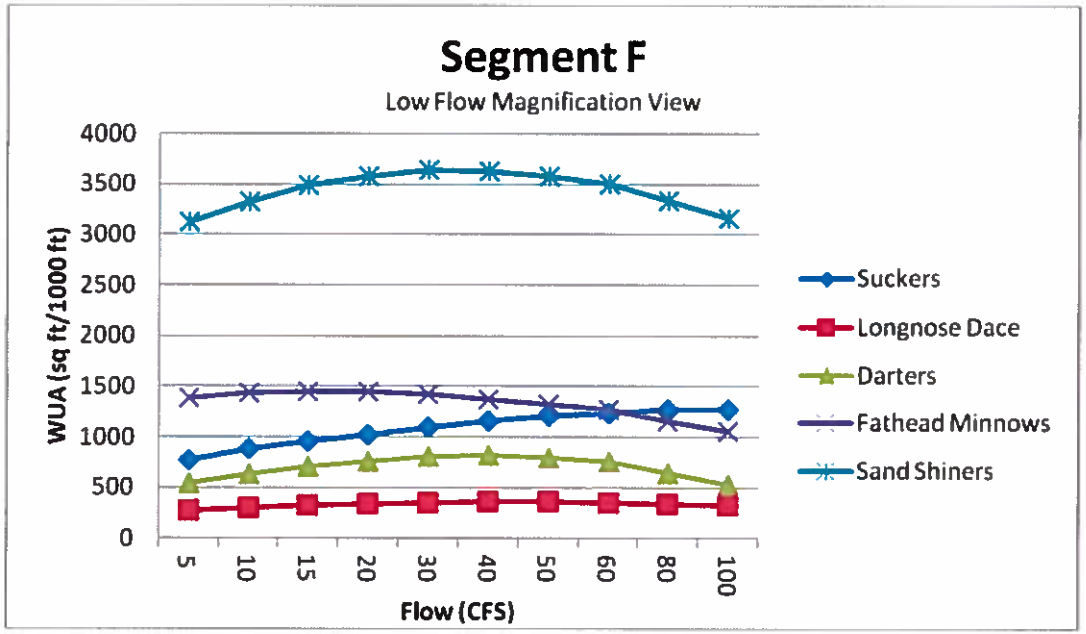
Flow (CFS)
Suckers
Longnose Dace
Darters
Fathead Minnows
Sand Shiners


Segment F
Low Flow Magnification View
WUA (sq ft/1000 ft)
4000
3500
3000
2500
2000
1500
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15
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30
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50
60
80
100
Flow (CFS)
Suckers
Longnose Dace
Darters
Fathead Minnows
Sand Shiners

APPENDIX C

FISHERY DATA SUMMARIES BY SEGMENT

(FROM GEI, 2013)

Fish species present by segment (**native species in bold**)

SEGMENT A

Species	**Historical 1912-1984**	**Recent Past 1985-2000**	**Current Conditions 2001-2012**
Brook stickleback		X	
Brown trout	X	X	X
Creek chub		**X**	
Fathead minnow		**X**	
Green sunfish		**X**	
Longnose dace	**X**	**X**	**X**
Longnose sucker	**X**	**X**	**X**
Mountain whitefish		X	
Rainbow trout		X	X
Smallmouth bass		X	
Walleye		X	
White sucker	**X**	**X**	**X**
Yellow perch		X	X

SEGMENT B

Species	Historical 1912-1984	Recent Past 1985-2000	Current Conditions 2001-2012
Bigmouth shiner	**X**		
Black bullhead	**X**	**X**	
Black crappie	X	X	
Bluegill	X	X	X
Brassy minnow		**X**	**X**
Brook stickleback			X
Brown trout	X	X	X
Central stoneroller	**X**	**X**	
Common carp	X	X	X
Common shiner	**X**	**X**	
Creek chub	**X**	**X**	**X**
Fathead minnow	**X**	**X**	**X**
Green sunfish	**X**	**X**	**X**
Hornyhead chub	**X**		
Iowa darter			**X**
Johnny darter	**X**	**X**	**X**
Largemouth bass	X	X	X
Longnose dace	**X**	**X**	**X**
Longnose sucker	**X**	**X**	**X**
Mountain whitefish	X	X	X
Orangespotted sunfish		**X**	
Plains killifish	**X**		
Plains minnow		**X**	
Plains topminnow	**X**	**X**	**X**
Pumpkinseed	X	X	X
Rainbow trout	X	X	X
Red shiner		**X**	
Sand shiner	**X**	**X**	**X**
Sauger			X
Smallmouth bass		X	X
White sucker	**X**	**X**	**X**
Yellow perch	X	X	X

SEGMENT C

Species	Historical 1912-1984	Recent Past 1985-2000	Current Conditions 2001-2012
Bigmouth shiner	**X**		**X**
Black bullhead	**X**	**X**	**X**
Black crappie	X	X	
Bluegill	X	X	X
Brassy minnow	**X**		**X**
Brook stickleback			X
Brown trout	X	X	X
Central stoneroller	**X**	**X**	
Common carp	X	X	X
Common shiner	**X**	**X**	
Creek chub	**X**	**X**	**X**
Fathead minnow	**X**	**X**	**X**
Gizzard shad			X
Green sunfish	**X**	**X**	**X**
Hornyhead chub	**X**		
Iowa darter	**X**	**X**	**X**
Johnny darter	**X**	**X**	**X**
Largemouth bass	X	X	X
Longnose dace	**X**	**X**	**X**
Longnose sucker	**X**	**X**	**X**
Mosquitofish			X
Mountain whitefish	X	X	
Orangespotted sunfish		**X**	**X**
Plains killifish	**X**	**X**	
Plains topminnow	**X**	**X**	**X**
Pumpkinseed		X	
Rainbow trout	X	X	X
Red shiner		**X**	
Sand shiner	**X**	**X**	**X**
Smallmouth bass	X	X	X
White crappie			X
White sucker	**X**	**X**	**X**
Yellow perch	X	X	X

SEGMENT D

Species	Historical 1912-1984	Recent Past 1985-2000	Current Conditions 2001-2012
Bigmouth shiner	**X**	**X**	**X**
Black bullhead	**X**	**X**	**X**
Black crappie	X	X	X
Bluegill	X	X	X
Brassy minnow	**X**		
Brook stickleback	X	X	X
Brown trout	X		
Common carp	X	X	X
Common shiner	**X**		
Creek chub	**X**	**X**	**X**
Fathead minnow	**X**	**X**	**X**
Green sunfish	**X**	**X**	**X**
Iowa darter			**X**
Johnny darter	**X**	**X**	**X**
Largemouth bass	X	X	X
Longnose dace	**X**	**X**	**X**
Longnose sucker	**X**	**X**	**X**
Mosquitofish			X
Orangespotted sunfish		**X**	**X**
Plains killifish	**X**	**X**	
Plains topminnow	**X**	**X**	**X**
Pumpkinseed	X	X	
Rainbow trout	X		X
Red shiner	**X**	**X**	**X**
Sand shiner	**X**	**X**	**X**
Smallmouth bass	X		
White crappie		X	X
White sucker	**X**	**X**	**X**
Yellow perch	X	X	

SEGMENT E

Species	Historical 1912-1984	Recent Past 1985-2000	Current Conditions 2001-2012
Bigmouth shiner	**X**	**X**	**X**
Black bullhead	**X**	**X**	**X**
Black crappie	X	X	X
Bluegill	X	X	X
Brassy minnow	**X**	**X**	
Brook stickleback	X	X	X
Brown trout	X	X	
Channel catfish		**X**	
Common carp	X	X	X
Common shiner	**X**		
Creek chub	**X**	**X**	**X**
Fathead minnow	**X**	**X**	**X**
Gizzard shad			X
Green sunfish	**X**	**X**	**X**
Iowa darter		**X**	**X**
Johnny darter	**X**	**X**	**X**
Largemouth bass	X	X	X
Longnose dace	**X**	**X**	**X**
Longnose sucker	**X**	**X**	**X**
Mosquitofish		X	X
Mountain whitefish	X		
Orangespotted sunfish	**X**	**X**	**X**
Plains killifish	**X**	**X**	
Plains topminnow		**X**	**X**
Pumpkinseed	X		X
Rainbow trout	X	X	
Red shiner	**X**	**X**	**X**
Sand shiner	**X**	**X**	**X**
Smallmouth bass	X		
White crappie		X	X
White sucker	**X**	**X**	**X**
Yellow perch	X	X	X

SEGMENT F

Species	Historical 1912-1984	Recent Past 1985-2000	Current Conditions 2001-2012
Bigmouth shiner	**X**	**X**	**X**
Black bullhead	**X**		
Black crappie	X		X
Bluegill	X		X
Brassy minnow	**X**	**X**	
Brook stickleback	X	X	X
Brown trout	X		
Channel catfish			**X**
Common carp	X	X	X
Common shiner	**X**		
Creek chub	**X**	**X**	**X**
Fathead minnow	**X**	**X**	**X**
Gizzard shad			X
Goldfish			X
Green sunfish	**X**	**X**	**X**
Hornyhead chub	**X**		
Iowa darter			**X**
Johnny darter	**X**	**X**	**X**
Largemouth bass	X	X	X
Longnose dace	**X**	**X**	**X**
Longnose sucker	**X**	**X**	**X**
Mosquitofish			X
Northern redbelly dace	**X**		
Orangespotted sunfish		**X**	**X**
Plains killifish	**X**	**X**	**X**
Plains topminnow		**X**	
Pumpkinseed	X		X
Quillback	**X**		
Rainbow trout	X	X	
Red shiner	**X**	**X**	**X**
Sand shiner	**X**	**X**	**X**
White crappie			X
White sucker	**X**	**X**	**X**
Yellow perch	X	X	X

PRELIMINARY ENGINEERING REPORT
POUDRE FLOWS AUGMENTATION PLAN

Prepared for:

CACHE LA POUDRE WATER USERS ASSOCIATION
CITY OF FORT COLLINS
CITY OF GREELEY
CITY OF THORNTON
COLORADO WATER CONSERVATION BOARD
COLORADO WATER TRUST
NORTHERN COLORADO WATER CONSERVANCY DISTRICT

Prepared by:

GREGORY K. SULLIVAN, P.E.
HEIDI M. WELSH

NOVEMBER 2020

Spronk Water Engineers, Inc.

Exhibit PF4
Agenda Item 23
Nov 18-19, 2020

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FIGURES

TABLES

APPENDICES

ABBREVIATIONS

AF	acre-feet
Association	Cache la Poudre Water Users Association
CBT	Colorado-Big Thompson
CDSS	Colorado Decision Support System
CPW	Colorado Parks and Wildlife
CWCB	Colorado Water Conservation Board
CWT	Colorado Water Trust
DWR	Colorado Diversion of Water Resources
GIC	Greeley Irrigation Company
JDC	Jackson Ditch Company
NCWCD	Northern Colorado Water Conservancy District
Phase I MOU	Agreement Regarding Phase I (Development) of a Multi-phase Plan for an Instream Flow Augmentation Plan on the Cache la Poudre River (1/13/2017)
Phase II MOA	Memorandum of Agreement for Phase II of the Cache la Poudre River Instream Flow Augmentation Plan (2/28/2020)
Poudre River	Cache la Poudre River
PRTI	Poudre Runs Through It Study/Action Work Group
SWE	Spronk Water Engineers, Inc.
WSSC	Water Supply and Storage Company

1.0 INTRODUCTION

The Cache la Poudre River ("Poudre River") is an important resource to the people of northern Colorado. It is a working river that provides essential water supply for irrigation, municipal, and other uses. River flows also provide habitat for numerous cold water and warm water fish species.

Under Colorado's prior appropriation doctrine, the demands of senior appropriators have long depleted the river of flows that would maintain the aquatic habitat, particularly in the reach of the Poudre River from the mouth of the Poudre Canyon west of Fort Collins ("Canyon Mouth") to the confluence with the South Platte River east of Greeley ("Poudre Flows Reach" or "Augmented Reach"). A map of the Poudre Flows Reach is shown in Figure 1-1. Numerous diversions and variable hydrologic conditions cause the Poudre River to dry up at various locations through this reach and increasing water demands may increase the frequency and duration of the dry-ups.

The Colorado Water Trust ("CWT") has partnered with the Colorado Water Conservation Board ("CWCB"), the Northern Colorado Water Conservancy District ("NCWCD"), the Cache la Poudre Water Users Association ("Association"), and the Cities of Fort Collins, Greeley and Thornton (together, "Poudre Flows Partners") to develop an instream flow augmentation plan to increase flows in the Poudre River by delivering water through various river reaches for augmentation of streamflows without adversely affecting existing water uses ("Poudre Flows Augmentation Plan" or "Poudre Flows Plan"). Colorado Parks and Wildlife ("CPW") is a supporting partner for the plan.

The cooperative arrangements between the parties are described in a February 8, 2020, Memorandum of Agreement for Phase II of the Cache la Poudre River Instream Flow Augmentation Plan ("Phase II MOA"). The Phase II MOA continues the efforts set forth in the earlier Agreement Regarding Phase I (Development) of a Multi-phase Plan for an Instream Flow Augmentation Plan on the Cache la Poudre River ("Phase I MOU").

CWT retained Spronk Water Engineers, Inc. ("SWE") to provide technical support in developing and implementing the Poudre Flows Plan. This work has included development of the analysis that is described herein to identify the location, frequency, and duration of low flow conditions on the Poudre River that would benefit from flow enhancement. In addition, SWE's work has included compilation, review, and analysis of historical records of streamflows, diversions and returns, and water rights administration (priority calls) for the Poudre River. These data were used to develop a point flow model to estimate historical daily flows of the Poudre River at numerous locations between the Canyon Mouth and the South Platte River confluence during a 2002 – 2019 study period.

CPW analyzed Poudre River fish habitat and channel hydraulics and used this information to develop proposed habitat preservation and improvement flow rates for six river segments in the Poudre Flows Reach. Historical daily streamflow deficits were computed for each river segment during the 2002 – 2019 study period based on the difference between the estimated point flows and the preserve and improve flow rates in CPW's analysis.

The estimated daily point flows and flow deficits are presented in graphical summaries attached to this report that illustrate the spatial and temporal variability of the historical streamflows and streamflow deficits. These results are being used by the Poudre Flows Partners to identify and quantify opportunities to improve streamflow conditions on the Poudre River. While there often are substantial differences between the historical flows and the preserve and improve flow rates, any amount of additional flow that can be delivered through the affected river reaches will have positive impacts on the aquatic habitat and fish population.

The proposed Poudre Flows Plan is intended to establish a framework pursuant to C.R.S. 37-92-102(4.5) to enhance streamflows in the Poudre Flows Reach through the addition of water rights decreed for augmentation use that are made available to the CWCB through contractual arrangements pursuant to C.R.S. 37-92-102(3). Augmentation water is initially being made available to the CWCB through previously changed and quantified water rights provided by the Cities of Fort Collins, Greeley, and Thornton ("Seed Water Rights"). Additional water can be added to the Poudre Flows Plan through a notice and review procedure to be developed and approved by the Division 1 Water Court ("Water Court").

The general concept for the augmentation supplies used in Poudre Flows Plan is that the supplies should represent additional water to the Augmented Reach that was not historically present. The additional water typically will be water that was historically consumed by irrigation or other uses, or water that returned to the river in a lower river reach (and therefore is additional flow when delivered through an upstream reach).

2.0 STUDY AREA

The Poudre River is a 126-mile-long tributary of the South Platte River located in northern Colorado with a watershed that drains approximately 1,760 square miles. The headwaters of the Poudre River are in the northern portion of Rocky Mountain National Park. The river descends east through the scenic Poudre Canyon before emerging on the eastern plains and meandering through Fort Collins, Timnath, Windsor, and Greeley before joining the South Platte River. The river west of Interstate 25 ("I-25") is characterized by a steeper and rocky bed compared to the flatter and less rocky bed east of I-25.

The proposed Poudre Flows Plan will augment streamflows in the approximately 52-mile reach between the Canyon Mouth and the South Platte River confluence shown in Figure 1-1. Within the augmented reach are 24 major diversions that serve agricultural, municipal, industrial, and other water users. The cumulative effects of diversions within the Poudre Flows Reach result in low flow or no flow at various locations depending on hydrologic conditions, water demands, and time of year. Frequent dry-up locations reported by Mark Simpson (District 3 Water Commissioner) are shown on the map in Figure 2-1 and are color-coded to indicate whether the dry-up typically occurs during the irrigation season, non-irrigation season, or both.

3.0 HISTORICAL STREAMFLOWS

The largest source of water flowing into the Poudre Flows Reach is snowmelt runoff during the spring and summer. The rate and volume of snowmelt runoff vary depending on the accumulated snowpack volume and temperatures during the runoff period. Additional flows occur sporadically from spring through fall from rainfall runoff, sometimes in spectacular and damaging amounts. Natural streamflows are supplemented by transbasin imports from the Colorado River basin as part of the Colorado-Big Thompson Project ("CBT Project") and other transbasin diversions. Return flows from irrigation and other uses are also significant sources of water in the lower sections of the Poudre Flows Reach.

Water is diverted from the Poudre Flows Reach for direct flow uses during the April – October season for irrigation uses and year-around for municipal and other uses. Diversions to storage occur primarily during the November – March non-irrigation season to fill reservoirs for subsequent use when the natural flows are limited. Deliveries of CBT and other transbasin waters are also made to supplement the natural flow supplies.

3.1 Poudre River Flow Records

Poudre River flows are measured at five locations in the Poudre Flows Reach as shown in Figure 3-1. The oldest gages are the Canyon Mouth gage at the upstream end of the reach with continuous records beginning in 1885 and the Near Greeley gage near the downstream end of the reach with continuous records going back to 1915. The three other gages were installed between 1975 and 1995. Annual flow statistics for each gage are provided in Table 3-1.

Several graphs are attached to illustrate the annual, seasonal, and spatial variability of the Poudre River flows through the Augmented Reach. Figure 3-2 shows the historical annual flows at the Canyon Mouth gage since 1885 and illustrates the long-term variability of annual Poudre River flows entering the Poudre Flows Reach. A summary of the historical Canyon Mouth gage flows is provided in the following table.

Summary of Annual Flows
Cache la Poudre at Canyon Mouth
1885 - 2019
(acre-feet)

Average	264,100
Median	252,500
Maximum	644,800
Minimum	64,800

Figure 3-3 was prepared to illustrate the historical average, maximum, and minimum daily flows at each of the five Poudre River gages during the 2002 – 2019 period that was selected for the point flow analysis described below. Figure 3-4 presents the same information using a logarithmic scale to better display the historical low flows.

3.2 Diversion and Return Records

The Colorado Division of Water Resources ("DWR") generally requires that all diversions from the Poudre River be measured and reported. Many point discharge returns (e.g., WWTP discharges) are also measured and reported. All available historical diversion and return data were compiled and summarized for the 2002 – 2019 study period.

Most of the diversion and return data were obtained from DWR's Colorado Decision Support System ("CDSS") online database, with additional flow data obtained from the U.S. Environmental Protection Agency ("EPA") and NCWCD. There are daily flow data available for most structures for the 18-year study period, however some structures did not operate during all portions of the study period. Several of the point discharge returns had only monthly data available and daily flows were estimated for these structures as the daily average rate during the month. Missing data for the Mulberry Wastewater Treatment Plant ("WWTP") were estimated for several months based on correlation with the data for the Greeley WWTP.

Table 3-2 was prepared to summarize historical records of diversions and returns within the Poudre Flows Reach. The table lists the structure name, alternate names, WDID, segment, stream mile, period of record, and the average annual flow in acre-feet. The locations of all diversions and returns are shown in Figure 3-1.

3.3 Point Flow Model

As described above, Poudre River flows are measured at five stream gages within the study reach as shown in the map in Figure 3-1. To estimate the flow at other locations, SWE developed a point flow model using industry standard procedures. Daily streamflow, diversion, and return records were used to compute the unmeasured gains and losses between the stream gages based on simple water balance calculations. Daily streamflows were estimated below each diversion and above each return by adding and subtracting the measured diversions and returns and the unmeasured gains and losses from daily flows for the nearest upstream gage. An illustration of the computations performed in the point flow model is provided in Appendix A.

The study period for the point flow model extends from January 1, 2002 to October 31, 2019 and was selected to include average, dry, and wet periods that are representative of current water use practices. Daily point flow estimates were computed in the model at 43 locations within the study reach in addition the measured data at the five gages.

3.4 Characterization of Historical Poudre River Flows

SWE developed a flow visualization tool to depict the results of the point flow model in a way that better illustrates spatial and temporal flow variations compared to typical line graphs. The flow visualization tool illustrates the streamflows in a matrix format with location shown in the horizontal and time shown in the vertical. The magnitude of flow at each point in time and space is illustrated by color. This type of graphic is referred to in the scientific literature as a "heat map" (Wilkinson and Friendly, 2009). Weather radar maps showing intensity of precipitation are a common form of heat map that most people are familiar with.

Heat maps illustrating the actual and estimated daily flows from the point flow model are available for each year of the 2002 – 2019 study period. Appendix B contains heat maps showing the computed point flows during a dry year (2002), an average year (2009), and a wet year (2014). The heat maps are color-coded from light to dark to represent increasing magnitude of flow (see the legend in the upper left of each figure). Dry-up locations are depicted in white.

The point flow heat maps are helpful in visualizing seasonal and spatial variations in flows. During the late spring and early summer months, snowmelt runoff enhances the streamflows as evidenced by the predominantly blue and black areas. Lower flows later in the irrigation season and during the non-irrigation season are evident in the lighter shades of green. A significant diversion or return can be identified by a color contrast at

the structure. The effects of return flows in the lower section of the river are evident as the colors become progressively darker in the downstream direction.

4.0 STREAMFLOW RECOMMENDATIONS

Streamflow needs in the Poudre Flows Reach were analyzed by CPW to establish ranges of flows that could benefit from the Poudre Flows Plan. A summary of recommended streamflows determined by CPW is provided below along with an analysis to quantify the timing and location of the flow deficits (difference between the historical flows and the CPW recommended flows) that could be reduced through augmentation.

4.1 CPW Analysis

CPW evaluated conditions within the Poudre Flows Reach to recommend flow ranges that would preserve and improve habitat for various fish species. The analysis, documented in a 2020 report, determined that it was appropriate to divide the river into six segments based on the fishery composition, hydraulic characteristics of the river channel, and other factors (CPW, 2020). These are identified as Segments A - F on the maps in Figure 1-1, Figure 2-1, and Figure 3-1.

As detailed in the 2020 CPW report, optimal flows vary by location, fish species, and life stage. CPW analyzed the relationship between flow and weighted useable cross-section area (a measure of habitat preferences) for various cold water and warm water species and life stages. CPW distilled the results of their analysis into ranges of flows that would preserve and improve the natural environment, balancing the needs of the various fish species in each segment. The flows recommended by CPW for each segment are summarized in Table 4-1.

The recommended flows for Segments A and B are greater than the recommended flows for other segments downstream largely due to the fishery composition, greater stream slopes, and flow velocities in the upper reaches of the river. Trout (rainbow trout in particular) prefer increased velocities and depths achieved at greater flows. These habitat preferences were balanced with needs of other fish species and life stages, in particular trout fry and warm-water species which are less tolerant of cold, swift water. In addition, note that the habitat improvement flows in the upper segments (Segments A & B) are greater in the summer compared to the winter, while the recommended flows in the lower segments (Segments C – F) are the same or similar for the summer and winter. This strategy allows for balancing different habitat preferences and flow needs at different times of the year for different species inhabiting Segments A & B.

4.2 Historical Flow Deficits

Heat map depictions of the flow deficits between historical streamflows and the habitat improvement flows determined by CPW were prepared for each year of the 2002 – 2019 study period. Heat maps illustrating the flow deficits for a dry year (2002), an average year (2009), and a wet year (2014) are provided in Appendix C. The flow deficit heat maps are color-coded to indicate the magnitude of the daily flow deficits, with larger deficits shown in increasingly darker colors. Historical flows that equaled or exceeded the recommended flows (i.e., zero deficit) are shown in white.

Review of the flow deficit heat maps shows that substantial deficits typically exist from the late summer through early spring in Segments A – C during average and dry years. There typically are no deficits in these segments during the high snowmelt runoff period, which ranges from a few weeks in dry years to a several months in wet years. Deficits typically decline further downstream because of the increasing return flows and the lower habit enhancement flows. However, there are flow deficits in Segments E and F during average and dry years during the irrigation season. In a wet year such as 2014, the flow deficits are less and of shorter duration, but additional flows would still be helpful at times in some segments during wet years.

5.0 CHANGED AND QUANTIFIED WATER RIGHTS DECREED FOR AUGMENTATION

Pursuant to the provisions of the recently enacted C.R.S. 37-92-102(4.5), sources of water used to augment streamflows are limited to water rights for which the historical consumptive use has been quantified and which have been previously changed to any augmentation use. Initially, augmentation supplies are being made available to the CWCB for use in the Poudre Flows Plan by the Cities of Fort Collins, Greeley, and Thornton, and these initial water contributions are referred to as "Seed Water Rights." The Seed Water Rights made available by Fort Collins, Greeley, and Thornton conform with the foregoing statutory requirements.

The Poudre Flows Plan will also allow additional augmentation water to be added to the plan after it is decreed based on a notice provided to the Division Engineer and other parties to the case. Augmentation supplies that may be added to the plan in the future are referred to as "Added Water."

5.1 Seed Water Rights

The Seed Water Rights made available to the CWCB for use in the Poudre Flows Plan are changed and quantified water rights that were originally used for irrigation of lands served by irrigation companies that divert from the Poudre River. Table 5-1 provides a summary of the Seed Water Right contributions, including descriptions of the specific Poudre River "Seed Water Reaches" within the segments to be augmented, and proposed average and maximum flow rates at which the augmentation water will be provided. A map showing the Seed Water Reaches is provided in Figure 5-1. Heat maps illustrating the combined proposed Seed Water Right contributions from the three cities are shown in Figure 5-2 (average rates) and Figure 5-3 (maximum flow rates).

Narrative descriptions of the Seed Water Rights being made available by the three cities follow.

5.1.1 Fort Collins Seed Water Rights

The Fort Collins Seed Water Rights are comprised of changed water rights represented by shares in the following irrigation companies that are part of the companies known collectively as the Southside Ditches companies[1]:

[1] The Warren Lake Reservoir Company is another of the so-called "Southside Ditches" companies; however, no shares in this company are included in the Poudre Flows Plan.

- Arthur Irrigation Company – 154.675 shares (12.82%)
- Larimer County Canal No. 2 Irrigating Company – 27.61175 shares (18.88%)
- New Mercer Ditch Company – 27.6083 shares (19.54%)

The subject ditches divert from the Poudre River within Segment A as shown in Figure 5-1.

Fort Collins changed the foregoing shares from irrigation use to municipal and other uses, including augmentation, in Case No. 05CW323, the decree for which was entered by the Water Court on April 24, 2014. Historical diversions and return flows were quantified by the Water Court based on analysis of historical use during a 1913-1970 study period. The 05CW323 decree includes terms and conditions to limit the changed uses of the subject water rights including monthly, annual, and long-term volume limits on diversions, leaving water in the original ditches for historical conveyance losses, and maintenance of historical return flows to the Poudre River.

The Fort Collins Seed Water Rights have continued to be diverted for agricultural irrigation at the original points of diversion for the subject ditches. Each year, pursuant to the terms of the 05CW323 decree, Fort Collins will make an election of how much of the subject water rights will remain in agricultural irrigation, be used for municipal use, or be made available to the Poudre Flows Plan.

Under typical operation, water made available to the Poudre Flows Plan will be quantified at the original points of diversion, and then will be delivered for augmentation use through Segments A and B and into Segment C where the consumptive use and subsurface winter return flow portions will be diverted at the Fossil Creek Reservoir Inlet Ditch ("FCRID") for storage in Rigden Reservoir, leaving the remainder in the stream to meet the immediate return flow requirements in the decree. Alternatively, Fort Collins may deliver the consumptive use water further downstream for lease to others.

5.1.2 Greeley Seed Water Rights

The Greeley Seed Water Rights consist of 125.12 shares in the Greeley Irrigation Company ("GIC") that were changed to municipal and other uses in Case Nos. 99CW232 and 15CW3163. These change decrees include annual and ten-year volume limits, but no monthly limits. Diversions are limited to the period from April 15 – October 31.

The GIC direct flow water rights are diverted at the headgate of the Greeley #3 Ditch located in Segment E as shown in Figure 5-1. Pursuant to the terms of the change decrees, Greeley's interest in the changed direct flow water rights will continue be diverted at the Greeley #3 Ditch headgate and the portion dedicated to the Poudre Flows Plan will be

returned to Poudre River at the "F" Street Return near the top of Segment F. Water returned to the river for the Poudre Flows Plan may include water that was previously consumed, as well as water to pay return flow obligations in which case it should be considered additional water in the reach upstream of where the obligation is owed.

Greeley currently uses its GIC shares for non-potable irrigation, augmentation of wells, and storage. Approximately 40 shares remain in agricultural irrigation, but these shares are expected to be converted to other uses within approximately two years. The number of GIC shares that Greeley will dedicate to the Poudre Flows Plan will vary from year to year, and Greeley proposes to provide annual notice of the shares dedicated to the plan each year.

GIC shares that are dedicated to the plan will be released back to the Poudre River at the "F" Street Return and the portion not being used to pay return flows be delivered downstream for augmentation use and reduced to account for transit losses. Greeley has an agreement to use up to 15 cfs in an existing bypass structure at the Oglivy Ditch headgate that can be used when the Ogilvy Ditch would otherwise be sweeping the river. After Greeley's Seed Water Rights are delivered through Segment F to the confluence with the South Platte River, Greeley may use the water for other beneficial purposes, including for return flow and other augmentation obligations, or for lease to others.

5.1.3 Thornton Seed Water Rights

Seed Water Rights made available to the Poudre Flows Plan by Thornton consist of changed water rights represented by shares in the following ditch companies:

- Water Supply and Storage Company ("WSSC") – 283.354 shares (47.43%)
- Jackson Ditch Company ("JDC") – 1.25 shares (5.10%)

WSSC operates the Larimer County Canal ("LCC") which diverts from the north bank of the Poudre River in Segment A. Water supplies for WSSC include direct flow water rights, storage water rights in mountain reservoirs and reservoirs under the LCC, and transmountain water rights.

JDC operates the Jackson Ditch (a.k.a. Dry Creek Ditch) that diverts from the north bank of the Poudre River downstream of the LCC in Segment A. There is some intermingling of the JDC and WSSC service areas and WSCC owns shares in the JDC.

Thornton's WSCC shares and JDC shares were changed to municipal and other uses, including augmentation, by the decree entered in 1998 in Consolidated Case Nos.

86CW401, 86CW402, 86CW403, and 87CW332. Since the decree was entered, Thornton's shares have been mostly leased to WSSC farmers for agricultural irrigation.

Once shares are converted to municipal use, Thornton is obligated to replicate historical return flows and meet other stipulated flow obligations at various points throughout the Poudre Flows Reach including the following:

- Larimer and Weld Canal headgate,
- Fossil Creek Reservoir Inlet Canal headgate,
- Greeley No. 2 Canal headgate,
- Boyd and Freeman Canal headgate,
- Just upstream of Greeley Water Purification Facility,
- Ogilvy Ditch headgate, and
- Poudre-South Platte confluence.

Thornton will meet its return flow and stipulation obligations by delivering water to the Poudre River at the following points:

- Chambers Lake and Long Draw Reservoirs,
- Augmentation station near the LCC headgate,
- Dry Creek confluence with the Poudre River, and
- Releases to the Poudre River from other reservoirs.

Thornton proposes to make its WSSC and JDC water available to the Poudre Flows Plan by providing changed share water decreed in Case No. 87W332 to upstream reaches of the Poudre River to meet downstream return flow obligations and other stipulated flow obligations. Deliveries will include water to cover any stream losses assessed by the Division Engineer. Deliveries to the Poudre River will comprise additional water for augmentation use in the river reaches between the points of delivery and the points at which the obligations are owed. Before April 1 and November 1 of each year, or as otherwise agreed to, Thornton will notify the CWCB of the anticipated amount, timing and location of water from the subject water rights that are initially estimated to be delivered to the Poudre Flows Plan for that season

5.2 Additional Water

The decree will contain provisions for other augmentation water to be added to the Poudre Flows Plan at a later date provided that it complies with the statutory requirements that the historical consumptive use for the water right(s) has been determined by the Water Court and the rights are decreed for augmentation use. The

process for adding water to the Poudre Flows Plan will be documented in the final decree for the Poudre Flows Plan, and will involve providing notice to the Division Engineer and other interested parties of the source of the water, the point(s) of delivery to the Poudre River, and the reach(es) to be augmented. Details of the notification process will be developed during the Water Court process.

6.0 ADMINISTRATION OF POUDRE FLOWS PLAN

Water rights administration in the Poudre River basin has long involved administration of direct flow water rights and storage water rights under the priority system, reservoir releases, and exchanges. Direct flow water rights are typically more senior than storage water rights, and Poudre River water rights are generally more senior than downstream South Platte River water rights. Based on this relative seniority, the Poudre River is generally controlled by local priority calls and rarely by calls from the South Platte River.

In addition, there are numerous decreed and administratively approved exchanges that operate on the Poudre River for which water is diverted upstream in exchange for water delivered to the river downstream, typically by a reservoir release. Exchanges are operated so as not to injure water rights within the exchange reach and are also administered by priority when there are exchanges competing for limited exchange flows.

Superimposed on priority administration of direct flow, storage, and exchange water rights, are deliveries of transmountain water and storage releases down the Poudre River for downstream use. These deliveries do no not have a priority, but rather are protected from priority administration and diversion by others. However, water users typically can exchange on these deliveries as they are conveyed down the river. Downstream deliveries of transmountain water and storage releases are assessed transit losses by the Division Engineer, typically at rates of 0.25% per mile west of I-25 and 0.50% per mile east of I-25.

Operation and administration of the Poudre Flows Plan will need to interface with the existing Poudre River administration in a manner that avoids injury to existing water rights and administrative exchanges approved before the date of filing of the Poudre Flows Plan application. Conveyance of augmentation water through all or portions of the Poudre Flows Reach will be similar to deliveries of storage water and transmountain water except that augmentation deliveries will be protected from others exchanging on the flows.

Delivering augmentation water past dry-up locations and protecting these deliveries from exchanges will require measurement of bypass flows at dry-up locations and potentially at other key locations, and working with ditch companies on modifications to diversion dams and other structures as necessary to effectively pass the augmentation water downstream.

The Poudre Flows partners have initiated discussions with the Division Engineer and his staff to identify and begin working through the administration issues that the Poudre Flows Plan presents. Preliminary indications are that an effective mechanism for administering the Poudre Flows Plan can be developed through cooperation and

communication among the local water users, the Poudre Flow Partners, and State water officials. It is anticipated that the procedures for operation, accounting, and administration will evolve and adapt as the parties "learn by doing."

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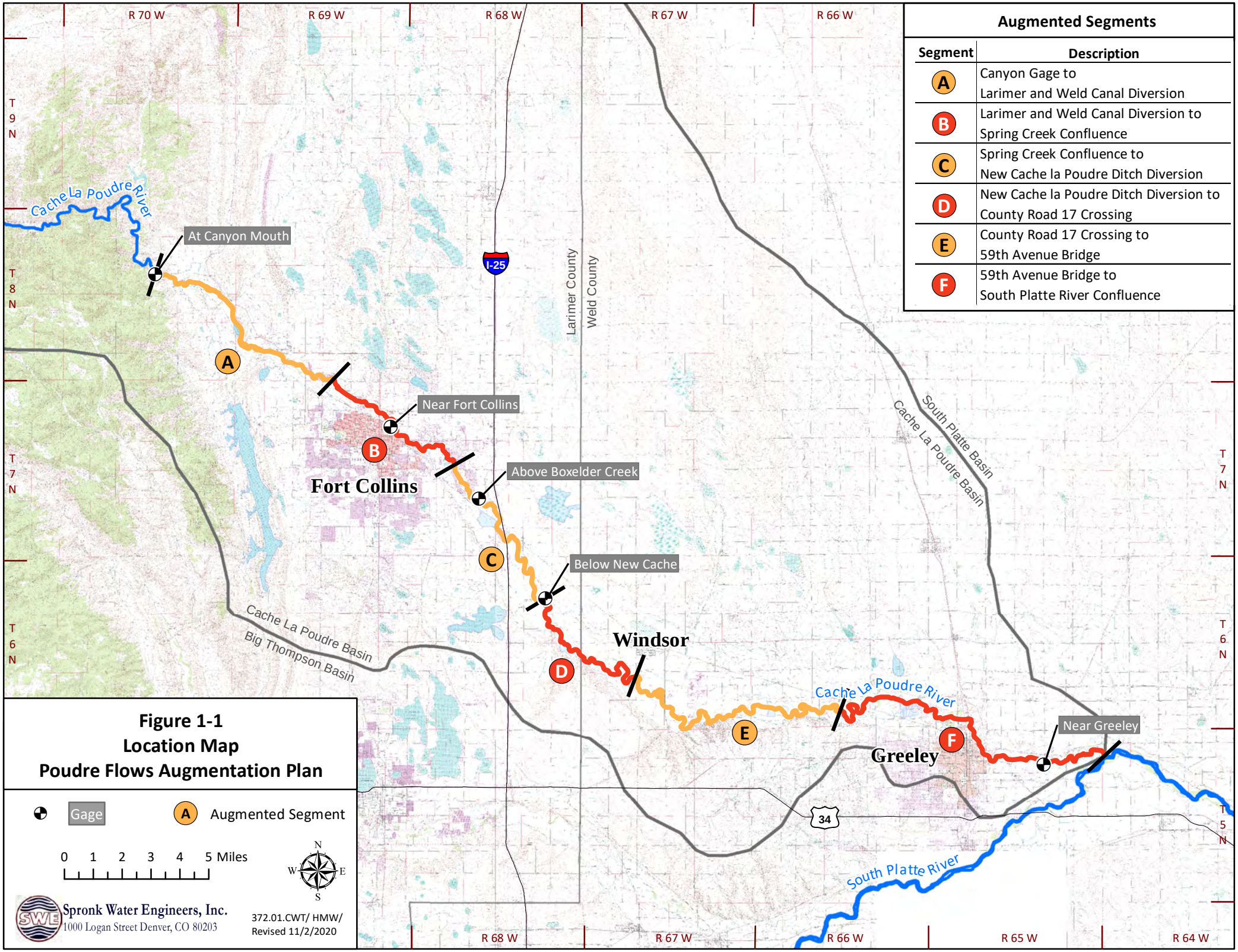
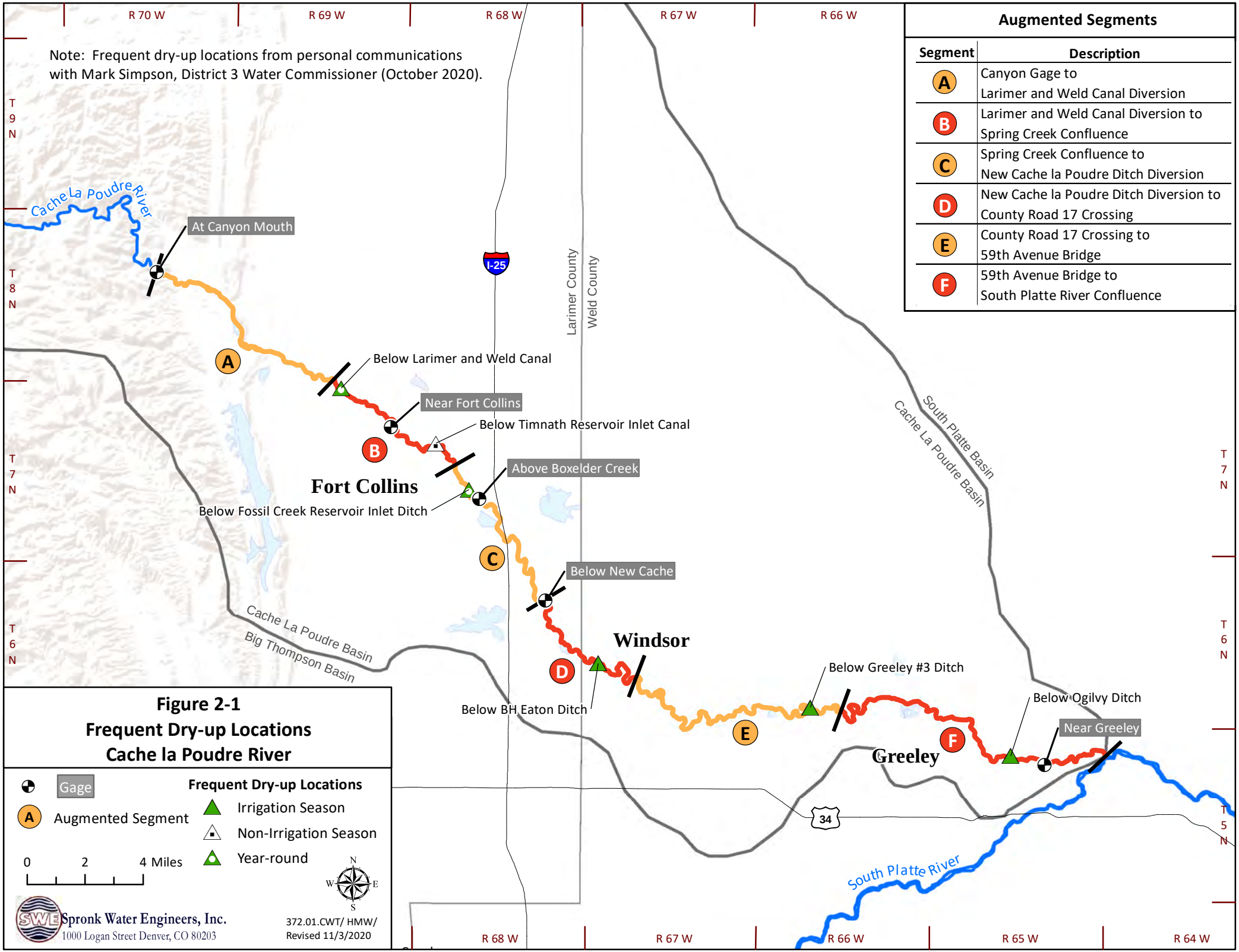
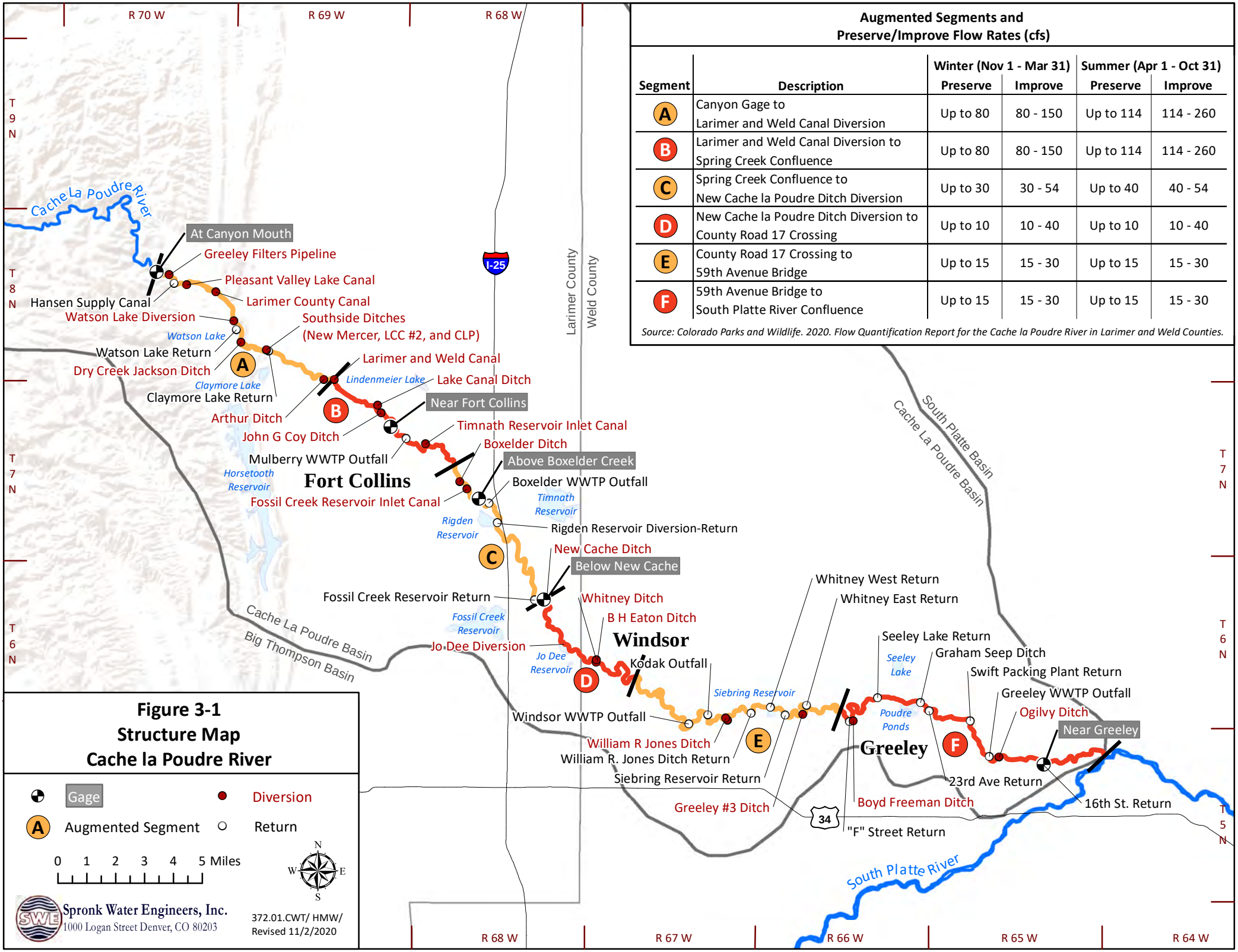
FIGURES


R 70 W
R 69 W
R 68 W
R 67 W
R 66 W
R 65 W
R 64 W
T 9 N
T 8 N
T 7 N
T 6 N
T 5 N
Cache La Poudre River
At Canyon Mouth
I-25
Larimer County
Weld County
A
Near Fort Collins
B
Fort Collins
Above Boxelder Creek
C
Below New Cache
Windsor
D
E
F
Greeley
Near Greeley
South Platte Basin
Cache La Poudre Basin
Big Thompson Basin
34
South Platte River
Augmented Segments
Segment
Description
A
Canyon Gage to Larimer and Weld Canal Diversion
B
Larimer and Weld Canal Diversion to Spring Creek Confluence
C
Spring Creek Confluence to New Cache la Poudre Ditch Diversion
D
New Cache la Poudre Ditch Diversion to County Road 17 Crossing
E
County Road 17 Crossing to 59th Avenue Bridge
F
59th Avenue Bridge to South Platte River Confluence
Figure 1-1
Location Map
Poudre Flows Augmentation Plan
Gage
A
Augmented Segment
0 1 2 3 4 5 Miles
N
W
E
S
Spronk Water Engineers, Inc.
1000 Logan Street Denver, CO 80203
372.01.CWT/ HMW/
Revised 11/2/2020


Note: Frequent dry-up locations from personal communications with Mark Simpson, District 3 Water Commissioner (October 2020).
Augmented Segments
Segment
Description
A
Canyon Gage to Larimer and Weld Canal Diversion
B
Larimer and Weld Canal Diversion to Spring Creek Confluence
C
Spring Creek Confluence to New Cache la Poudre Ditch Diversion
D
New Cache la Poudre Ditch Diversion to County Road 17 Crossing
E
County Road 17 Crossing to 59th Avenue Bridge
F
59th Avenue Bridge to South Platte River Confluence
R 70 W
R 69 W
R 68 W
R 67 W
R 66 W
R 65 W
R 64 W
T 9 N
T 8 N
T 7 N
T 6 N
T 5 N
Cache La Poudre River
At Canyon Mouth
I-25
Larimer County
Weld County
Below Larimer and Weld Canal
Near Fort Collins
Below Timnath Reservoir Inlet Canal
Above Boxelder Creek
Fort Collins
Below Fossil Creek Reservoir Inlet Ditch
Below New Cache
Windsor
Below BH Eaton Ditch
Below Greeley #3 Ditch
Below Ogilvy Ditch
Near Greeley
Greeley
South Platte Basin
Cache La Poudre Basin
Big Thompson Basin
South Platte River
34
Figure 2-1
Frequent Dry-up Locations
Cache la Poudre River
Gage
Augmented Segment
Frequent Dry-up Locations
Irrigation Season
Non-Irrigation Season
Year-round
0
2
4 Miles
N
W
E
S
Spronk Water Engineers, Inc.
1000 Logan Street Denver, CO 80203
372.01.CWT/ HMW/
Revised 11/3/2020



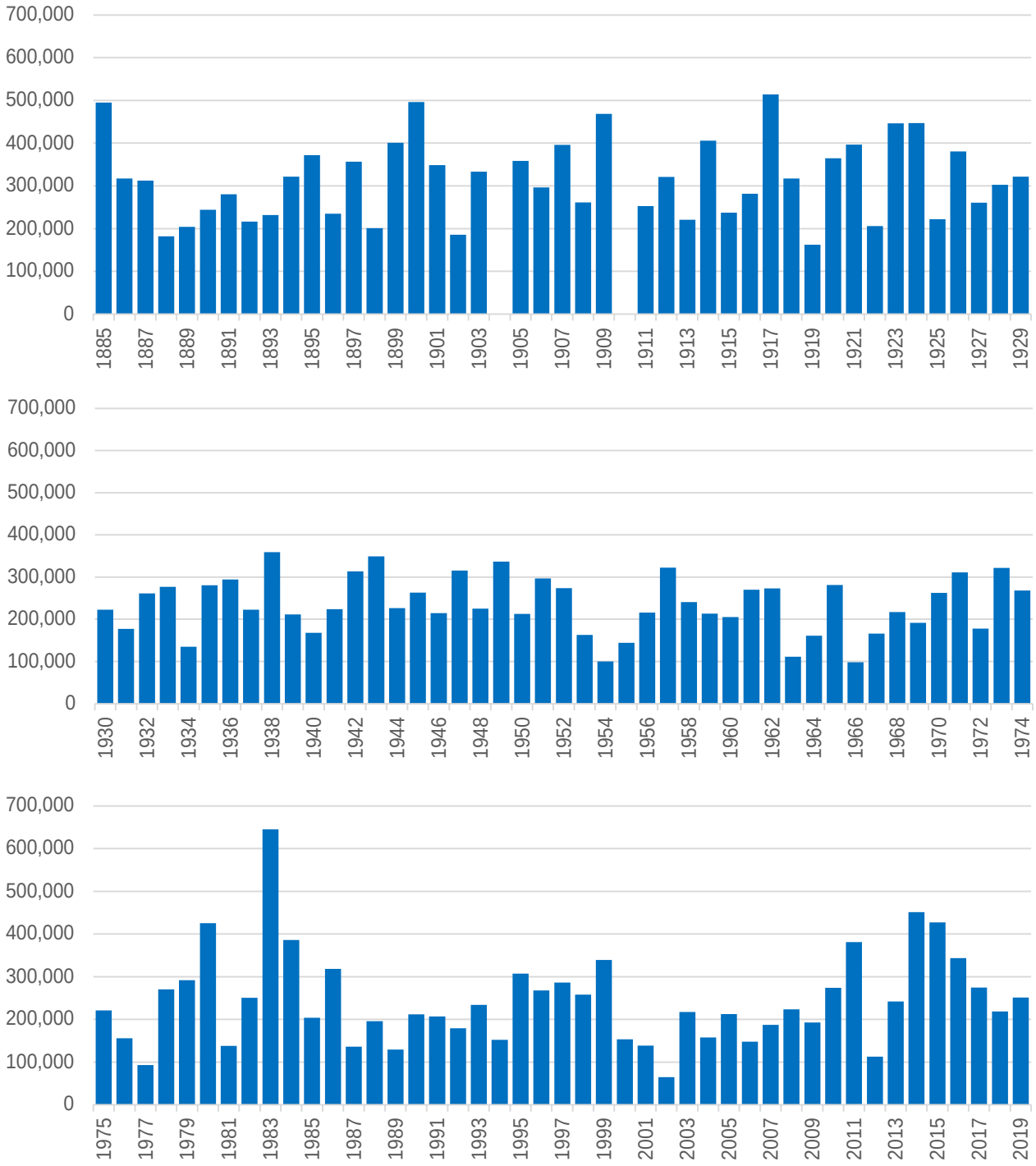
Augmented Segments and Preserve/Improve Flow Rates (cfs)

Segment	Description	Winter (Nov 1 - Mar 31) Preserve	Winter (Nov 1 - Mar 31) Improve	Summer (Apr 1 - Oct 31) Preserve	Summer (Apr 1 - Oct 31) Improve
A	Canyon Gage to Larimer and Weld Canal Diversion	Up to 80	80 - 150	Up to 114	114 - 260
B	Larimer and Weld Canal Diversion to Spring Creek Confluence	Up to 80	80 - 150	Up to 114	114 - 260
C	Spring Creek Confluence to New Cache la Poudre Ditch Diversion	Up to 30	30 - 54	Up to 40	40 - 54
D	New Cache la Poudre Ditch Diversion to County Road 17 Crossing	Up to 10	10 - 40	Up to 10	10 - 40
E	County Road 17 Crossing to 59th Avenue Bridge	Up to 15	15 - 30	Up to 15	15 - 30
F	59th Avenue Bridge to South Platte River Confluence	Up to 15	15 - 30	Up to 15	15 - 30

Source: Colorado Parks and Wildlife. 2020. Flow Quantification Report for the Cache la Poudre River in Larimer and Weld Counties.

Figure 3-2

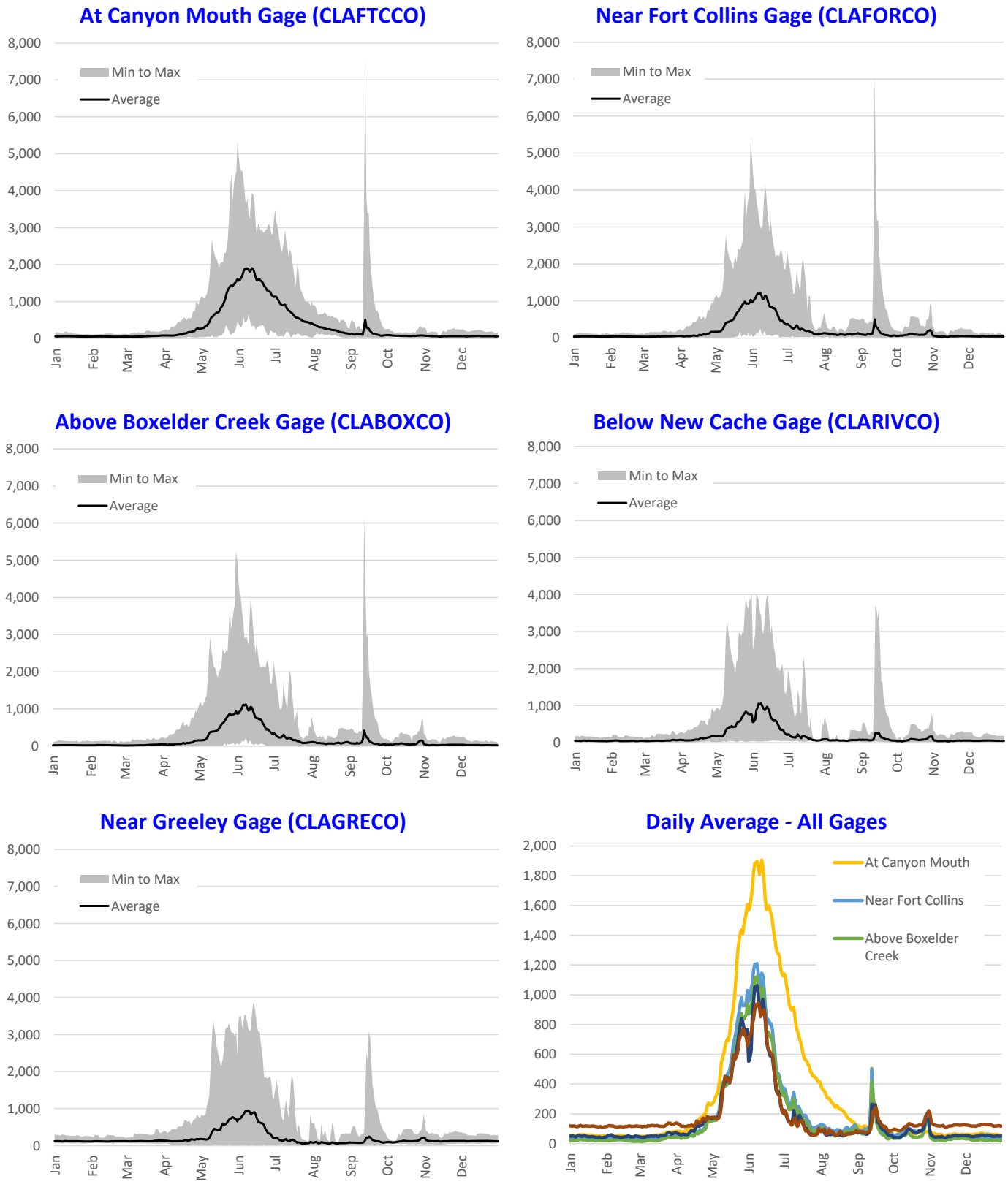
Annual Historical Flows
Cache la Poudre at Canyon Mouth
1885 - 2019 (AF)



Notes:
October - September water year totals of daily measured flows obtained from DWR CDSS.
Data missing for 1904 and 1910.

Figure 3-3

Daily Average, Maximum, and Minimum Flows
Cache la Poudre River
2002 - 2019
(cfs)

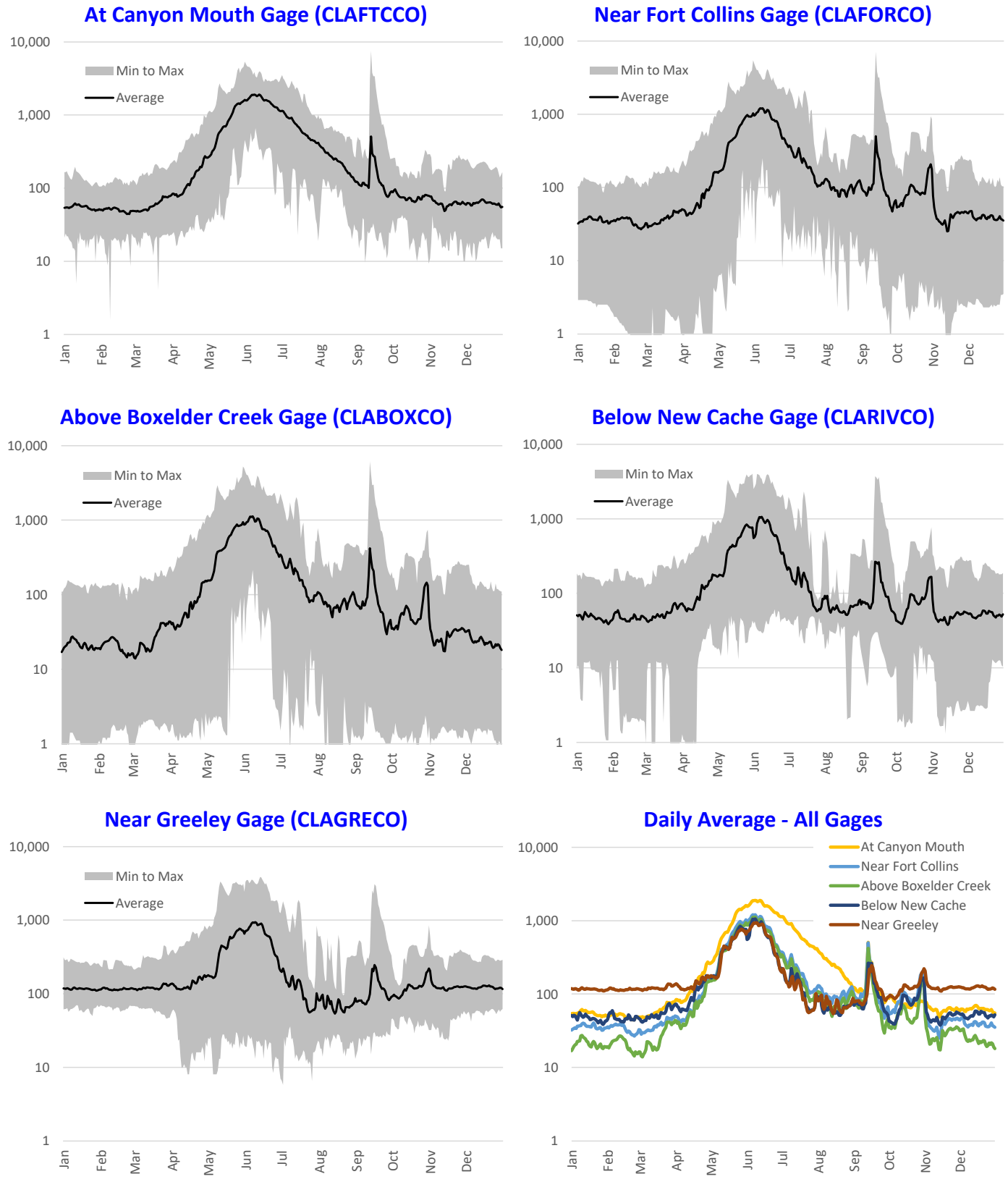


Source: Colorado Division of Water Resources daily streamflow records.

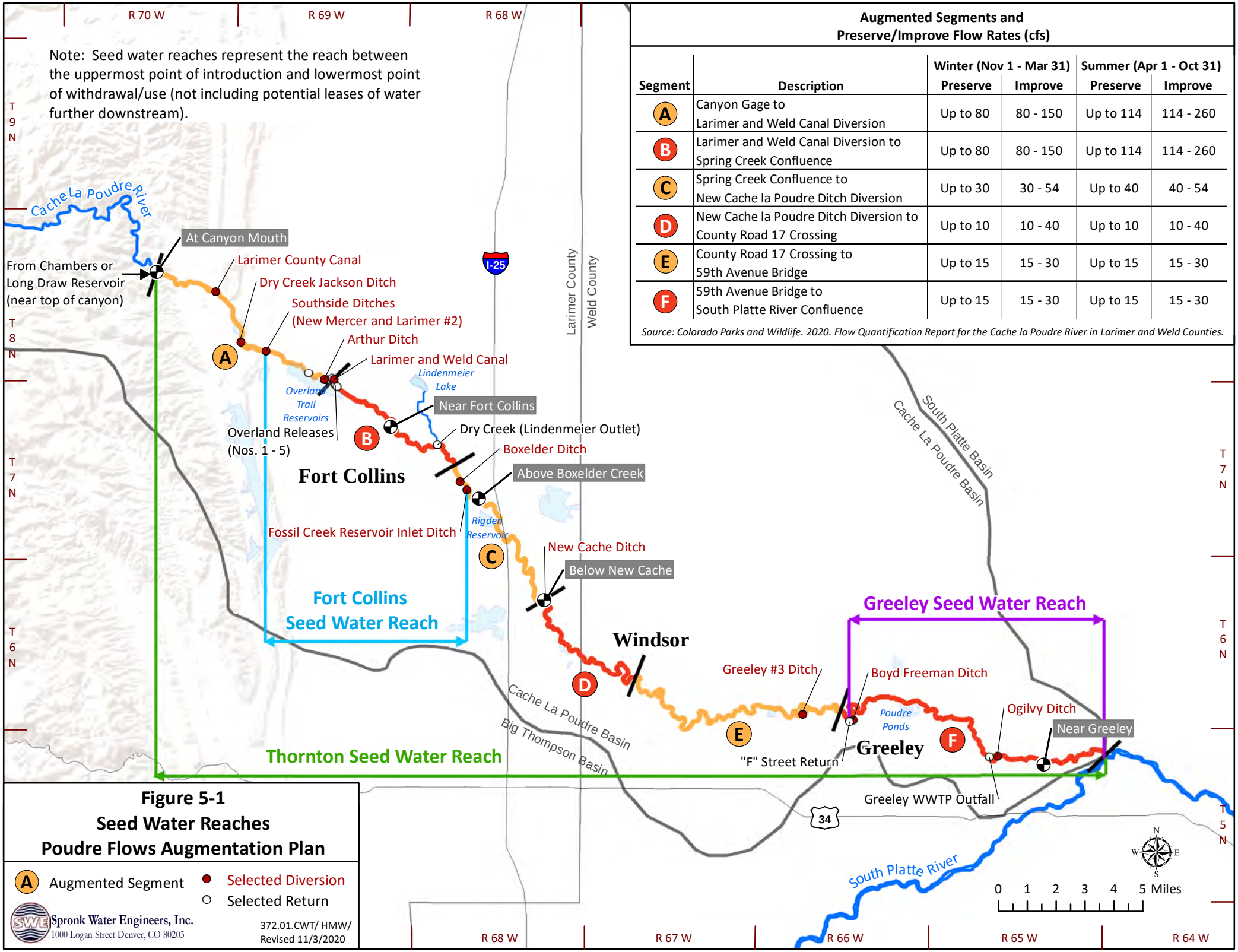
Note different scale.

Figure 3-4

Daily Average, Maximum, and Minimum Flows
Cache la Poudre River
2002 - 2019 (Log Scale)
(cfs)



Source: Colorado Division of Water Resources daily streamflow records.



Augmented Segments and Preserve/Improve Flow Rates (cfs)

Segment	Description	Winter (Nov 1 - Mar 31) Preserve	Winter (Nov 1 - Mar 31) Improve	Summer (Apr 1 - Oct 31) Preserve	Summer (Apr 1 - Oct 31) Improve
A	Canyon Gage to Larimer and Weld Canal Diversion	Up to 80	80 - 150	Up to 114	114 - 260
B	Larimer and Weld Canal Diversion to Spring Creek Confluence	Up to 80	80 - 150	Up to 114	114 - 260
C	Spring Creek Confluence to New Cache la Poudre Ditch Diversion	Up to 30	30 - 54	Up to 40	40 - 54
D	New Cache la Poudre Ditch Diversion to County Road 17 Crossing	Up to 10	10 - 40	Up to 10	10 - 40
E	County Road 17 Crossing to 59th Avenue Bridge	Up to 15	15 - 30	Up to 15	15 - 30
F	59th Avenue Bridge to South Platte River Confluence	Up to 15	15 - 30	Up to 15	15 - 30

Source: Colorado Parks and Wildlife. 2020. Flow Quantification Report for the Cache la Poudre River in Larimer and Weld Counties.

Figure 5-1
Seed Water Reaches
Poudre Flows Augmentation Plan

A Augmented Segment
Selected Diversion
Selected Return

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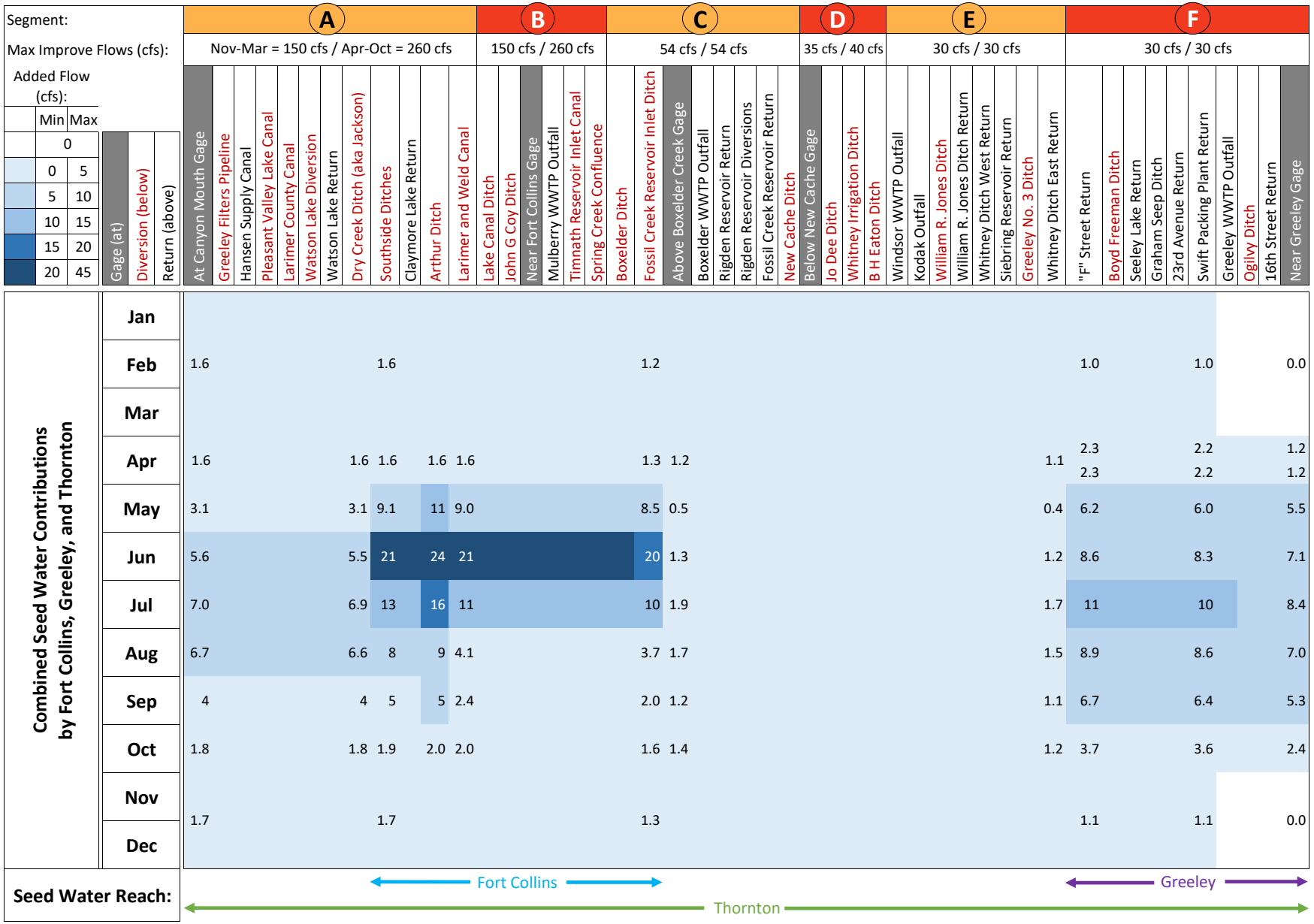
1000 Logan Street Denver, CO 80203

372.01.CWT/ HMW/
Revised 11/3/2020

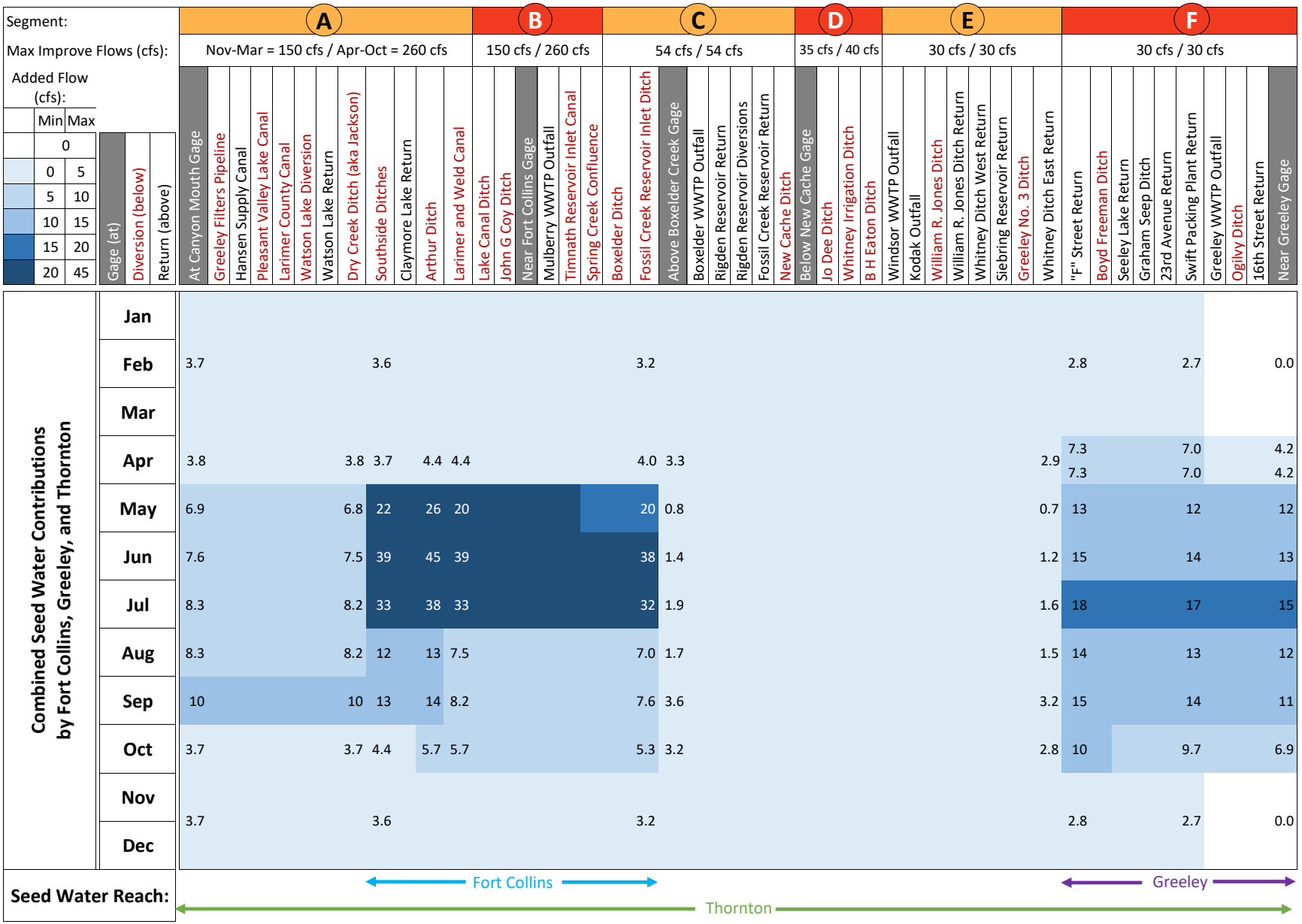
Figure 5-2
Average Seed Water Contributions
Poudre Flows Augmentation Plan



Notes:

Rates are estimated total average daily flows from seed water providers shown as introduced at uppermost top of reach to lowermost bottom or reach. Approximate river transit losses are assumed (0.25% per mile west of I-25 and 0.50% per mile east of I-25). Contributions are summed for overlapping reaches. Rates are reduced for Thornton return flow obligations in segments A, C, and F.

Figure 5-3
Maximum Seed Water Contributions
Poudre Flows Augmentation Plan



Notes:

Rates are estimated total maximum daily flows from seed water providers shown as introduced at uppermost top of reach to lowermost bottom or reach. Approximate river transit losses are assumed (0.25% per mile west of I-25 and 0.50% per mile east of I-25). Contributions are summed for overlapping reaches. Rates are reduced for Thornton return flow obligations in segments A, C, and F.

TABLES

Table 3-1

Cache la Poudre River Gages

	Station Name	Station ID	Abbrev.	(1) Operator	(2) Period of Record	Water Year Flows (AF)				
						All Years Avg (3)	2002-2019			
							Avg	Median	Max	Min
(4)	At Canyon Mouth	06752000	CLAFTCCO	DWR	1881 - 2020	263,600	243,500	221,200	451,300	64,800
	At Fort Collins	06752260	CLAFORCO	USGS	1975 - 2020	125,800	133,200	96,400	348,300	24,100
	Above Boxelder Creek	06752280	CLABOXCO	USGS	1979 - 2020	113,000	113,800	81,300	351,200	11,400
	Below New Cache	CLARIVCO	CLARIVCO	DWR	1995 - 2020	109,100	111,900	70,400	358,800	21,200
(5)	Near Greeley	06752500	CLAGRECO	DWR	1903 - 2020	107,000	136,100	103,100	414,400	37,200

Notes:

(1) All data downloaded from Colorado Department of Water Resources ("DWR") Colorado Decision Support System ("CDSS").

(2) Water year (Oct - Sep).

(3) Water year average for years with complete records.

(4) Incomplete records 1881 and 1883 - 1884; and missing records for 1882, 1904, and 1910.

(5) Incomplete records 1903 - 1904, 1914, and 1924; and missing records for 1905 - 1913 and 1920 - 1923.

Table 3-2

Stream Gages, Diversions, and Returns
Poudre River Point Flow Model

	Seg.	WDID	Structure Name (1)	Alternate Names (2)	Gage Name	Type (3)	Mile (4)	Record (5)	Avg Ann AF (6)
	A	301200	Cache la Poudre at Mouth of Canyon	Poudre at Canyon Mouth	CLAFTCCO	Stream gage	0.0	2002-2019	243,300
	A	300908	Greeley Filters Pipeline	City of Greeley Filters Pipeline		Diversion	0.4	2002-2019	12,200
	A	300909	Hansen Supply Canal	Charles Hansen Canal		Return	0.9	2002-2019	67,400
	A	300910	Pleasant Valley Lake Canal	Pleasant Valley + Lake Canal	PVLCANCO	Diversion	1.3	2002-2019	10,600
	A	300911	Larimer County Canal	Larimer County Ditch, Henry Smith Ditch	LACDITCO	Diversion	2.5	2002-2019	55,700
	A	303766	Watson Lake Diversion	Watson Lake Diversion Weir (03002134)		Diversion	4.1	2002-2019	200
	A	303766	Watson Lake Return			Return	4.1	2002-2019	100
	A	300912	Dry Creek Jackson Ditch	Dry Creek Ditch, Jackson Ditch	JAKDITCO	Diversion	4.7	2002-2019	5,500
	A	n/a	Southside Ditches			Point	5.8	n/a	n/a
	A	300913	New Mercer Ditch		NEWMERCO	Diversion	5.8	2002-2019	4,900
	A	300914	Larimer County Canal No. 2	Larimer County Canal No. 2 Irrigation Ditch	LARNO2CO	Diversion	5.8	2002-2019	6,200
	A	300915	Cache la Poudre Ditch	Little Cache la Poudre Ditch	LTCDITCO	Diversion	5.8	2002-2019	13,900
	A	302780	Claymore Lake Return	New Mercer Claymore Lake Return (302922)		Return	5.9	2002-2019	500
	A	300918	Arthur Ditch	Fort Collins Irrigation Canal	ARTCANCO	Diversion	8.5	2002-2019	3,000
	B	300919	Larimer and Weld Canal	Larimer Weld Irrigation Canal, Eaton Ditch	LAWIRRCO	Diversion	8.8	2002-2019	60,300
	B	300922	Lake Canal Ditch			Diversion	10.7	2002-2019	7,900
(7)	B	300923	John G Coy Ditch			Diversion	11.0	2002-2011	500
	B	302900	CLP near Fort Collins gage	Poudre at Fort Collins	CLAFORCO	Stream gage	11.6	2002-2019	133,400
(8)	B	302313	Mulberry WWTP Outfall	Fort Collins WWTP No. 1		Return	12.4	2002-2019	3,200
	B	303775	Timnath Reservoir Inlet Canal	Cache la Poudre Reservoir Inlet Canal, Timnath Inlet (0300924)		Diversion	13.4	2002-2019	6,100
	B	n/a	Dry Creek confluence			Point	14.0	n/a	n/a

Table 3-2

Stream Gages, Diversions, and Returns
Poudre River Point Flow Model

	Seg.	WDID	Structure Name	Alternate Names	Gage Name	Type	Mile	Record	Avg Ann AF
	C	n/a	Spring Creek confluence			Point	14.8	n/a	n/a
	C	300926	Box Elder Ditch			Diversion	15.4	2002-2019	8,100
	C	303774	Fossil Creek Reservoir Inlet Ditch	Fossil Creek Inlet Ditch, Fossil Creek Reservoir Inlet Canal (0300927)		Diversion	15.9	2002-2019	12,800
	C	301673	CLP above Boxelder gage	Cache la Poudre above Boxelder Creek near Timnath	CLABOXCO	Stream gage	16.8	2002-2019	114,100
	C	302322	Boxelder WWTP Outfall	Boxelder Sanitation District WWTP		Return	17.4	2002-2019	2,200
(9)	C	303326	Rigden Reservoir Diversions-Return	Rigden Diversion Pump Station (300522)		Diversion	18.4	2015-2019	500
(9)	C			Rigden Inflow-Outflow Spillway (300523)		Return	18.4	2015-2019	400
	C	n/a	I-25 crossing			Point	19.1	n/a	n/a
	C	303774	Fossil Creek Reservoir Return	Fossil Creek Reservoir Feeder Canal, Fossil Creek Reservoir Outflow Canal (0300928)		Return	22.6	2002-2019	20,800
	C	300929	New Cache Ditch	New Cache la Poudre Company Ditch, Cache la Poudre Irrigation Company Ditch, Greeley #2, Greeley #2 Canal, New Cache la Poudre Irrigation Canal	CLAIRRCO	Diversion	23.1	2002-2019	45,300
	D	302929	CLP below New Cache gage	River Point below New Cache	CLARIVCO	Stream gage	23.2	2002-2019	113,500
	D	303377	La Poudre Reservoir #4	La Poudre Reservoir #3 & #4 Diversion, Jo Dee Reservoir Diversion		Diversion	27.0	2002-2019	300
	D	300930	Whitney Ditch	Whitney Irrigation Ditch, Great Western Dev. Surface Diversion 1	WHITNYCO	Diversion	27.1	2002-2019	8,900
	D	300931	BH Eaton Ditch	B H Eaton Ditch	BHEATNCO	Diversion	27.2	2002-2019	4,900

Table 3-2

Stream Gages, Diversions, and Returns
Poudre River Point Flow Model

			(1)	(2)		(3)	(4)	(5)	(6)
	Seg.	WDID	Structure Name	Alternate Names	Gage Name	Type	Mile	Record	Avg Ann AF
	E	n/a	County Rd 17			Point	30.1	n/a	n/a
(10)	E	302300	Windsor WWTP Outfall	Windsor Sewer		Return	34.1	2002-2019	1,300
(10)	E	302316	Kodak Outfall			Return	34.8	2002-2019	1,000
	E	300932	William R Jones Ditch	Jones Ditch	JONESDCO	Diversion	36.2	2002-2019	3,900
	E	302901	William R Jones Ditch Return	Jones Ditch Central Aug RT	CENJNZCO	Return	37.4	2002-2019	900
(11)	E	302904	Whitney Ditch West Return			Return	38.2	2003-2019	600
	E	303803	Siebring Reservoir Return	CCWCD Siebring Reservoir, Lucky Lake George, Neeland B Siebring Reservoir		Return	38.4	2002-2019	700
	E	300934	Greeley #3 Ditch	Canal 3 Ditch, Greeley #3, GIC #3	CANAL3CO	Diversion	39.8	2002-2019	20,900
	E	302905	Whitney Ditch East Return			Return	40.5	No data	0
	F	n/a	59th Ave Bridge			Point	42.2	n/a	n/a
(12)	F	302320	"F" Street Return	Canal 3 F Street Return		Return	42.8	2009-2019	2,500
	F	300935	Boyd Freeman Ditch			Diversion	43.0	2002-2019	200
	F	303772	Seeley Lake Return	Seeley Lake Outlet		Return	45.0	2002-2019	400
(13)	F	301321	Graham Seep Ditch			Return	45.2	2002-2014	800
	F	302318	23rd Ave Return	Canal 3 23rd Ave Return		Return	47.7	2002-2019	3,400
(14)	F	302302	Swift Packing Plant Return	Swift Packing Plant Sewer		Return	48.9	2004-2019	1,500
	F	302312	Greeley WWTP Outfall	Greeley Sewer	GREWASCO	Return	50.6	2002-2019	8,400
	F	300937	Ogilvy Ditch		OGIDITCO	Diversion	51.2	2002-2019	21,300
	F	302319	16th Street Return	Canal 3 16th Street Return		Return	52.9	2002-2019	5,200
	F	301201	CLP near Greeley gage	Cache la Poudre near Greeley	CLAGRECO	Stream gage	52.9	2002-2019	137,000
	F	399034	South Platte River confluence			Point	55.8	n/a	n/a

Table 3-2

Stream Gages, Diversions, and Returns
Poudre River Point Flow Model

Notes:

(1) Main structure name used in tables and figures.
(2) Alternate structure names that may be used in CDSS database or by other water users.
(3) All stream gages, diversions, and returns are measured. The points are not measured flows.
(4) Stream mile from At Canyon Mouth gage from CDSS records (structures) and estimated from GIS analysis (points).
(5) Available flow data records for study period (Jan 2002 - Oct 2019) per CDSS and other sources.
(6) Average annual flows for study period 2002 - 2019. Values round to nearest 100 AF.
(7) Structure is inactive and has not been used since 2011.
(8) Estimated data Mar 2006 - Apr 2006, Sep 2008 - Jun 2011, and Nov 2014.
(9) Structure constructed/used starting in 2015.
(10) Only monthly data available 2015 - 2019. Monthly data converted to daily.
(11) No data available for 2002.
(12) Structure constructed/used for augmentation purposes starting in 2009.
(13) Structure not used after 2015. It was determined that the water could not be used for augmentation.
(14) Only monthly data available after Nov 2011. Monthly data converted to daily.

Table 4-1

Recommended Stream Flows to Preserve and Improve Fish Habitat
Cache la Poudre River
(cfs)

Segment	Description	Winter (Nov 1 - Mar 31)		Summer (Apr 1 - Oct 31)	
		Preserve	Improve	Preserve	Improve
A	Canyon Gage to Larimer and Weld Canal Diversion	Up to 80	80 – 150	Up to 114	114 – 260
B	Larimer and Weld Canal Diversion to Spring Creek Confluence	Up to 80	80 – 150	Up to 114	114 – 260
C	Spring Creek Confluence to New Cache la Poudre Ditch Diversion	Up to 30	30 – 54	Up to 40	40 – 54
D	New Cache la Poudre Ditch Diversion to County Road 17 Crossing	Up to 10	10 – 40	Up to 10	10 – 40
E	County Road 17 Crossing to 59th Avenue Bridge	Up to 15	15 –30	Up to 15	15 –30
F	59th Avenue Bridge to South Platte River Confluence	Up to 15	15 –30	Up to 15	15 –30

Note: Flow rates determined by CPW that are needed to "preserve the natural environment" and the upper limit of flows that will "improve the natural environment."

Source: Flow Quantification Report for the Cache la Poudre River in Larimer and Weld Counties, Prepared by Colorado Parks and Wildlife to Support the Poudre River Flow Augmentation Plan. October 2020.

Table 5-1

Summary of Seed Water Contributions
Poudre Flows Augmentation Plan

		(1)		(2)		(3)	
	Seed Water Provider	**Fort Collins**		**Thornton**		**Greeley**	
	Top of Reach	Southside Ditches + Arthur Ditch		Mouth of Canyon		"F" Street Return	
	Bottom of Reach	Fossil Creek Reservoir Inlet Ditch		South Platte River Confluence		South Platte River Confluence	
(4)	Reach Length (mi)	10.1		55.8		13.0	
(5)	Start Date	Apr 1		Jan 1		Apr 15	
(6)	End Date	Oct 31		Dec 31		Oct 31	
(7)		Daily Flow Rates (cfs)					
	Month	Avg	Max	Avg	Max	Avg	Max
	Jan	0.0	0.0	1.6	3.7	0.0	0.0
	Feb	0.0	0.0	1.5	3.7	0.0	0.0
	Mar	0.0	0.0	1.5	3.7	0.0	0.0
	Apr	0.1	0.7	1.6	3.8	1.3	4.4
	May	8.2	19.2	3.1	6.9	5.8	11.9
	Jun	19.0	37.3	5.6	7.6	7.5	13.4
	Jul	8.8	30.4	7.0	8.3	8.9	16.2
	Aug	2.0	5.4	6.7	8.3	7.4	12.4
	Sep	0.8	4.1	4.4	10.3	5.6	11.7
	Oct	0.3	2.1	1.8	3.7	2.5	7.2
	Nov	0.0	0.0	1.7	3.7	0.0	0.0
	Dec	0.0	0.0	1.7	3.7	0.0	0.0

Notes:

(1) Sum of water available at Southside Ditches (New Mercer and Larimer #2) and Arthur Ditch. Average and maximum rates are derived from 40 year and single year monthly maximum volumetric limits (05CW323 Decree).

(2) Releases made from Chambers and Long Draw reservoirs (rates at mouth of canyon). Flow rates vary downstream as return flow obligations are made in Segments A, C, and F. Returns may be supplied downstream of Canyon Mouth at the Larimer County Canal Augmentation Station or from Lindenmeier Lake outlet (via Dry Creek).

(3) Greeley limited to annual volumetric limits.

(4) Mileage computed from CDSS data.

(5) Start date of seed water availability.

(6) End date of seed water availability.

(7) Daily average and maximum rate of seed water at top of reach (provided by each city). Approximate transit loss = 0.25% per mile west of I-25, and 0.50% per mile east of I-25.

Appendix A

Example Point Flow Calculation
Poudre River Point Flow Model

Example Point Flow Calculation
Poudre River Point Flow Model

Flow at any point = Measured flow at the nearest upstream gage

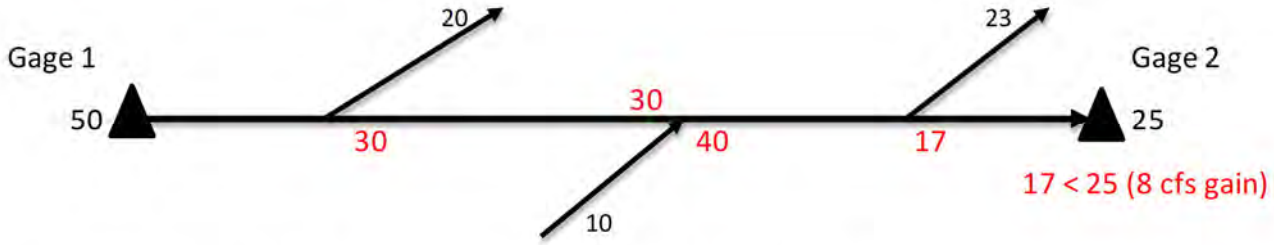
+ Measured inflows or returns*

- Measured outflows or diversions*

+/- Unmeasured reach gains or losses*

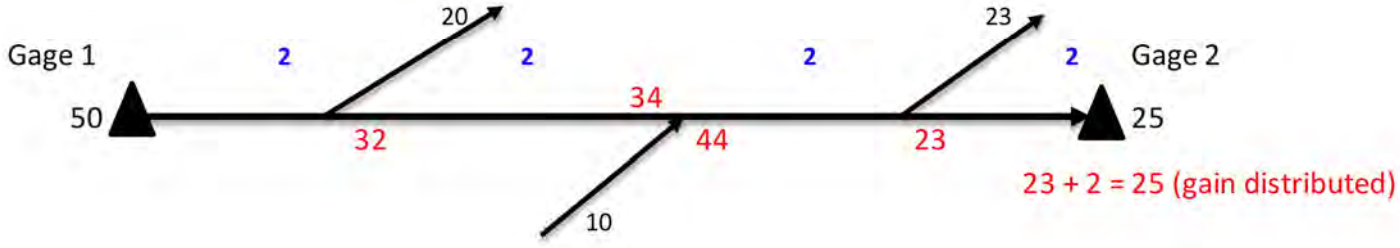
Note:
*between the upstream gage and the point of interest

Computed Flows (without gain/loss)
Measured Flows



Mass Balance Equation: Gage 1 - Diversions + Returns + Gain/Loss = Gage 2
Rearrange to compute Gain/Loss: Gain/Loss = Gage 2 + Diversions - Returns - Gage 1
Gain/Loss = 25 + 20 + 23 - 10 - 50
Gain/Loss = 8

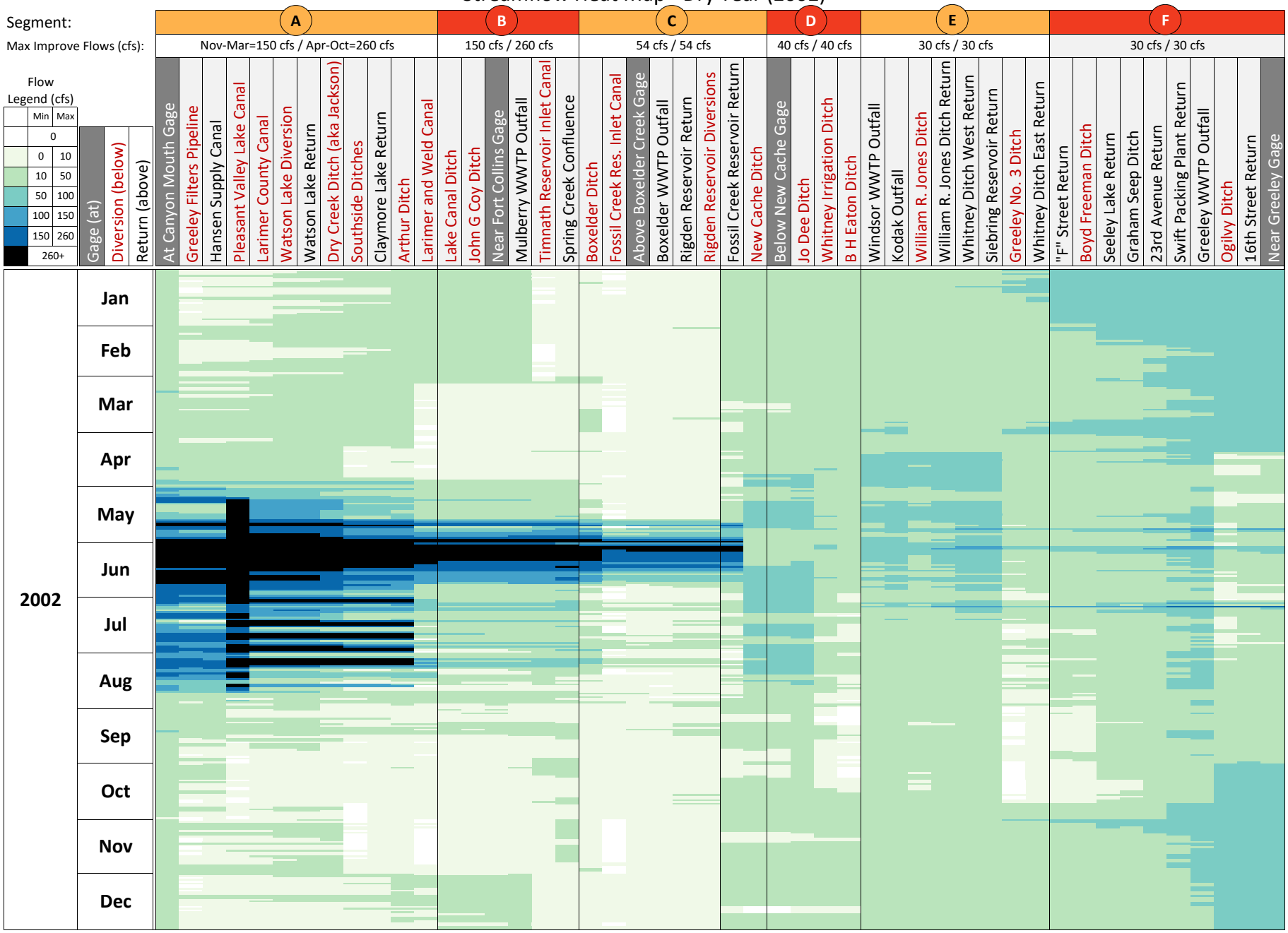
Computed Flows (with distributed gain/loss)
Measured Flows



Appendix B

Streamflow Heat Maps
Poudre River Point Flow Model

Streamflow Heat Map - Dry Year (2002)

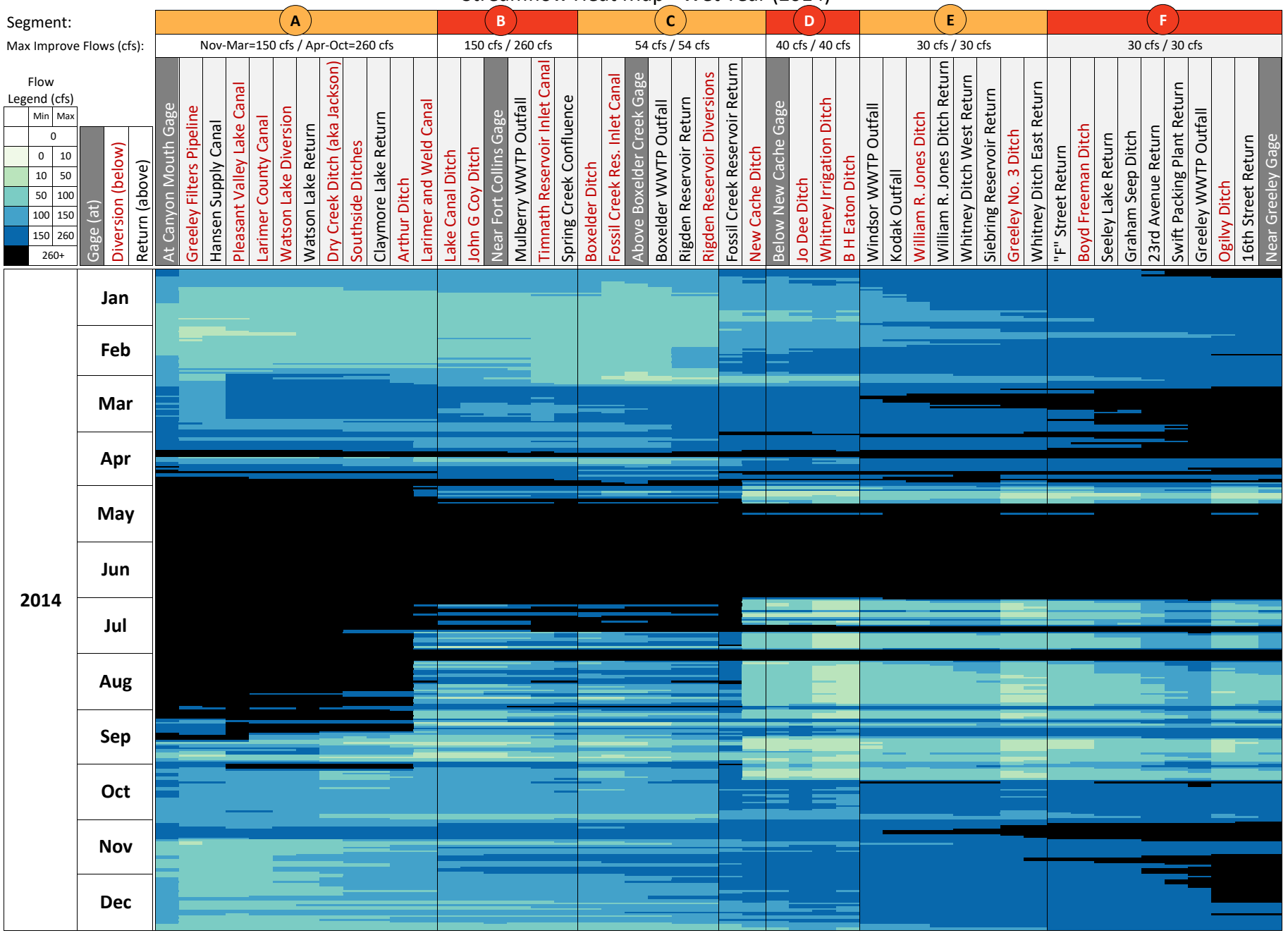


Note: Point flows are computed below diversions and above returns.

Streamflow Heat Map - Average Year (2009)

Note: Point flows are computed below diversions and above returns.

Streamflow Heat Map - Wet Year (2014)

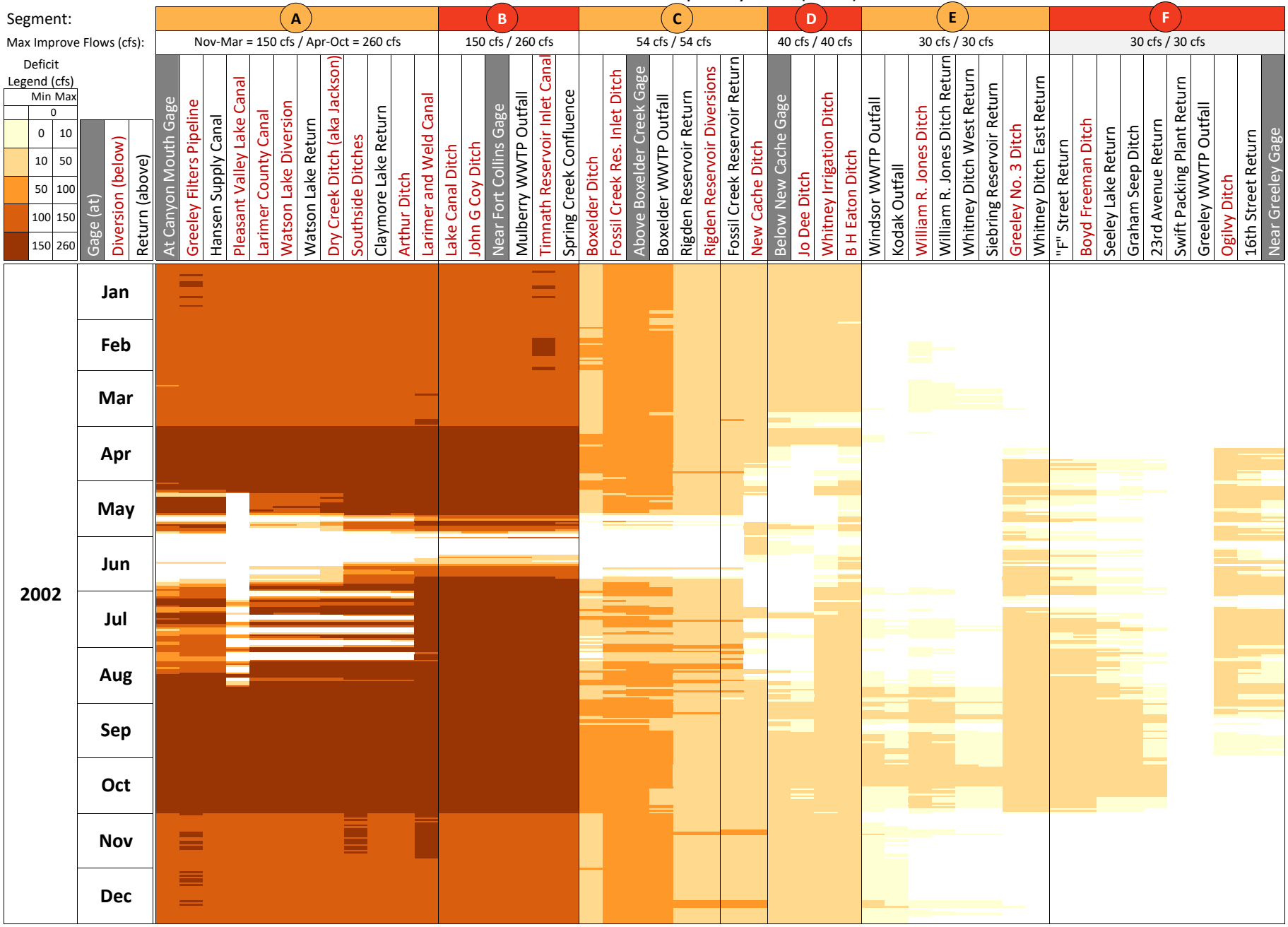


Note: Point flows are computed below diversions and above returns.

Appendix C

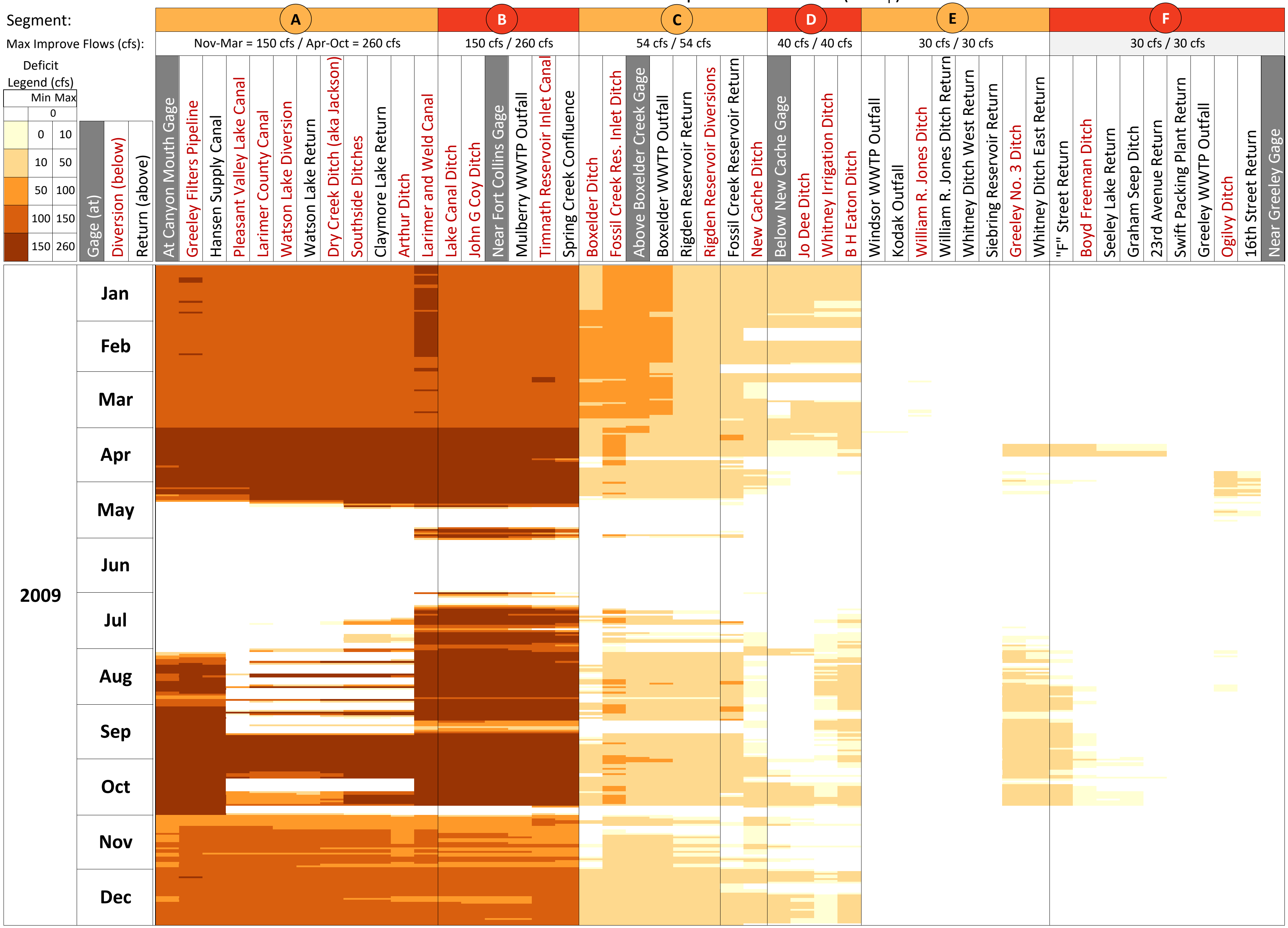
Streamflow Deficit Heat Maps
Poudre River Point Flow Model

Streamflow Deficit Heat Map - Dry Year (2002)



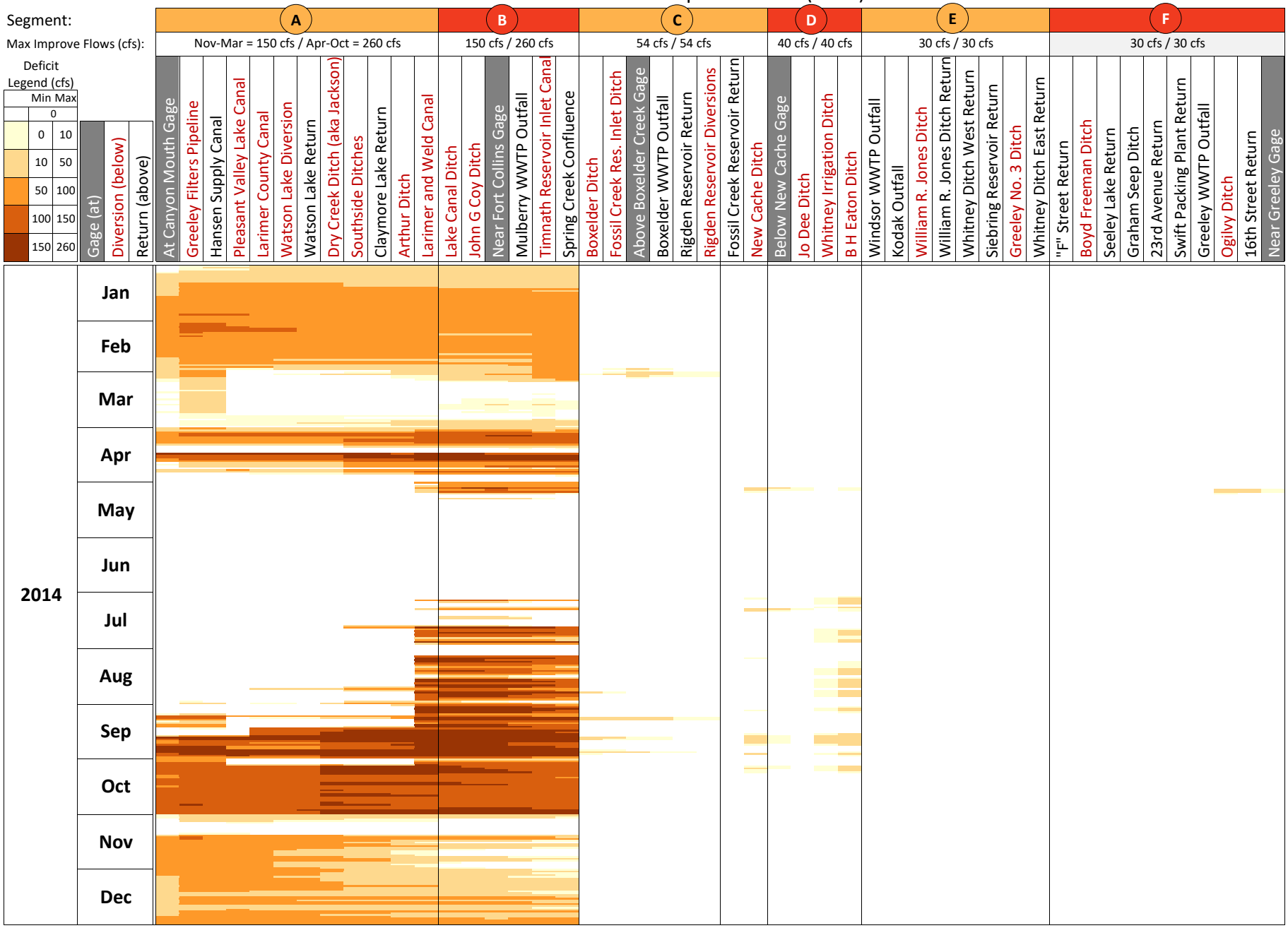
Note: Deficit flows computed as the maximum improve flows minus the point flow.

Streamflow Deficit Heat Map - !ǾŜ⅏·ƎŜ Year (200ȸ)



Note: Deficit flows computed as the maximum improve flows minus the point flow.

Streamflow Deficit Heat Map - ² Ŝű Year (20мп)



Note: Deficit flows computed as the maximum improve flows minus the point flow.

MEMORANDUM OF AGREEMENT FOR PHASE II OF THE CACHE LA POUDRE RIVER INSTREAM FLOW AUGMENTATION PLAN

This Agreement, dated this February 8, 2020, is entered into by and between the following Parties listed in no particular order: the Cache la Poudre Water Users Association, a Colorado non-profit corporation; the City of Fort Collins, Colorado, a home rule municipality; the Colorado Water Trust, a Colorado non-profit organization; the Northern Colorado Water Conservancy District, a quasi-municipal entity and political subdivision of the State of Colorado; the City of Greeley, Colorado, a home rule municipality; the City of Thornton, Colorado, a home rule municipality; the Colorado Water Conservation Board, an agency of the State of Colorado; and the Colorado Division of Parks and Wildlife, an agency of the State of Colorado.

RECITALS

A. PRTI is a group of community water leaders convened by the Colorado State University's Colorado Water Institute for the purpose of exploring options to improve the Poudre River as a healthy, working river. From time-to-time the PRTI establishes informal initiative-specific committees to advance concepts or actions supported by PRTI.

B. The PRTI's FLOWS Committee is one such committee, and is comprised of members of PRTI and was tasked with exploring options to improve flows in the Poudre River, particularly downstream of the canyon mouth to the confluence of the South Platte River, at times when increased flows would improve the ecological health of the river, while ensuring that such options would not adversely affect existing operations and administration on the Poudre River or injuriously affect the owners of or persons entitled to use water under vested water rights or decreed conditional water rights.

C. As part of this effort, the FLOWS Committee developed the idea of the ISF Augmentation Plan as an innovative, voluntary approach to increase and protect additional flows in portions of the Poudre River without injuriously affecting the owners of or persons entitled to use water under vested water rights or decreed conditional water rights, or adversely affecting existing operations and administration on the Poudre River. As further described in the Draft Application, the Parties intend to accomplish this by measuring and delivering Added Water to the Poudre River at various points, having the Added Water shepherded by State water officials through designated segments to various downstream points, and to account for and have administered such deliveries of Added Water separately from other water in the river, as further described in the Draft Application. The Water Trust developed a multi-phase plan for developing the ISF Augmentation Plan.

D. The multi-phase plan may be generally summarized as follows:

1. Phase I (Development) generally concerns various initial and preliminary tasks needed to develop the ISF Augmentation Plan such that approval can subsequently be sought. Phase I tasks include: the organization of interested

Exhibit PF5
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Nov 18-19, 2020

parties for the purposes of pursuing Phase I, various engineering, feasibility, and other analyses to support the ISF Augmentation Plan.

2. Phase II (CWCB and Water Court Approval and Formation) generally concerns the tasks needed to acquire approval of the ISF Augmentation Plan from the CWCB and from Water Court. Phase II Tasks include: creating this Phase II Agreement among the Parties; obtaining CWCB approval of the ISF Augmentation Plan; obtaining agreements/leases between the CWCB and some of the Water Users to provide Seed Water Rights for use in the ISF Augmentation Plan; establishing an organizational structure for the administration and operation of the ISF Augmentation Plan such that it can be implemented in Phase III; and preparing and prosecuting the Draft Application for the ISF Augmentation Plan in the Water Court to a final decree. To the extent it is necessary or helpful to amend existing statutes to clarify statutory authority for the ISF Augmentation Plan, as such Plan is contemplated by the Members and this Agreement, Phase II may also include seeking such legislative amendments, subject to the principles set forth herein.

3. Phase III (Implementation) generally concerns the tasks needed to implement the ISF Augmentation Plan as approved by the CWCB and the Water Court and with the consensus of the Water Users, Water Trust, and CWCB. Phase III tasks include: accounting; communication with the Water Commissioner and the Parties on stream conditions and water releases; securing additional augmentation supplies to add to the ISF Augmentation Plan; reporting as required by the final decree; funding for operations and water acquisitions; and establishing operating procedures for the ISF Augmentation Plan.

4. To commence the ISF Augmentation Plan, Northern Water, the Association, Greeley, Fort Collins, and the Water Trust executed the Phase I MOU, which governed the development efforts for the ISF Augmentation Plan concept.

5. Phase I, and the tasks described in the Phase I MOU, are substantially complete and the original participants have agreed to proceed with Phase II on the terms and conditions described herein. Thornton, CPW, and the CWCB also wish to participate in development of the ISF Augmentation Plan and therefore, each is also a Party to the Phase II Agreement.

6. Each of the Parties and their involvement and expectations related to the development of the ISF Augmentation Plan are described in more detail below:

a. The Association is a Colorado non-profit association comprised of nearly all the major water users that derive their sources of supply from the Poudre River and its tributaries. One of the Association's primary purposes is to protect the water rights of its members from injury. While improving stream flows and the ecological health of the River is not among the Association's purposes, the Association recognizes that certain of its members do have such purposes, and one of the purposes of the Association is to maintain among such water users an effective spirit and

means of co-operative effort for the common good. The Association believes that the ISF Augmentation Plan is likely to be a worthwhile "tool" for water users within the Poudre Basin provided it is voluntary, market-based, managed and operated locally by Poudre Basin water users, and, critically, is non-injurious to the water and property rights of other water users in the Basin and does not adversely affect existing operations or administration on the Poudre River.

b. Fort Collins is located along the Poudre River below the canyon mouth and has an interest in this Agreement and its subject matter for various reasons, including: Fort Collins' various policy goals related to preserving and improving the health and natural environment of the Poudre River and its associated systems; Fort Collins' ownership of lands traversed by the Poudre River, including the majority of the floodplain in Fort Collins' city limits and growth management area; Fort Collins' role as a home rule municipality and the centrality of the Poudre River to the health, safety, welfare, and identity of the citizens of Fort Collins; and Fort Collins' ownership of and reliance upon numerous water rights in and along the Poudre River. Fort Collins has been an active participant in the PRTI, the FLOWS Committee, and the ISF Augmentation Plan since its inception and intends to actively continue in this Phase II as a Water User as discussed herein. Fort Collins also desires to include some of its water rights in the ISF Augmentation Plan in accordance with the terms of this Agreement (and any subsequent agreements regarding this Phase II and any subsequent phases) and relevant agreements between Fort Collins and the CWCB.

c. The Water Trust is a Denver-based, statewide nonprofit whose mission is to restore stream flows to Colorado's rivers in need. To accomplish its mission, the Water Trust works with willing water users and suppliers to create voluntary, market-based solutions to those challenges, while respecting private property rights and working within the prior appropriation system. In 2013, the PRTI invited the Water Trust to present to the assembled Poudre River community options for voluntary streamflow restoration. Since then, the Water Trust has helped design, organize, and fund this locally-driven effort, and remains committed to its success.

d. Northern Water owns and is developing several conditional water rights in the Cache la Poudre River basin, including the water rights associated with Glade Reservoir and the South Platte Water Conservation Project. Northern Water through the NISP Water Activity Enterprise is nearing completion of the permitting process for NISP. As part of the permitting approval process, NISP has committed to providing mitigation and enhancement for fish and wildlife, and improving flows in Poudre River. Northern Water supports additional efforts to improve flows and the

natural environment in the Poudre River, and therefore has been a participant in the PRTI, the FLOWS Committee, and the discussions for the ISF Augmentation Plan since its inception and plans to continue in this Phase II as part of the Management Committee as discussed herein.

e. Greeley is a home rule municipality situated just above the confluence of the Poudre and South Platte Rivers, with its primary domestic water treatment plant located below the mouth of the Poudre Canyon. Greeley owns and operates water rights in a variety of ditch systems throughout the Poudre Basin and has been invested in the health and vitality of the Poudre River for many years, including via its involvement with the PRTI Work Group, its FLOWS Committee, and the ISF Augmentation Plan. Greeley desires to continue that investment by its participation in Phase II, and by including certain of its water rights decreed for augmentation uses in the ISF Augmentation Plan, as contemplated by this Agreement and in accordance with any future agreements for such inclusion with the CWCB.

f. Thornton is a home rule city in the northern Denver Metropolitan Area and owns and operates an integrated municipal water supply and sewer system. Thornton has water rights in the Poudre River Basin that were changed or adjudicated for multiple uses including augmentation use within the Poudre River Basin. Thornton desires to include certain of its water rights decreed for augmentation in the ISF Augmentation Plan, as contemplated by this Agreement and in accordance with any future agreements for such inclusion with the CWCB. Thornton desires to participate in the Poudre ISF Augmentation plan because it is a voluntary, non-regulatory, market-based program that will preserve and improve streams flows in the Poudre River while at the same time protecting its water rights and property interests.

g. CWCB is an agency of the state tasked with promoting the conservation of the waters of the state of Colorado in order to secure the greatest utilization of such waters pursuant to § 37-60-106, C.R.S. To that end, the CWCB has the exclusive authority to appropriate and acquire water rights for instream flow uses to preserve or improve the natural environment to a reasonable degree. The CWCB may also acquire by grant, purchase, donation, lease, exchange, or other contractual agreement, such water, water right, or interests in water in such amount as the board determines is appropriate for stream flows to preserve or improve the natural environment to a reasonable degree. § 37-92-102(3), C.R.S. The CWCB has a specific grant of authority from the General Assembly to file applications for augmentation plans. § 37-92-102(3). The CWCB desires to participate in the planning process and in Water Court proceedings to support the local water users' efforts to increase flows in the Poudre River. CWCB will participate toward the goal of obtaining and implementing a Water Court decree for an instream flow augmentation

plan that establishes up-to flow rates for the beneficial uses of preserving and improving the natural environment to a reasonable degree in certain segments of the Poudre River and facilitates the use of acquired water rights to augment the flows of the river to reach such target flows.

h. CPW has a statutory mission to protect wildlife and aquatic resources, and maintain and protect stream flows for recreational and ecological purposes. CPW also has a statutory obligation to consult with and provide opinions to CWCB on any proposed instream flow acquisitions. CPW has provided quantification of appropriate flows for the ISF Augmentation Plan based on scientific analyses needed to preserve and improve the natural environment to a reasonable degree. To further these statutory purposes, and to encourage and support the development of innovative ways to protect stream flows, CPW is party to this Agreement in an advisory and consulting role.

7. Recognizing that the Parties each have different purposes and motivations for being involved in the ISF Augmentation Plan, all Parties believe that it is in their mutual interest to pursue the Plan collaboratively in accordance with the terms and conditions described herein. Accordingly, the purpose of this Agreement is to set forth the Parties' general understanding, the guiding principles upon which the Parties will pursue the Plan, and in particular, how the Parties shall proceed to accomplish Phase II Tasks, including all tasks needed to acquire approval of the ISF Augmentation Plan from the CWCB and from the Water Court. A further purpose of this Agreement is to anticipate the implementation of the ISF Augmentation Plan (Phase III), including the governing/decision-making and administrative structure needed to implement the ISF Augmentation Plan once CWCB and Water Court approval has been obtained. The Parties expect to develop and execute a Phase III agreement consistent with the goals and guiding principles described herein that will more fully govern implementation of the ISF Augmentation Plan at or near the conclusion of Phase II.

NOW THEREFORE, in consideration of the mutual covenants made herein, the Parties hereby agree as follows:

AGREEMENT AND UNDERSTANDING

1. **INCORPORATION OF RECITALS.** The foregoing recitals are hereby incorporated as if fully restated in their entirety.

2. **DEFINED TERMS.** The following defined terms are used throughout this Agreement, including in the foregoing recitals.

a. "Added Water" means the water to be added to the Poudre River under the ISF Augmentation Plan and protected from diversion as set forth herein, which will be either Seed Water Rights or Additional Water Rights.

b. "Additional Water Rights" means the water rights that are to be added to the Plan after the plan is decreed as additional sources of Added Water.

c. "Association" means the Cache la Poudre Water Users Association, a Colorado non-profit corporation.

d. "Agreement" or "Phase II Agreement" means this Agreement, including its exhibits.

e. Common Interest Agreement means that agreement executed by the Parties, effective July 23, 2018.

f. "CPW" means the Colorado Division of Parks and Wildlife, an agency of the State of Colorado.

g. "CWCB" means the Colorado Water Conservation Board, an agency of the State of Colorado.

h. "Draft Application" means Exhibit A, which is a rough draft of an application to be filed in Water Court pursuant to this Agreement that requests judicial approval of the ISF Augmentation Plan.

i. "Fort Collins" means the City of Fort Collins, Colorado, a home rule municipality.

j. "Greeley" means the City of Greeley, Colorado, a home rule municipality.

k. "ISF Augmentation Plan" means a plan for augmentation for instream flow purposes on the Poudre River being pursued by the Parties.

l. "Management Committee" means the committee of representatives from the Association, Fort Collins, Greeley, Northern Water, Thornton, the Water Trust, and the CWCB tasked under this Agreement to manage the ISF Augmentation Plan.

m. "Management Committee Account" means the account for monetary resources for Phase II held by the Water Trust pursuant to this Agreement.

n. "Member" means a Party to this Agreement with a seat on the Management Committee.

o. "Northern Water" means the Northern Colorado Water Conservancy District, a quasi-municipal entity and political subdivision of the State of Colorado.

p. "Parties" means all entities that have signed this Agreement.

q. "Phase I MOU" means the *Agreement Regarding Phase I (Development) of a Multi-Phase Plan for an Instream Flow Augmentation Plan on the Cache La Poudre River* that Northern Water, the Association, Greeley, Fort Collins, and the Water Trust executed on January 13, 2017.

r. "Phase II Tasks" means the tasks under Phase II of the multi-phase plan for developing the ISF Augmentation Plan identified in this Agreement and needed to acquire approval of the ISF Augmentation Plan from the CWCB and from Water Court, including any legislative amendments determined by the Members to be necessary or helpful to clarify authority for development of the ISF Augmentation Plan.

s. "Plan" means the ISF Augmentation Plan.

t. "Poudre River" means the Cache La Poudre River.

u. "PRTI" means the Poudre Runs Through It Study/Action Work Group.

v. "Seed Water Rights" means the water rights that are the initial sources of Added Water for the Plan expressly identified in the Draft Application.

w. "SWSP" means a substitute water supply plan under C.R.S. §37-92-308 or successor statutes.

x. "Thornton" means the City of Thornton, Colorado, a home rule municipality.

y. "Water Court" means the District Court for Water Division 1.

z. "Water Trust" means the Colorado Water Trust, a Colorado non-profit organization.

aa. "Water Users" means the Association, Fort Collins, Northern Water, Greeley, and Thornton.

3. PURPOSE OF PHASE II AGREEMENT.

a. **THIS AGREEMENT.** The primary purposes of this Agreement are to set forth the Parties' understanding and the guiding principles upon which the Parties will pursue the ISF Augmentation Plan, and to describe the nature and completion of Phase II Tasks necessary to obtain CWCB and Water Court approval. In particular, related to the completion of Phase II Tasks, this Agreement shall govern the development and prosecution of: 1) all actions necessary to achieve CWCB approval of the ISF Augmentation Plan; and 2) all actions necessary to achieve approval of the claims in the Draft Application to the Water Court seeking approval of the ISF Augmentation Plan; 3) any actions determined by the Members to be necessary to achieve legislative amendments clarifying

statutory authority for development of the ISF Augmentation Plan. The Parties may also seek to operate the ISF Augmentation Plan through a temporary SWSP during Phase II. The Agreement also anticipates the implementation of the ISF Augmentation Plan once a decree is entered (Phase III), including the governing/decision-making structure and the Plan administration and accounting. Another purpose of this Agreement is to articulate certain goals and guiding principles that shall serve as the foundation for the Parties' agreement to proceed with the Plan and Phase II Tasks, and that shall inform future decision-making in both Phase II and Phase III.

b. **GOALS AND GUIDING PRINCIPLES.** The goal of the ISF Augmentation Plan is to provide a legal mechanism whereby Added Water may be added to a defined segment or segments of the Poudre River and legally protected from diversion (including diversions by, under, or pursuant to exchanges, SWSPs, plans for augmentation, or other means that cause a reduction to the Added Water within the stream segment(s), other than reductions caused by accounted for evaporation, transportation, and other losses). More specifically, the goals of the ISF Augmentation Plan include:

(1) to increase stream flows in the Poudre River from the canyon mouth to the South Platte River using Added Water supplies that have historically not flowed or been delivered through the segment(s) desired to be protected;

(2) to protect the Added Water in the subject segment(s) by providing for State water officials to shepherd the Added Water downstream without diversion (including diversions by, under, or pursuant to exchanges, SWSPs, plans for augmentation, or other means that cause a reduction to the Added Water within the stream segment(s), other than reductions caused by accounted for evaporation, transportation, and other losses);

(3) to allow for Additional Water Rights to be added to the Plan;

(4) to accomplish the first three goals without injuriously affecting the owners of or persons entitled to use water under vested water rights or decreed conditional water rights or adversely affecting existing operations or administration on the Poudre River; and

(5) to require the Management Committee to consider other potential adverse impacts that the operation of the Plan and all actions taken in furtherance of the Plan may have on vested water rights, decreed conditional water rights, and other exchanges, practices, and operations (which may or may not be approved by Water Court decree) to assure Plan operations do not adversely impact such water rights, exchanges, practices or operations.

The guiding principles that Parties have agreed to include that the Plan shall be voluntary and operated locally by water users in the Poudre River basin. Any alteration to or modification of existing ditch or reservoir structures infrastructure (e.g. headgates, diversion dams) required to implement the ISF

Augmentation Plan shall only take place after agreement with the owner(s) of any such structures. An additional goal is to develop the Plan with sufficient flexibility to allow water rights to be added to the Plan. The goals include for the Plan to be capable of utilizing water rights that may only be available temporarily (including: water rights associated with local alternative transfer mechanisms projects (commonly called "ATMs"); Agricultural Water Protection Water Rights under House Bill 16-1228, the rules and regulations promulgated thereunder, and subsequent statutes; and other water rights that are the subject of temporary administrative approvals) and serve as a potential revenue source for water users in the Poudre River basin willing to lease or to enter into agreements allowing for the use of their water rights in the Plan. The Parties also agree that the ISF Augmentation Plan and actions taken for it shall not be or result in violations of applicable CWCB statutes and rules and regulations.

c. **ADDED WATER.** The Parties intend that this Paragraph 3.c identifies the initial sources of Added Water (the Seed Water Rights) which are expressly identified in the Draft Application, establishes procedures for the inclusion of Additional Water Rights in the future, and sets forth principles for the Management Committee's operation of Added Water and consideration of Additional Water Rights. The Parties do not intend that this Paragraph 3.c or any other portion of this Agreement affects in any way the standards of review that may be applied by the Water Court, the Colorado Supreme Court, the CWCB, or any administrative agency. Any Added Water included in the Plan must be capable of being measured where delivered to the stream. Any Added Water also shall not be water attributable to calculated accretions to the stream from recharge or lawn irrigation return flows. Added Water shall only be protected under the ISF Augmentation Plan in stream segments in which such Added Water has not historically flowed or been delivered.

   i. **Seed Water Rights: Initial Sources of Added Water.** The initial sources of Added Water for the Plan are the Seed Water Rights. The Parties agree that these water rights are appropriate sources of Added Water for the Plan, consistent with the principles regarding operations set forth in this Agreement. Any Party may raise concerns within the context of the Management Committee concerning any adverse impacts (as contemplated in Paragraph 3.b(4) and (5) above) that are resulting or may result from specific operations of the Seed Water Rights going forward.

   ii. **Additional Water Rights: Future Additional Sources of Added Water.** The Parties anticipate that Additional Water Rights will be sought for inclusion in the Plan after this Agreement is executed, after the Draft Application is filed with the Water Court or after the final decree for the Plan is entered. The Management Committee (discussed below in Paragraph 4) must first approve the inclusion of any

Additional Water Rights (in accordance with the process set forth below) before such water rights may be included in the Plan and before any requests for their inclusion in the Plan are approved by the CWCB and filed with the Water Court or administrative agencies. A person or entity (including a Party) seeking to include any Additional Water Rights in the Plan must request approval from the Management Committee and provide the Management Committee with sufficient information regarding such water rights and their proposed operations to allow for a complete review of the request, including but not limited to: information required by any decree approving the Plan regarding such Additional Water Rights; copies of the decree(s) for the Additional Water Rights; historical use of the Additional Water Rights, including recent historical use; how the subject water would be measured; how the subject water would be accounted for separately from other water in the river; where the subject water would be delivered to the Poudre River; where and in what segments the subject water would be used under the Plan; whether the subject water would need to be bypassed past any intervening diversion structures and if any agreements to that effect exist; and where or how the subject water would be reused, if applicable. The Management Committee will thereafter consider the request, including the information provided by the requesting person or entity, any additional relevant information, the final decree for the Plan, the guiding principles regarding Added Water, and any other relevant information concerning the Additional Water Rights The Management Committee may only approve the inclusion of Additional Water Rights in the Plan if inclusion is consistent with the goals and guiding principles set forth in Paragraphs 3.b and 3.c. of this Agreement. The Management Committee's approval to include any Additional Water Rights in the Plan must be in writing and may include additional terms and conditions as the Management Committee may deem appropriate, including to be consistent with the goals and guiding principles set forth in this Agreement.

iii. **Principles for Inclusion of Additional Water Rights.** The Parties agree to the following guiding principles regarding Additional Water Rights. Additional Water Rights is water that is diverted, measured, and delivered to the stream that is attributable to:

(1) a water right that has been changed by judicial decree to be legally available for augmentation use, or has been granted administrative approval to be legally available for augmentation use;

(2) a nontributary, transmountain, or other developed water right that is legally available for augmentation use; or

(3) a water right decreed to be legally available for augmentation use, or administratively approved to be legally available for augmentation use.

iv. **General Principles Regarding Added Water.** In determining how and whether Added Water Rights can be operated in the Plan, the Management Committee shall specifically determine whether water attributable to the Added Water Rights has historically flowed through or been delivered for diversion or re-diversion in any portion of the subject stream reach. The Management Committee shall not seek to protect, under the Plan, Added Water in any stream segment(s) in which the Added Water has historically flowed through or been delivered for diversion or re-diversion. The operation of Added Water must be consistent with the goals and guiding principles set forth in this Agreement and the Management Committee shall not approve or allow such operations that are not consistent with the goals and guiding principles.

v. **Principles Regarding Legislative Amendments.** The Parties agree that any legislative amendments sought shall be for the limited purpose of clarifying statutory authority for development of the ISF Augmentation Plan, while not injuriously affecting the owners of or persons entitled to use water under vested water rights or decreed conditional water rights.

d. **IMPLEMENTATION OF THE ISF AUGMENTATION PLAN.** Based upon and limited by the foregoing goals and guiding principles, the Parties agree to the following general description of the ISF Augmentation Plan that is to be brought before the CWCB for approval and to be applied for with the Water Court in the form of an application substantially similar to the Draft Application, which shall guide all decision-making concerning the ISF Augmentation Plan. The ISF Augmentation Plan will create the legal framework for the inclusion of the Seed Water Rights in the Plan and a procedure for the introduction of Additional Water Rights to the Plan after the entry of the decree pursuant to C.R.S. § 37-92-305(8)(c). The application shall contain provisions that provide for the State water officials to shepherd Added Water past intervening points of diversion so that it is legally protected from diversion (including diversions by, under, or pursuant to exchanges, SWSPs, plans for augmentation, or other means that cause a reduction to the Added Water within the stream segment(s), other than reductions caused by accounted for evaporation, transportation, and other losses) within stream segment(s) of the Poudre River, while assuring that, as the Added Water is shepherded downstream, there will be no injurious effect on the owners of or persons entitled to use water under vested water rights or decreed conditional water rights, or any adverse effect on existing operations or administration on the Poudre River. The Parties understand and agree that shepherding the Added Water past existing structures in the River is likely to be necessary in certain instances, but that nothing in the ISF Augmentation Plan is intended to require or compel structure owners to alter existing structures or operations to accommodate

Plan operations; any alterations or modifications to existing structures or structure operations needed to add or bypass Added Water or to otherwise facilitate Plan operations shall only take place by separate agreement with the owners of such structures. To the extent permitted by law, the Parties agree that no alterations, modifications or use of structures will be accomplished by condemnation. Further, to promote Plan efficiency and flexibility and potential rental options for water users in the Poudre River basin, the ISF Augmentation Plan shall seek to provide a mechanism in the decree by which Additional Water Rights can be voluntarily added to the ISF Augmentation Plan for temporary or permanent use in the Plan. It is further anticipated that the ISF Augmentation Plan will provide for the reuse or successive use of Added Water downstream of the segments where the Added Water is used in the Plan. In accordance with the applicable water right decree(s) or other relevant legal authority, the owners of the Seed Water Rights and Additional Water Rights shall be entitled to reuse or successively use water attributable to those water rights downstream of the segment(s) where those water rights are used in the Plan, or to enter into agreements with other persons or entities for their reuse or successive use of such water. Decisions concerning such agreements shall be made consistent with this Agreement, sound Plan management and other Plan goals, but to the extent possible, preference shall be given to water users within the Poudre River basin who desire such water for reuse or successive use.

4. **ESTABLISHMENT OF MANAGEMENT COMMITTEE.**

a. **MANAGEMENT COMMITTEE IN PHASE II.** To implement and manage Phase II Tasks, a Management Committee is hereby created.

i. **Representation.** Each Member shall designate one (1) person, and may designate one (1) alternate, to be the Party's representative on the Management Committee. The following are the Parties' Management Committee representatives:

Water User Members	Representative	Alternate
Association:	Dan Brown	none
Fort Collins:	John Stokes	Susan Smolnik
Greeley:	Jennifer Petrzelka	Leah Hubbard
Northern Water:	Brad Wind	Luke Shawcross
Thornton:	Emily Hunt	Cari Bischoff

Non-Water User Members	Representative	Alternate
Water Trust:	Kate Ryan	Mickey O'Hara
CWCB:	Linda Bassi / Chief of Stream & Lake Protection Section	Kaylea White / Senior Water Resources Specialist

Each Member shall be entitled, at its sole discretion, to change its representative and alternate on the Management Committee, provided that the Member provides prompt notice of the same to the other Members. Each Member may designate an additional representative for the specific purpose of representing the Member with regard to any legislative amendments proposed under this Agreement.

ii. **Charge.** The purpose of the Management Committee is to provide oversight (including oversight of operations and Added Water), direction, and decision-making for the ISF Augmentation Plan and other tasks described herein during Phase II, and Phase III as appropriate in accordance with Paragraph 3.b. The Management Committee is charged with meeting, discussing, and conferring regarding all decisions necessary to implement and accomplish Phase II Tasks, including the filing and prosecution of the Draft Application, and reviewing proposed additional sources of Additional Water Rights pursuant to Paragraph 3.c.

iii. **Duties.** Each representative will: (a) represent its Member on the Management Committee including, communicating the Member's perspectives and positions; and (b) communicate to its Member the work of the Management Committee and the ISF Augmentation Plan.

iv. **Decision-making in Phase II.** Decisions of the Management Committee are to be made consistent with Plan goals and guiding principles set forth herein. The Management Committee shall operate by consensus in making Phase II decisions and prosecution of Phase II Tasks. To this end, the Members of the Management Committee shall make a good faith effort to reach consensus, propose alternative solutions, and otherwise work to resolve any issues that prevent consensus. Any decisions involving the use of a particular Water User's water rights may only be made with the consent of that Water User that owns the particular water right, in that Water User's sole discretion.

v. **Water Court Application.** To implement the ISF Augmentation Plan some of the Parties will file an application in Water Court substantially in the form of the Draft Application. The CWCB shall be an applicant because the Application involves the adjudication of an augmentation plan to help preserve and improve the natural environment under the CWCB's statutory authority to use water for instream flow purposes. It is anticipated that other Parties may individually participate as a co-applicant(s) or the Management Committee may create an entity, should it deem it necessary, for this purpose and that entity may participate as a co-applicant. It is presently anticipated that the Association will be a co-applicant. All decisions concerning the prosecution of the Application shall be made in accordance with Paragraph 4.a.iv. A Water User/co-applicant in its sole discretion may withdraw as a co-applicant. Any Party that is not a co-applicant may file a "friendly" statement of opposition to the Draft Application, and the Parties hereby consent to the submission of said "friendly" statement of opposition. In the event a Party files a statement of opposition, other than a "friendly" statement of opposition, or files documents that are contrary to the entry of the decree, such Party is automatically removed from the Management Committee, but shall continue to be subject to the Common Interest Agreement.

vi. **Meetings.** The Management Committee will schedule monthly meetings but said meetings may occur more frequently or less frequently as the Management Committee determines to be prudent. The Management Committee shall agree on a time and place of meetings that is convenient and practical for as many Members as practicable. At the Management Committee's discretion these meetings may be in person, by telephone, or may allow participation by other means of remote access. Water Trust shall circulate a financial report pursuant to Paragraph 4.d.iii at least one week in advance of the meetings, unless otherwise agreed to by the Members. Water Trust shall take action minutes of all meetings identifying: (a) the Members present and other attendees; and (b) any and all decisions made and actions taken by the Management Committee. The draft action minutes taken by Water Trust shall be circulated to the Management Committee one week prior to the next meeting for any comments or corrections. The Management Committee may coordinate on taking more detailed minutes, in addition to the action minutes to be taken by Water Trust. The Management Committee may collectively determine whether persons other than representatives of the Members may attend any meeting(s) no less than one week in advance of the meeting. If the Management Committee determines that persons other than representatives of the Members may attend a meeting, the meeting shall be open to such persons, and perhaps the public, and the

Management Committee shall determine how, when, and if to provide notice of the time and location of the meeting.

b. **CONSULTATION WITH CPW.** The Parties agree that CPW will be consulted to assist in the development of the ISF Augmentation Plan in the following ways:

   i. To provide science-based recommendations regarding appropriate segments and appropriate flows for augmentation, including use of the Seed Water Rights, any administrative approval to be pursued, and Additional Water Rights to be added later;
   ii. To review and assist in the development of the Water Court application and proceedings; and
   iii. To attend meetings and conference calls as-needed.

c. **MANAGEMENT COMMITTEE IN PHASE III.** The Parties presently anticipate that the Management Committee will continue into Phase III as the governing and decision-making body for the ISF Augmentation Plan, although the precise structure and make-up of the governing body shall be determined by the Parties at the conclusion of Phase II. The Parties expect, however, that the Management Committee's role will evolve in Phase III to primarily involve: (a) broad policy questions regarding the operation of the ISF Augmentation Plan; (b) fundraising and the general financial position and expenditures to implement the ISF Augmentation Plan; (c) necessary water infrastructure alterations, measurement and related issues within the Plan segment(s); (d) decisions concerning the protection and defense of the ISF Augmentation Plan; and (e) such other matters as are necessary for the oversight and operation of the ISF Augmentation Plan. Additionally, in Phase III the overall operation of the ISF Augmentation Plan will be overseen by the Management Committee consistent with the goals and guiding principles set forth herein. Management Committee functions will include decisions regarding the protection and defense of the ISF Augmentation Plan in Water Court or in SWSP proceedings. To assure that efforts toward protection and defense of the ISF Augmentation Plan are coordinated, consistent, and not unnecessarily disruptive or costly to the Parties and to other water users, the Parties agree that the decision to protect and defend the Plan in Water Court, in SWSP proceedings, and in appeals associated with Water Court and SWSP proceedings is the right and obligation of the Management Committee, and no individual Party shall assert this right or take on this obligation without the prior written authorization of the Management Committee. The foregoing notwithstanding, any Party who has contributed/dedicated water rights to the Plan or has a contractual interest in the water rights included in the Plan may participate in Water Court and in SWSP proceedings for the purpose of protecting and defending such water rights or contractual interests, and for all other purposes, but shall not independently/autonomously seek to protect or defend the ISF Augmentation Plan or Plan operations. Additionally, the CWCB may independently defend: (1) the legal basis of this ISF Augmentation Plan, and (2) CWCB's

administrative procedures for accepting acquired water rights into this ISF Augmentation Plan. Day-to-day operation and administration of the ISF Augmentation Plan, including communications with the Water Commissioner and other water users, and including headgate operations and accounting, are anticipated to be undertaken by staff/representative(s) of the Association at the direction of the Management Committee, which may require a separate agreement with the Association.

d. **WATER TRUST AS PLAN AND FISCAL AGENT IN PHASE II.** Water Trust shall act as the ISF Augmentation Plan fiscal agent of the Plan during Phase II, as set forth in this Paragraph 4.d.

i. **Water Trust Role.** Water Trust agrees to provide the staffing, office space, and office equipment to assist in the fulfillment of Phase II Tasks and the Plan more generally, subject to Water Trust Board of Director's review and budgeting authority, and any other limitations herein. Water Trust office space and equipment remain property of the Water Trust. Water Trust Executive Director remains the supervisor of Water Trust staff and Water Trust staff remain employees solely of Water Trust. Water Trust staff will engage in fundraising to support Phase II, the Draft Application, and the Plan. Exercising its own discretion, but subject to the approval of the Management Committee, which approval shall not be unreasonably withheld, the Water Trust may pursue Additional Water Rights for use in the Plan to be brought to the Management Committee, and funds for the operation of the ISF Augmentation Plan from government and private grants, corporate funding campaigns, individual donors, and other larger fund-building campaigns. Water Trust, in coordination with the Parties, agrees to assist in the accomplishment of the Phase II goals and tasks set forth herein, including developing and implementing legal strategies, acquiring water, water rights, and interests in water, and hiring consultants.

ii. **Water Trust to Hold Monies for the Plan.** Water Trust shall establish and hold all monetary resources for Phase II Tasks in the Management Committee Account with a financial institution that is acceptable to the Management Committee. The monetary resources for the Phase II Tasks shall not be intermingled with any other funds or monetary resources, which may be accomplished either by the use of a separate account with a financial institution or by accounting for the monetary resources for the Phase II Tasks as being separate funds.

iii. **Financial Reporting.** Water Trust shall provide a financial report, in writing, to the Management Committee at its meetings including the Management Committee Account balance, anticipated expenditures and withdrawals, including Water Trust reimbursements, and

anticipated revenues. In addition, Water Trust shall provide to any Member any documents or other information regarding the Management Committee Account upon request.

iv. **Debt.** With the prior approval of the Management Committee, the Water Trust may incur debt associated with the implementation of the Plan. However, no Party hereto shall be liable for any debts incurred by Water Trust under this Agreement without their written and express authorization.

v. **Unused Funds.** If, upon termination of this Agreement pursuant to Paragraph 6, there are funds in the Management Committee Account that have not been spent, are not required to be returned to the granting entity pursuant to that grant's agreement, and are not needed to pay any outstanding obligations, the Management Committee shall confer regarding how such funds may be used or refunded.

e. **OPERATIONAL FUNDING.** The Parties agree that, due to its unique position among the Parties, Water Trust may reimburse itself from the Management Committee Account for its time and resources spent on the Plan. Water Trust shall provide the Management Committee with an accounting of such reimbursements, in the form of detailed accounting provided to the Management Committee, which shall include, among other relevant information as may be requested by the other Parties from time to time, a specification of: (a) the costs incurred by Water Trust; (b) the hours spent by Water Trust staff on the Plan; (c) the rate(s), as may change from time to time, claimed for Water Trust staff; and (d) a description of the associated task so claimed by Water Trust.

f. **PAYMENT FOR WATER.** It is generally intended that no compensation shall be paid for the inclusion of the Seed Water Rights in the Plan, although actual compensation shall be determined between the Water User and the CWCB on a case-by-case basis, provided that such a transaction is permissible under the charters, ordinances, rules and regulations, and other legal authorities governing such Parties. If compensation for such Seed Water Rights is required, the Management Committee will determine how to proceed. As articulated in the guiding principles, it is envisioned that this Plan will allow Additional Water Rights to be added to the Plan upon approval of the Management Committee, with the idea being that the Plan be capable of utilizing temporary water supplies (including temporary water supplies from local ATM projects, Agricultural Water Protection Water Rights, and temporary administratively approved sources) and serve as a potential revenue source for Poudre River Basin water users willing to lease water supplies to the Plan. Accordingly, the Management Committee may consider compensating for Additional Water Rights included in the Plan. However, no Party is obligated herein to contribute to any future requested compensation.

5. **MONETARY RESOURCES FOR PHASE II.**

a. **MONETARY CONTRIBUTIONS BY THE PARTIES.** The monetary resources for Phase II will include monetary contributions from some of the Parties. Except as outlined herein, nothing in this Agreement shall require any Party to contribute or obligate any funds.

i. **Initial Contributions.** Fort Collins hereby agrees to provide twenty thousand dollars ($20,000) to the Water Trust for the purposes of this Agreement, and in particular the Phase II Tasks. Northern Water hereby agrees to provide twenty thousand dollars ($20,000) to Water Trust for the purposes of this Agreement, and in particular the Phase II Tasks. Greeley hereby agrees to provide twenty thousand dollars ($20,000.00) to Water Trust for the purposes of this Agreement, and in particular the Phase II Tasks. Thornton hereby agrees to provide twenty thousand dollars ($20,000.00) to the Water Trust for the purposes of this Agreement, and in particular the Phase II Tasks. Any Party may provide additional funds to the Water Trust for the purposes of this Agreement, and in particular the Phase II Tasks, which shall be documented in writing with a copy to all Parties. The monetary contributions under this Paragraph 5.a are subject to annual appropriations and, upon making such initial contributions, the contributing Party shall have no ongoing obligations except as expressly set forth herein.

ii. **Subsequent Contributions.** The Parties may further contribute additional funds to Water Trust for the purposes of this Agreement. Any Party making such a contribution shall notify the other Parties of such contribution.

b. **FUNDRAISING/MONETARY CONTRIBUTIONS BY NON-PARTIES.** The Parties intend to seek additional monetary resources for the Plan through various fundraising activities including seeking grants.

c. **DEPOSIT.** Water Trust will deposit all monetary funds in the Management Committee Account.

d. **NON-MONETARY CONTRIBUTIONS BY THE PARTIES.** Nothing herein shall preclude the Parties from contributing non-monetary resources to the Plan, including water, staff and consultant time, but no water right of any Party may be used or operated under the ISF Augmentation Plan without the written and express authorization of the owner of that water right.

6. **TERM, TERMINATION, WITHDRAWAL, AND ASSIGNMENT.**

a. **TERM.** This Agreement shall remain in effect until terminated by the Parties or completion of Phase II.

b. **TERMINATION.** This Agreement shall terminate automatically upon a determination by the Management Committee not to proceed with the ISF Augmentation Plan. This Agreement shall also terminate if the Water Users withdraw pursuant to Paragraph 6.c such that there is only one Water User remaining.

c. **WITHDRAWAL.** Each Party, in its sole discretion, shall be entitled to withdraw from this Agreement upon written notice to the remaining Parties, but shall continue to be subject to the Common Interest Agreement

i. **Withdrawal by the Association, Fort Collins, Northern Water, Thornton, Greeley or CPW.** If the Association, Fort Collins, Thornton, Northern Water, Greeley or CPW withdraws from this Agreement, the following terms and conditions shall apply. Said Party shall not be entitled to reimbursement for any funds provided to Water Trust for the purposes of this Agreement pursuant to Paragraph 5.a. Said Party shall be entitled to retain any information acquired pursuant to this Agreement. Said withdrawal shall not affect said Party's rights to enforce other contracts or agreements with any of the other Parties and with respect to the Plan. Upon withdrawal, said Party shall have no further liability or obligations hereunder.

ii. **Withdrawal by Water Trust.** If Water Trust withdraws from this Agreement, the following terms and conditions shall apply. Water Trust shall account for any funds in the Management Committee Account Water Trust shall then transfer those funds to an account identified by the remaining Parties for their use for the Plan to the extent that such funds are not needed to meet existing obligations. Water Trust shall be entitled to retain any information acquired pursuant to this Agreement.

iii. **Withdrawal by the CWCB.** If the CWCB withdraws from this Agreement, the following terms and conditions shall apply. CWCB and all co-applicants in Water Court shall cancel the ISF Decree for the ISF Augmentation Plan, or, if still pending, shall dismiss the Draft Application. CWCB and the other Parties shall terminate this MOA and all other agreements related to the Plan.

d. **ASSIGNMENT BY WATER TRUST.** If Water Trust assigns this Agreement under Paragraph 16, Water Trust shall account for any funds in the Management Committee Account. Water Trust shall then transfer those funds to the assignee in an account identified by the remaining Parties for their use for the

Plan to the extent that such funds are not needed to meet existing obligations. Water Trust shall also transfer all documents and files pertaining to the Plan, either as originals or copies, to the assignee, subject to the assignee agreeing to execute the Common Interest Agreement.

7. **REMEDIES.** Withdrawal pursuant to Paragraph 6.c and other any other remedy available at law shall be the exclusive remedies for any breach of this Agreement.

8. **FISCAL CONTINGENCY.** Notwithstanding any other provision of this Agreement to the contrary, the obligations of Fort Collins, Northern Water, Thornton, and Greeley (in this paragraph, "Governmental Entity"), in fiscal years after the fiscal year of this Agreement shall be subject to appropriation of funds sufficient and intended therefor, with the Governmental Entity having the sole discretion to determine whether the subject funds are sufficient and intended for use under this Agreement, and the failure of the Governmental Entity to appropriate such funds shall be grounds for the Governmental Entity to withdraw from this Agreement pursuant to Paragraph 6.c. Likewise, all commitments by the CWCB are subject to sufficient funds being appropriated for such commitments, at the sole discretion of the CWCB.

9. **NO THIRD-PARTY BENEFICIARIES.** This Agreement is entered into between the Parties for the purposes set forth herein. It is the intent of the Parties that they are the only beneficiaries of this Agreement and the Parties are only benefitted to the extent provided under the express terms and conditions of this Agreement and there are no third-party beneficiaries.

10. **GOVERNING LAW AND ENFORCEABILITY.** This Agreement shall be construed in accordance with the laws of the State of Colorado. The Parties recognize that the constitutions, statutes, and rules and regulations of the State of Colorado and of the United States, as well as the Parties respective bylaws, city charters and codes, and rules and regulations, impose certain legal constraints on each Party and that the Parties intend to carry out the terms and conditions of this Agreement subject to those constraints. Whenever possible, each provision of this Agreement shall be interpreted in such a manner so as to be effective and valid under applicable law.

11. **WAIVER.** A waiver of a breach of any of the provisions of this Agreement shall not constitute a waiver of any subsequent breach of the same or another provision of this Agreement. Nothing in this Agreement shall be construed as any waiver of governmental immunity of the Parties who are Governmental Entities or the CWCB or any other governmental provisions of State law.

12. **NOTICES.** All notices or other communications hereunder shall be sufficiently given and shall be deemed given when mailed or e-mailed, addressed as follows:

To Association:	Fischer, Brown, Bartlett & Gunn, P.C. 1319 East Prospect Rd. Fort Collins, CO 80525 danbrown@fbgpc.com
To Fort Collins:	City Manager City Hall West 300 LaPorte Avenue; P.O. Box 580 Fort Collins, Colorado 80522-0580
With copy to:	Fort Collins City Attorney 300 LaPorte Avenue; P.O. Box 580 Fort Collins, Colorado 80522-0580 epotyondy@fcgov.com
and:	Fort Collins Utilities Attn: Water Resources Manager 700 Wood Street P.O. Box 580 Fort Collins, Colorado 80522-0580
and:	Natural Areas Department 745 Hoffman Mill Road Fort Collins, Colorado 80524 jstokes@fcgov.com; dfiggs@fcgov.com
To Water Trust:	Director of Programs Colorado Water Trust 3264 Larimer Street, Suite D Denver, Colorado 80205
To Northern Water:	General Manager 220 Water Avenue Berthoud, Colorado 80513
To Greeley:	Greeley Water and Sewer Department Attn: Deputy Director of Water Resources 1001 11th Avenue, Second Floor Greeley, Colorado 80631
With copy to:	Greeley City Attorney's Office Attn: Environmental and Water Resources 1100 10th Street, Suite 401 Greeley, Colorado 80631 daniel.biwer@greeleygov.com

To: CWCB	Stream and Lake Protection Section 1313 Sherman St., Rm. 718 Denver, Colorado 80203 DNR_CWCBISF@state.co.us
With copy to:	Office of the Attorney General Attn: Water Conservation Unit, Natural Resources Section 1300 Broadway, 7th Floor Denver, Colorado 80203 Ema.schultz@coag.gov Jen.Mele@coag.gov
To Thornton:	Thornton Water Resources Division Attn: Water Resources Manager 9500 Civic Center Drive Thornton, Colorado 80229 emily.hunt@cityofthornton.net
With copy to:	Thornton City Attorney's Office Attn: City Attorney 9500 Civic Center Drive Thornton, Colorado 80229
To: CPW	Water Resources Section Manager Colorado Parks and Wildlife 6060 Broadway Denver, CO 80216
With copy to:	Colorado Department of Law Attn: Elizabeth Joyce Natural Resources Section Parks, Wildlife and Trust Lands Unit 1300 Broadway, 7th Floor Denver, CO 80203 Elizabeth.joyce@coag.gov

13. **CONSTRUCTION.** This Agreement shall be construed according to its fair meaning as it was drafted by the Parties together. Headings in this Agreement are for convenience and reference only and shall in no way define, limit, or prescribe the scope or intent of any provision of this Agreement.

14. **ENTIRE AGREEMENT.** This Agreement constitutes the entire agreement of the Parties regarding the matters addressed herein. This Agreement binds and benefits the Parties and their respective successors and assigns. Covenants or representations not

contained in this Agreement regarding the matters addressed herein shall not bind the Parties.

15. **REPRESENTATIONS.** Each Party represents to the other parties that it has the power and authority to enter into this Agreement and the individual signing below on behalf of that Party has the authority to execute this Agreement on its behalf and legally bind that Party.

16. **ASSIGNMENT.** No Party may assign any rights or delegate any duties under this Agreement without the written consent of all other Parties.

17. **INTERGOVERNMENTAL AGREEMENT.** The Parties that are Governmental Entities agree this Agreement is an intergovernmental agreement pursuant to Article XIV, Sec. 18 of the Colorado Constitution and C.R.S. 29-1-201 est. seq. inclusive.

18. **NO OPERATING OBLIGATION.** Nothing in this Agreement shall be deemed or construed as creating any obligation on any of the Parties to operate their water rights or their raw or treated waterworks systems in any particular manner. Each party retains sole and exclusive discretion concerning the operation of their water rights and waterworks systems.

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CACHE LA POUDRE WATER USERS ASSOCIATION, a Colorado non-profit corporation

By: Shawn Hoff Date: 1/16/2020

ATTEST:

By: Kimberly Nelson

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CITY OF FORT COLLINS, COLORADO, a Colorado home rule municipality

By: _____ Date: 6-27-19
Darin A. Atteberry, City Manager

ATTEST:

By: _____
City Clerk

CITY OF FORT COLLINS SEAL COLORADO

APPROVED AS TO LEGAL FORM:

By: _____
Eric Potyondy
City Attorney's Office

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COLORADO WATER TRUST, a Colorado non-profit organization

By:  Date: 2/7/2020

Andy Schultheiss, Executive Director

ATTEST:

By: _____

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NORTHERN COLORADO WATER CONSERVANCY DISTRICT, a political subdivision of the State of Colorado

By: _____ Date: 11/2/20
Bradley D. Wind, General Manager

ATTEST:

By: _____

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CITY OF GREELEY, COLORADO, a home rule municipality

DocuSigned by:
By: _____ Date: 1/14/2020
D93D100AE64B4E6...
Roy Otto, City Manager

AS TO LEGAL FORM:

DocuSigned by:
By: Douglas R. Marek
1E817506B21B4AA...
City Attorney's Office

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CITY OF THORNTON, COLORADO, a Colorado home rule municipality

By: _____ Date: 1-23-20
Kevin S. Woods, City Manager

ATTEST:

_____
Kristen N. Rosenbaum, City Clerk

APPROVED AS TO FORM:

_____
Luis A. Corchado, City Attorney

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COLORADO WATER CONSERVATION BOARD, an agency of the STATE OF COLORADO

By: Rebecca Mitchell Date: 12-20-2019

Rebecca Mitchell
Director
Colorado Water Conservation Board

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COLORADO PARKS AND WILDLIFE, an agency of the STATE OF COLORADO

By: _____ Date: 1/21/20

ATTEST:

By: _____

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DISTRICT COURT, WATER DIVISION NO. 1 Weld County Courthouse 901 9th Avenue P.O. Box 2038 Greeley, Colorado 80631	
CONCERNING THE APPLICATION FOR WATER RIGHTS OF: **CACHE LA POUDRE WATER USERS ASSOCIATION, CITY OF FORT COLLINS, CITY OF GREELEY, COLORADO WATER TRUST, NORTHERN COLORADO WATER CONSERVANCY DISTRICT, CITY OF THORNTON, AND COLORADO WATER CONSERVATION BOARD** IN LARIMER AND WELD COUNTIES, COLORADO.	▲ COURT USE ONLY ▲
Attorneys for Cache la Poudre Water Users Association: Dan Brown, #30799 Fischer, Brown, Bartlett & Gunn. P.C. 1319 E. Prospect Road Fort Collins, Colorado 80525 Telephone: (970) 407-9000 Email: danbrown@fbgpc.com Attorneys for City of Fort Collins: Eric R. Potyondy, #38243 Fort Collins City Attorney's Office 300 LaPorte Avenue Fort Collins, Colorado 80521 Telephone: (970) 416-2126 Email: epotyondy@fcgov.com Attorneys for City of Greeley: Daniel J. Biwer, #46308 Greeley City Attorney's Office 1100 10th Street, Suite 401 Greeley, Colorado 80631 Telephone: (970) 350-9291 Email: Daniel.Biwer@Greeleygov.com	Case Number: 20___CW____ **DRAFT FOR CWCB** **November 2020 Board Meeting**

Exhibit PF6
Agenda Item 23
Nov 18-19, 2020

DRAFT for CWCB November 2020 Board Meeting

Attorneys for the Colorado Water Trust: Katherine Ryan, #38873 3264 Larimer Street, Suite D Denver, Colorado 80205 Telephone: (720) 570-2897 Email: kryan@coloradowatertrust.org Attorneys for the Northern Colorado Water Conservancy District: Doug Sinor, #31148 Trout Raley 1120 Lincoln St., Suite 1600, Denver, Colorado 80203-2141 Telephone: (303) 861-1963 Email: dsinor@troutlaw.com Attorneys for the City of Thornton: David C. Taussig, #16606 Alan E. Curtis, #34571 Heather A. Warren, #35952 White and Jankowski, LLP 511 Sixteenth Street, Suite 500 Denver, Colorado 80202 Telephone: (303) 595-9441 Email: davet@white-jankowski.com Attorneys for Colorado Water Conservation Board: Philip J. Weiser, Attorney General Jennifer L. Mele, #30720 (Counsel of Record) Natural Resources and Environment Section Colorado Department of Law 1300 Broadway 7th Floor Denver, Colorado 80203 Telephone: 720-508-6282 Email: jen.mele@coag.gov	▲ COURT USE ONLY ▲ Case Number: 20___CW____ (continued)

APPLICATION FOR APPROVAL OF A PLAN FOR AUGMENTATION TO AUGMENT STREAM FLOWS ON THE CACHE LA POUDRE RIVER PURSUANT TO C.R.S. § 37-92-102(4.5)

DRAFT for CWCB November 2020 Board Meeting

1. **Name, mailing address, email address, and telephone number of Applicants.**

Cache la Poudre Water Users Association
1319 East Prospect Rd.
Fort Collins, Colorado 80525
Telephone: (970) 407-9000
Email: danbrown@fbgpc.com

City of Fort Collins ("Fort Collins")
c/o John Stokes, Director of Natural Areas Department
1745 Hoffman Mill Road (80524)
P.O. Box 580
Fort Collins, Colorado 80522
Telephone: (970) 416-2815
Email: jstokes@fcgov.com

City of Greeley ("Greeley")
c/o Jennifer Petrzelka, Water Resources Operations Manager
1001 11th Avenue, Second Floor
Greeley, Colorado 80631
Telephone: (970) 350-9859
Email: jennifer.petrzelka@greeleygov.com

Colorado Water Trust
c/o Kate Ryan, Senior Staff Attorney
3264 Larimer Street, Suite D
Denver, Coloado 80205
Telephone: 720-570-2897
Email: kryan@coloradowatertrust.org

Northern Colorado Water Conservancy District
c/o General Manager
220 Water Avenue
Berthoud, Colorado 80513
Telephone: (970) 622-2320
Email: bwind@northernwater.org

City of Thornton ("Thornton")
c/o Water Resources Division
12450 Washington Street
Thornton, Colorado 80241
Telephone: (720) 977-6600
Email: emily.hunt@cityofthornton.net

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Colorado Water Conservation Board ("CWCB")
1313 Sherman St., Room 718
Denver, Colorado 80203
Telephone: (303) 866-3441
Email: dnr_cwcbisf@state.co.us

2. **General Description of Application.** Applicants are seeking to decree a plan for augmentation pursuant to C.R.S. § 37-92-102(4.5) for the purpose of preserving and improving the natural environment to a reasonable degree in the Cache la Poudre River ("Poudre River") at locations downstream of the Cache la Poudre at Canyon Mouth Near Fort Collins gage ("Canyon Gage") to the confluence of the South Platte River ("Poudre Flows Plan" or "Plan").

This Application is based on the CWCB's authority to acquire interests in water rights through contractual arrangements pursuant to C.R.S. § 37-92-102(3) and to file applications in Water Court, utilizing the water rights it acquires, including applications for plans for augmentation. *Id.*; C.R.S. § 37-92-102(4.5). CWCB does not by this Application seek to appropriate an instream flow water right pursuant to C.R.S. § 37-92-102(3).

3. **Need for Augmentation of Stream Flows.** Applicants will augment stream flows in six defined segments of the Poudre River from the Canyon Gage to the Poudre River's confluence with the South Platte River ("Augmented Segments"), as set forth below:

Segment	Upper Terminus	Lower Terminus
A	Canyon Gage	Larimer and Weld Canal Diversion
B	Larimer and Weld Canal Diversion	Spring Creek Confluence
C	Spring Creek Confluence	New Cache la Poudre Ditch Diversion
D	New Cache la Poudre Ditch Diversion	County Road 17 Crossing
E	County Road 17 Crossing	59th Avenue Bridge
F	59th Avenue Bridge	South Platte River Confluence

A map showing the approximate location of the Augmented Segments of the Poudre River are shown on Exhibit 1 to this Application.

The Canyon Gage is in the NW1/4 of Section 15, Township 8 North, Range 70 West. (All legal locations herein are based on the 6th P.M and in Larimer or Weld County.) The Poudre River flows from the Canyon Gage through the following sections: Section 15, Township 8 North, Range 70 West; Sections 14, 13, 24, and 25, Township 8 North, Range 70 West; Sections 19, 30, 29, 32, 33, and 34, Township 8 North, Range 69 West; Sections 3, 2, 11, 12, and 13, Township 7 North, Range 69 West; Sections 18, 17, 20, 21, 28, 27, and 34, Township 7 North, Range 68 West; Sections 3, 2, 11, 14, 13, and 24, Township 6

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North, Range 68 West; Sections 19, 20, 29, 28, 33, 34, 35, and 36, Township 6 North, Range 67 West; Sections 31, 32, 33, 34, 35, 26, and 36, Township 6 North, Range 66 West; Sections 31 and 32, Township 6 North, Range 65 West; Sections 5, 4, 9, 10, 11, 12, 3, 2, and 1, Township 5 North, Range 65 West; and Section 6, Township 5 North, Range 64 West. The confluence of the Poudre River and the South Platte River is in the SW1/4 of Section 6, Township 5 North, Range 64 West.

The Canyon Gage is located in the NW1/4 of Section 15, Township 8 North, Range 70 West. The Larimer and Weld Canal Diversion is located in the SW1/4 of Section 34, Township 8 North, Range 69 West. The Spring Creek Confluence is located in the SW1/4 of Section 17, Township 7 North, Range 68 West. The New Cache la Poudre Ditch Diversion is located in the NE1/4 of Section 11, Township 6 North, Range 68 West. County Road 17 Crossing is located along the section line between Sections 28 and 29, Township 6 North, Range 67 West. The 59th Avenue Bridge is located along the section line between Sections 33 and 34, Township 6 North, Range 66 West. The South Platte River Confluence is located in the SW/14 of Section 6, Township 5 North, Range 64 West.

The Augmented Segments will be augmented under the Poudre Flows Plan to preserve and improve the natural environment to a reasonable degree up to the rates of flow (in cubic feet per second ("cfs")) set forth in the following table.

Segment	**Winter (Nov 1 – Mar 31) Preserve**	**Winter (Nov 1 – Mar 31) Improve**	**Summer (Apr 1 – Oct 31) Preserve**	**Summer (Apr 1 – Oct 31) Improve**
A	Up to 80	80 -150	Up to 114	114-260
B	Up to 80	80 - 150	Up to114	114-260
C	Up to 30	30 - 54	Up to 40	40 - 54
D	Up to 10	10 - 35	Up to 10	10 - 40
E	Up to 15	15 - 30	Up to 15	15 - 30
F	Up to 15	15 - 30	Up to 15	15 - 30

These flow rates were quantified by Colorado Parks and Wildlife in its *Flow Quantification Report for the Cache la Poudre River in Larimer and Weld Counties*, dated October 2020. The specific section of the Poudre River wherein flows will be augmented at any specific time will depend on the Introduction Point and Terminal Point (as defined in Paragraph 6.2 below) for each Augmentation Source (as defined in Paragraph 4 below) and all Augmentation Water (as defined in Paragraph 6.2 below), included in the Poudre Flows Plan.

At a regularly scheduled board meeting on January_____, 2021 the CWCB board determined that using acquired water, including the Augmentation Sources listed below, up to the above flow rates are appropriate to preserve and improve the natural environment to a reasonable degree. In addition to the other claims set forth in this Application, the

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CWCB seeks confirmation from the Court of the CWCB's determination that using acquired water rights, including the Augmentation Sources listed below, up to the flow rates listed above are appropriate to preserve and improve the natural environment to a reasonable degree.

4. **Water Rights to Be Used for Augmentation ("Augmentation Sources").** Applicants intend to include the following expressly identified "Seed Water Rights" as Augmentation Sources in the Poudre Flows Plan pursuant to C.R.S. § 37-92-102(4.5)(b)(III).

4.1. **Fort Collins' 2005CW323 Southside Ditch Companies Changed Water Rights.** Water rights, all sourced from the Poudre River, represented by certain shares owned by Fort Collins in the Arthur Irrigation Company, Larimer County Canal No. 2 Irrigating Company, and New Mercer Ditch Company, for which the historical consumptive use was quantified and which were changed in Case No. 2005CW323, Water Division No. 1, among other things, to include various new uses including augmentation use. The following information concerning these sources can be found in the decree entered in Case No. 2005CW323: the dates of the original decrees and all relevant subsequent decrees, the types of water rights, legal descriptions of each point of diversion and storage structure, the sources of water, the appropriation dated, the decreed amounts, and the decreed uses. A more complete description of these water rights is shown on Exhibit 2 to this Application. The locations of the structures are shown on Exhibit 3 to this Application.

4.2. **Greeley's 1999CW232 and 2015CW3163 Greeley Irrigation Company Changed Water Rights.** Water rights represented by shares owned by Greeley in the Greeley Irrigation Company ("GIC"). The historical consumptive use of shares in the GIC was quantified on a ditch-wide basis in Case No. 1996CW658, Water Division No. 1. In accordance with that ditch-wide quantification, Greeley changed the type, manner, and use of certain of its GIC shares in Case Nos. 1999CW232 and 2015CW3163. More specifically, Greeley changed these GIC shares to include alternate points of re-diversion and places of storage, and to include a number of additional uses beyond irrigation, including augmentation. A more complete description of the water rights to be included by Greeley in the Poudre Flows Plan via agreement with the CWCB is shown on Exhibit 4 to this Application. The locations of the structures are shown on Exhibit 3 to this Application.

4.3. **Thornton's TNP Decree.** The *Findings of Fact, Conclusion of Law, Judgment and Decree on Remand* in Consolidated Cases No. 86CW401, 86CW402, 86CW403, and 87CW332 ("TNP Decree") changed Thornton's interests represented by shares in the Water Supply and Storage Company ("WSSC") for native water rights in the Poudre River basin and transmountain water rights as described in attached Exhibit 5 to this Application, which was Exhibit B to the TNP Decree ("WSSC Water Rights"). The TNP Decree also changed Thornton's interests represented by shares in the Jackson Ditch Company ("JDC") for native water rights in the Poudre River

basin as described in attached Exhibit 6 to this Application, which was Exhibit C to the TNP Decree ("JDC Water Rights"). The TNP Decree quantified the historical consumptive use and changed Thornton's interest in the WSSC Water Rights and the JDC Water Rights to alternate types and places of use including among other things, augmentation in the Poudre River and South Platte River basins pursuant to the terms of the decree in paragraphs 11.3.1 and 11.3.2. The Poudre River Exchange in Case No. 86CW401, the WSSC Ditch Exchange in Case No. 86CW402, and the 1986 Appropriations in 86CW403 from the TNP Decree will not be part of or included in this Plan. The location of the structures are shown on Exhibit 3 to this Application.

5. **Additional or Alternative Water Rights to Be Used for Augmentation.** Applicants further seek that any decree entered in this case include procedures to allow the use of additional or alternative augmentation sources pursuant to C.R.S. § 37-92-305(8)(c) that will comply with the requirements of C.R.S. § 37-92-102(4.5). Specifically, Applicants seek a mechanism in the decree pursuant to C.R.S. § 37-92-305(8)(c) to add augmentation sources to the Plan after the decree is entered, provided those additional sources meet the requirements of C.R.S. § 37-92-102(4.5) ("Added Water").

6. **Complete Statement of the Plan.**

6.1. Applicants and others are parties to the Memorandum of Agreement for Phase II of the Cache La Poudre River Instream Flow Augmentation Plan dated February 8, 2020 ("Phase II MOA") related to the Poudre Flows Plan. A copy is attached as Exhibit 7. The Phase II MOA sets forth the responsibilities of the parties, including to work cooperatively on filing this Application and to implement and operate the Poudre Flows Plan once in place. The CWCB has acquired a contractual interest in the Seed Water Rights identified in Paragraph 4 above, pursuant to CWCB Rule 6 of the Rules Concerning the Colorado Instream Flow and Natural Lake Level Program.

6.2. Applicants intend to augment flows in the Augmented Sections through all or portions of the Poudre River from the Canyon Gage to its confluence with the South Platte River. The use of the Augmentation Sources and Added Water (together "Augmentation Water") in this Plan will be pursuant to agreements between the owner(s) of the Augmentation Water and the CWCB. Applicants specifically intend to deliver Augmentation Water to the Poudre River at various points ("Introduction Points") and to measure that water as required by C.R.S. § 37-92-502(5)(a) and the terms and conditions of any decree entered in this case. Once the Augmentation Water has been delivered to the stream at an Introduction Point, it will be used to augment stream flows in the Augmented Sections to preserve and improve the natural environment to a reasonable degree. The Poudre River is a free-flowing river subject to natural (including diurnal) variation, and the

DRAFT for CWCB November 2020 Board Meeting

Augmentation Water will be subject to evaporation, transportation and other losses as determined by the Division Engineer as it flows through the Augmented Segments in a manner consistent with other water flowing through the same reach. Subject to terms and conditions of C.R.S. § 37-92-102(4.5) that protect water rights, undecreed existing exchanges that have been administratively approved before the date of the Application, and the owners of structures from injury, the Augmentation Water will be shepherded downstream from the Introduction Points to various downstream points ("Terminal Points"). Between the Introduction Points and Terminal Points, the Augmentation Water will be placed to augmentation use in the stream and will be under the Applicants' dominion and control. For Applicants to maintain dominion over the Augmentation Water, State water officials must be capable of administering the water past intervening headgates. When the Augmentation Water reaches the Terminal Point, it may be used, reused or successively used for beneficial uses in accordance with the applicable underlying decree(s) or administrative approval(s) for the Augmentation Water, less any transit losses assessed by the Division Engineers that are incurred between the Introduction Points and Terminal Points. The Augmentation Water will be measured as required by C.R.S. § 37-92-502(5)(a) and the terms and conditions of any decree entered in this case.

6.3. Use of Augmentation Water in this Plan is subject to the terms and conditions of any applicable decree to which the Augmentation Water is subject. C.R.S. § 37-92-102(4.5)(b)(V).

6.4. This Plan will include any terms and conditions necessary to prevent injury to the owners of vested water rights or decreed conditional water rights. C.R.S. § 37-92-102(4.5)(b)(VI).

6.5. This Plan will include any terms and conditions necessary to prevent injury to other water rights that result from any change in the time, place, or amount of water available for diversion or exchange to the extent that other appropriators have relied upon the stream conditions that resulted from the historical use of the Augmentation Water used in this Plan before their use in this Plan. Any decree for this Plan will recognize that junior appropriators are entitled to the continuation of stream conditions as the conditions existed at the time of the junior appropriation. C.R.S. § 37-92-102(4.5)(b)(VI).

6.6. This Plan will include any terms and conditions necessary to prevent injury to other water users' undecreed existing exchanges of water to the extent the undecreed existing exchanges have been administratively approved before the date of the filing of this Application. C.R.S. § 37-92-102(4.5)(b)(VII).

6.7. The Augmentation Water used to augment stream flows in this Plan shall not be diverted within the Augmented Segments by an exchange, plan for substitution,

DRAFT for CWCB November 2020 Board Meeting

plan for augmentation, or other means that cause a reduction of the Augmentation Water in the Augmented Segments. The Augmentation Water used in this Plan is subject to such reasonable transit losses as may be imposed by the water court or the state and division engineers. C.R.S. § 37-92-102(4.5)(b)(VIII).

6.8. If operation of this Plan requires the use of, or making of physical modifications to, an existing diversion structure within a stream reach to allow the Augmentation Water to bypass the structure, the operator of the Plan must have consent from the owner of the existing diversion structure and bear all reasonable construction costs associated with any physical modifications and all reasonable operational and maintenance costs incurred by the owner of the structure that would not have been incurred in the absence of physical modifications to the structure. C.R.S. § 37-92-102(4.5)(b)(IX).

6.9. This Application does not include any claims for exchanges or changes of water rights. Because the Seed Water Rights described in Paragraph 4 above meet the requirements of C.R.S. §37-92-102(4.5)(b)(III), no further change of the Seed Water Rights is required.

7. **Name(s) and address(es) of owner(s) or reputed owner(s) of the land upon which any new diversion or storage structure, or modification to any existing diversion or storage structure is or will be constructed or upon which water is or will be stored, including any modification to the existing storage pool.**

Not applicable.

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Dated this _____ day of _____, 20__.

FISCHER, BROWN, BARTLETT & GUNN, P.C.
Signature on file pursuant to C.R.C.P. 121 § 1-26(7)

By: _____
Dan Brown (#30799)

Attorneys for the Applicant, Cache la Poudre Water Users Association

FORT COLLINS CITY ATTORNEYS OFFICE
Signature on file pursuant to C.R.C.P. 121 § 1-26(7)

By: _____
Eric R. Potyondy (#38243)

Attorneys for the Applicant, the City of Fort Collins

GREELEY CITY ATTORNEYS OFFICE
Signature on file pursuant to C.R.C.P. 121 § 1-26(7)

By: _____
Daniel J. Biwer (#46308)

Attorneys for the Applicant, the City of Greeley

COLORADO WATER TRUST
Signature on file pursuant to C.R.C.P. 121 § 1-26(7)

By: _____
Katherine Ryan (#38873)

Attorneys for the Applicant, Colorado Water Trust

TROUT RALEY
Signature on file pursuant to C.R.C.P. 121 § 1-26(7)

By: _____
Doug Sinor (#31148)

Attorneys for the Applicant, Northern Colorado Water Conservancy District

DRAFT for CWCB November 2020 Board Meeting

WHITE AND JANKOWSKI, LLP
Signature on file pursuant to C.R.C.P. 121 § 1-26(7)

By: _____
David C. Taussig (#16606)

Attorneys for the Applicant, City of Thornton

COLORADO ATTORNEY GENERAL'S OFFICE
Signature on file pursuant to C.R.C.P. 121 § 1-26(7)

By: _____

Jennifer L. Mele (#30720)

Attorneys for the Applicant, Colorado Water Conservation Board

DRAFT for CWCB November 2020 Board Meeting

VERIFICATION
(Cache la Poudre Water Users Association)

STATE OF COLORADO)
) ss.
COUNTY OF LARIMER)

I, _____, declare under penalty of perjury under the law of Colorado that I have personal knowledge of the facts stated and verify its contents to the best of my knowledge, information, and belief.

_____

DRAFT for CWCB November 2020 Board Meeting

VERIFICATION
(City of Fort Collins)

STATE OF COLORADO)
) ss.
COUNTY OF LARIMER)

I, John Stokes, Director of the City of Fort Collins Natural Areas Department, declare under penalty of perjury under the law of Colorado that I have personal knowledge of the facts stated and verify its contents to the best of my knowledge, information, and belief.

_____

DRAFT for CWCB November 2020 Board Meeting

VERIFICATION
(City of Greeley)

STATE OF COLORADO)
) ss.
COUNTY OF WELD)

I, _____, declare under penalty of perjury under the law of Colorado that I have personal knowledge of the facts stated and verify its contents to the best of my knowledge, information, and belief.

_____

DRAFT for CWCB November 2020 Board Meeting

VERIFICATION
(Colorado Water Trust)

STATE OF COLORADO)
) ss.
COUNTY OF DENVER)

I, _____, declare under penalty of perjury under the law of Colorado that I have personal knowledge of the facts stated and verify its contents to the best of my knowledge, information, and belief.

_____

DRAFT for CWCB November 2020 Board Meeting

VERIFICATION
(Northern Colorado Water Conservancy District)

STATE OF COLORADO)
) ss.
COUNTY OF LARIMER)

I, _____, declare under penalty of perjury under the law of Colorado that I have personal knowledge of the facts stated and verify its contents to the best of my knowledge, information, and belief.

_____

DRAFT for CWCB November 2020 Board Meeting

VERIFICATION
(City of Thornton)

STATE OF COLORADO)
) ss.
COUNTY OF ADAMS)

I, Emily Hunt, Deputy Infrastructure Director for the City of Thornton, declare under penalty of perjury under the law of Colorado that I have personal knowledge of the facts stated and verify its contents to the best of my knowledge, information, and belief.

_____

DRAFT for CWCB November 2020 Board Meeting

VERIFICATION
(Colorado Water Conservation Board)

STATE OF COLORADO)
) ss.
COUNTY OF DENVER)

I, _____, declare under penalty of perjury under the law of Colorado that I have personal knowledge of the facts stated and verify its contents to the best of my knowledge, information, and belief.

_____

CERTIFICATE OF SERVICE

I hereby certify that on this _____ day of _____, 20__, I served a true and correct copy of the foregoing **APPLICATION FOR APPROVAL OF PLAN FOR AUGMENTATION TO AUGMENT STREAM FLOWS ON THE CACHE LA POUDRE RIVER PURSUANT TO C.R.S. § 37-92-102(4.5)** by ICCES e-filing addressed to the following:

Division Engineer	Division 1 Water Engineer	State of Colorado DWR Division 1
State Engineer	Colorado Division of Water Resources	State of Colorado - Division of Water Resources

_____

/s/ signature on file
Pursuant to C.R.C.P. 121, §1-26(7)

EXHIBIT 1
to
DRAFT WATER COURT APPLICATION

Location Map

(Board Agenda Item 23 Memo Exhibit PF2-1)

EXHIBIT 2
to
DRAFT WATER COURT APPLICATION

City of Fort Collins Seed Water Rights

(2005CW323 Southside Ditch Companies

Changed Water Rights)

EXHIBIT 3
to
DRAFT WATER COURT APPLICATION

Seed Water Map

(Board Agenda Item 23 Memo Exhibit PF2-2)

EXHIBIT 4
to
DRAFT WATER COURT APPLICATION

City of Greeley Seed Water Rights

(Greeley Irrigation Company

Changed Water Rights)

EXHIBIT 5
to
DRAFT WATER COURT APPLICATION

City of Thornton Seed Water Rights

(WSSC - Changed Water Rights)

EXHIBIT 6
to
DRAFT WATER COURT APPLICATION

City of Thornton Seed Water Rights

(JDC - Changed Water Rights)

EXHIBIT 7
to
DRAFT WATER COURT APPLICATION

Phase II MOA, dated February 8, 2020

(Board Agenda Item 23 Memo Exhibit PF5)

COLORADO
Parks and Wildlife
Department of Natural Resources

Water Resources Section – Aquatic,
Terrestrial, and Natural Resources Branch

November 5, 2020

Ms. Linda Bassi
Ms. Kaylea White
Colorado Water Conservation Board
Stream and Lake Protection Section
1313 Sherman Street, 7th Floor
Denver, CO 80203

SUBJECT: Plan for Augmentation to Augment Stream Flows in the Cache la Poudre River

Linda and Kaylea:

The purpose of this letter is to provide the Colorado Water Conservation Board (CWCB) staff with Colorado Parks and Wildlife's (CPW) opinions regarding the potential acquisition of water rights to maintain, enhance, and improve river conditions on the Cache la Poudre River (Poudre River) in Division 1 as part of a plan for augmentation to augment stream flows in the Poudre River. The proposed acquisition arrangement involves the CWCB acquiring an interest in water rights through contractual agreements with the Cities of Thornton, Greeley, and Fort Collins. The Cities have provided the first set of water rights ("Seed Water") to be included in the augmentation plan to augment stream flows for the purpose of preserving and improving the natural environment to a reasonable degree in six segments of the Poudre River from the canyon mouth to the confluence with the South Platte River. The following represents CPW's opinions and recommendations on the acquisition of the Seed Water and on the concept of a plan for augmentation of stream flows on the Poudre River ("Poudre Flows Plan"). November will be the first of a two CWCB meeting process, in which the CWCB can take action on the proposed acquisition at the second January meeting. CPW's opinions and recommendations on the Seed Water from Fort Collins, Greeley, and Thornton are included in this letter.

Background

Stream flows in the Poudre River above and through the City of Fort Collins have been a concern for many decades. There have been many attempts to address this issue with little success; in the late 1980s, the City of Fort Collins approached the state to investigate the possibility of an appropriated CWCB instream flow water right. The state quickly concluded that significant and complex water availability issues precluded such an approach because there simply was not enough water through the reach to support a new appropriation.

More recently, a group of local stakeholders, water users, and state agencies gathered with the common goal of developing a new approach to improve connectivity in the Poudre River. With several dry-up locations on the river for much of the year, water was not available for a traditional appropriation of water for instream flow use. The group has endeavored to pilot a

Exhibit PF7
Agenda Item 23
Nov 18-19, 2020

concept leveraging quantified augmentation supplies to meet instream flow needs. This novel concept adds replacement water to the Poudre River to satisfy non-consumptive, instream flow needs. The group, which stemmed from the FLOWS committee of the Poudre Runs Through It Group, is referred to as the Poudre Flows Group, and includes major water users in the Poudre Basin, including the Cache la Poudre Water Users Association, the City of Fort Collins, Northern Colorado Water Conservancy District, the City of Greeley, and the City of Thornton. The Colorado Water Trust has led this group of broad interests to solidify the concept of a plan for augmentation of stream flows and completed a legislative effort in early 2020 to clarify CWCB's statutory authority to file an application for such a plan for augmentation.

Natural Environment in the Poudre River

The Poudre River has been extensively studied by CPW and other entities. The natural environment includes a somewhat diverse fishery consisting of both native and non-native species. The upper reaches of the Poudre River as it emerges from Poudre Canyon are typical cold-water trout habitat supporting rainbow and brown trout. As the river flows eastward through Fort Collins, the fishery transitions to a mixed cold water/cool water/warm water fishery. Trout occur regularly downstream to approximately Prospect Avenue, but persist in the system down to approximately the highway crossing at I-25; however, they are challenged and limited by low flows, reduced habitat, and higher water temperatures.

High public use exists throughout the urban stretch of the Poudre River. Considerable public access draws visitors to swim, tube, picnic, walk, bird watch, and fish. Recent fish population surveys indicate there are 1,000 to 2,000 trout per river mile within the Fort Collins area. Impacts associated with this high recreational use include accelerated bank erosion and degradation of natural values. Regardless, the Poudre River is an important resource for the community. Fishing and the overall health of the Poudre River is an important recreational driver for the local economy.

The transition zone of the Poudre River provides important habitat for cold-water species seasonally coming down from the canyon, as well as plains species that move up from the low gradient plains zone of the Poudre River. Fish species diversity increases as the river flows through Fort Collins, where native minnow, sucker, and darter species, as well as the Plains Topminnow (Tier 1 Species of Greatest Conservation Need, CPW State Wildlife Action Plan) start to show up in fish sampling efforts. East of I-25, the fishery is dominated by species in the darter, minnow, and sucker families.

The Poudre River is important from a native species conservation standpoint although sampling efforts show a declining trend in native species diversity and abundance. This is coincident with increased demands and water diversions, causing habitat fragmentation during periodic low flow conditions and fewer high flow events connecting the river with its floodplain. The Poudre Flows Plan will introduce sufficient water to improve upon low flow conditions and take necessary steps towards habitat connectivity for fish species in decline.

Evaluation of Flows Necessary to Preserve and Improve the Natural Environment

Early in their process, the Poudre Flows Group asked CPW to assemble and analyze all existing biological and hydraulic data in order to develop instream flow recommendations to be used as flow targets for water acquisitions in this reach of the river. The quantification of flows required to both preserve and improve the natural environment to a reasonable degree is

summarized by CPW in the report titled "Flow Quantification Report for the Cache la Poudre River in Larimer and Weld Counties" dated October 2020.

In general, CPW used a combination of R2CROSS and PHABSIM data collected and published by a variety of parties over a period of ten years. The R2CROSS data was collected by CPW, Fort Collins, and CWCB staff; other data was collected and analyzed by several consulting firms working on various aspects of the Northern Integrated Supply Project (NISP) and Halligan and Seaman Reservoir expansion projects. Flow recommendations and segment delineations from the Flow Quantification Report are provided below:

Segment	**Winter** (November 1 – March 31)		**Summer** (April 1 – October 31)	
	Preserve Flow	**Improve Flow**	**Preserve Flow**	**Improve Flow**
A and B	Up to 80 cfs	80 – 150 cfs	Up to 114 cfs	114 - 260 cfs
C	Up to 30 cfs	30 – 54 cfs	Up to 40 cfs	40 – 54 cfs
D	Up to 10 cfs	10 – 40 cfs	Up to 10 cfs	10 – 40 cfs
E and F	Up to 15 cfs	15 –30 cfs	Up to 15 cfs	15 –30 cfs

Segment	Upper Terminus	Lower Terminus
A	Canyon Gage	Larimer/Weld Canal Diversion
B	Larimer/Weld Canal Diversion	Spring Creek Confluence
C	Spring Creek Confluence	New Cache la Poudre Diversion
D	New Cache la Poudre Diversion	County Road 17 Crossing
E	County Road 17 Crossing	59th Avenue Bridge (Greeley)
F	59th Avenue Bridge (Greeley)	South Platte Confluence

The Poudre River from the canyon mouth to the confluence of the South Platte River is considered an important transition zone fishery. Transition zones provide aquatic habitat conditions that support an array of species, including important native species with varying temperature and habitat preferences that can be unique to transition zones. Conditions within transition zones are not static and may shift seasonally or from year-to-year. The flow recommendations summarized in this report are based on physical habitat, but do not include habitat assessments for all native species and no direct temperature considerations were made. Future investigations to the relationship between habitat, flow, and thermal regime may be incorporated into CPW's preferred flow targets to ensure favorable habitat and thermal conditions for native warm-water species using the transition zone.

Seed Water Rights

The envisioned Poudre Flows Plan starts with the initial Seed Water donations from the Cities; augmentation water can be subsequently added to the Plan after appropriate review and approval processes by both the CWCB and Division of Water Resources (DWR). Water rights which may be added to the plan are limited to water rights for which historical consumptive use has been quantified and changed to augmentation. The initial Seed Water from Thornton, Greeley, and Fort Collins is described in more detail below. CPW is supportive of the benefits that will be provided individually and collectively from the Cities' contributions of water.

Fort Collins

Fort Collins has offered to the CWCB Seed Water which includes their shares in the Arthur Irrigation Company, the Larimer County Canal No. 2 Irrigating Company, and the New Mercer Ditch Company (which together with the Warren Lake Reservoir Company are collectively known as the Southside Ditches, however Warren Lake Reservoir Company shares are not included in the offered water rights). Shares were quantified and changed to include augmentation and other uses. Currently, water is being diverted and used for irrigation in their original ditch systems.

As part of the Poudre Flows Plan, each year Fort Collins will make a determination how much water will continue to be used for irrigation or municipal use, or be made available for use in the Poudre Flows Plan. Under typical operations, water will be used for instream flow augmentation in Segments A, B, and upper portions of C where the consumptive use portion of their shares will be diverted at Fossil Creek Reservoir Inlet Ditch (FCRID) for storage in Rigden Reservoir. Return flow obligations will be left in the river. Fort Collins may also deliver the consumptive use credits farther downstream to lease to other users.

Fort Collins' Seed Water Contribution may provide additional water between the Southside Ditches and FCRID in average daily rates *up to* 0.1 to 19 cfs between April and October, depending on Fort Collins' contribution in a given year. Added water will increase flows at two dry-up locations – increasing flows for both cold-water trout and native species and providing notable benefits to the heavily used urban stretch of the Poudre River surrounding Fort Collins.

Greeley

Greeley has offered to the CWCB Seed Water which includes their water right shares in Greeley Irrigation Company (GIC) that were changed from irrigation to municipal use. Greeley's shares are currently being diverted at the GIC (Greeley #3) headgate. Seed Water part of the Poudre Flows Plan will travel approximately 2 miles down the canal where it will be released back to the Poudre River through the F-street return structure. As such, the reach benefitting from Greeley's Seed Water is between the F-Street Return and the confluence with the South Platte, although Greeley may choose to bypass water at the GIC headgate in the future.

Greeley will decide on a year-to-year basis how much water to dedicate to the Poudre Flows Plan, making no less than 1 cfs available each year. Greeley's Seed Water contribution may increase river flows by an average of *up to* 1.3 to 8.9 cfs between April through October. Maximum rates of up to 16 cfs in July may be provided. Additional water will benefit native species in Segment F representing the first step to restore connectivity at a known dry-up location during irrigation season.

Thornton

Thornton has offered to the CWCB Seed Water which includes Water Supply and Storage Company Shares and Jackson Ditch Company Shares changed from irrigation use to municipal use. Thornton has proposed making all of this water available to the Poudre Flows Plan to meet downstream return flow obligations and stipulation requirements of changed water at various points within the six segments.

Benefits resulting from Thornton's Seed Water commitment will accrue over the entire Poudre Flows Plan reach extending from the canyon mouth to the South Platte River confluence.

Thornton's additions may increase river flows by an average of *up to* 1.5 cfs to 7.0 cfs year-round. Flow rates vary downstream as return flow obligations are satisfied, but this added water will provide year-round increased river flows to improve connectivity for cold-water trout and native warm-water fish species in Segments A through F.

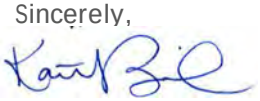
Conclusions and Recommendations

CPW applauds the efforts of the Poudre Flows Group to innovate a creative, market-driven approach to solving the complex water shortages facing the Poudre River. In addition to having broad support from water users in the Poudre River Basin, this plan for augmentation offers a unique solution to improve connectivity in an over-appropriated river without injuring vested water rights holders.

CPW strategic goals in the Poudre River include "supporting fish passage projects for warm-water and transitional zones and continuing focused fish community monitoring as it relates to water development and habitat restoration projects" (CPW South Platte Basin Plan, 2018). Both of these strategic goals align with flow restoration benefits that will be realized through the Poudre Flows Plan. The availability of sufficient water and flow regimes are a critical factor impacting fish communities, and CPW is hopeful the added water will help improve conditions for species in decline.

CPW is of the opinion that the proposed acquisition of the Seed Water will result in benefits, namely supporting improvements to habitat fragmentation throughout the Poudre River. We appreciate the collaboration amongst water users and the state to restore the Poudre River to a healthy, working river. CPW therefore believes that CWCB should proceed with this acquisition concept while continuing to coordinate with the water users, DWR, and CPW. As the Poudre Flows Plan is implemented, logistical hurdles related to administration and physical bypass of water at diversion structures are expected. CPW looks forward to being involved in these conversations as they unfold; incorporating fish passage for both trout and native species at physical barriers would provide notable connectivity benefits. As always, CPW staff will be available at the November 2020 CWCB meeting to answer any questions that the CWCB might have relating to this agenda item. Thank you for the opportunity to assist in this matter.

Sincerely,



Katie Birch
Instream Flow Program Specialist

CC: Battige, Spohn, Wright, Conovitz, Armstrong, Harris, DeWalt, Leslie, Cannon, Surface