COLORADO
Colorado Water Conservation Board
Department of Natural Resources

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Denver, CO 80203

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Jared Polis, Governor
Dan Gibbs, DNR Executive Director
Rebecca Mitchell, CWCB Director

TO: Colorado Water Conservation Board Members

FROM: Kaylea White, Senior Water Resource Specialist
Pete Conovitz, Water Resource Specialist
Stream and Lake Protection Section

DATE: November 17-18, 2021

AGENDA ITEM: #21. Proposed Lease of Ruedi Reservoir Water for Instream Flow Use on the Fryingpan River and 15-Mile Reach of the Colorado River (Water Division 5)

Staff Recommendation

No formal action is required at this time.

Pursuant to Rule 6b. of the Rules Concerning the Colorado Instream Flow and Natural Lake Level Program ("ISF Rules"), the Board's consideration of this proposal at this meeting will initiate the 120-day period for Board review. The initial presentation of this proposal provides an opportunity for the Board and the public to identify questions or concerns that Staff will address at this or a subsequent meeting.

Introduction

The Colorado River Water Conservation District, acting through its Colorado River Water Projects Enterprise ("District"), has offered the Colorado Water Conservation Board ("CWCB") another opportunity to enter into a one-year short-term lease of a portion of water that the District holds in Ruedi Reservoir for instream flow ("ISF") use. This would be the third of such leases with the District.

The objective of the proposed lease is to help maintain Fryingpan River flows up to a rate of 70 cfs to prevent the formation of anchor ice at times when temperatures and low flows could otherwise combine to create anchor ice during between January and March. The CWCB would use the leased water to supplement its existing decreed ISF water right to preserve and improve the natural environment to a reasonable degree on the Fryingpan River. Beginning April 1, the balance of the leased water, if any, would be delivered to the 15-Mile Reach as needed to help meet or reduce shortfalls to the U.S. Fish and Wildlife Service ("USFWS") flow recommendations for the endangered fish critical habitat in that reach. See the Location Map attached as **Exhibit A** and River District Offer Letter as **Exhibit B**.

Background

In 2018, the District worked with the Roaring Fork Conservancy ("RFC") to evaluate needs and potential available supply to enhance instream flows in the Fryingpan River below Ruedi Reservoir during the winter months under certain conditions. Studies have shown that winter flows of 70 cfs, 31 cfs above the decreed ISF rate of 39 cfs (November 1 –April 30), would benefit the natural environment by preventing and/or mitigating the effects anchor ice. Anchor ice formation has been shown to adversely impact aquatic macroinvertebrates and trout fry in the Fryingpan River.

Based upon those studies and a recommendation from Colorado Parks and Wildlife ("CPW"), the District and CWCB entered into a one-year lease agreement in 2018. Operation of that lease in 2019 provided up to 26 cfs of additional flows from January 1, 2019 – March 7, 2019 by releasing 3,201 acre-feet, and proved to be very beneficial toward maintaining Fryingpan River flows at a minimum of 70 cfs. These releases helped mitigate the effects of anchor ice formation. The balance of the leased water remaining after March 31, 2019 in the amount of 299 acre-feet was released in late September of 2019 for use in the 15-Mile Reach.

In 2020, the District and CWCB entered into a second lease for 3,500 acre-feet of water for ISF use on the Fryingpan River and 15-mile reach. Operation of that lease again provided additional flows to meet the 70 cfs target rate from January 1, 2021 – February 28, 2021.

This year, the District has offered to lease 1,750 acre-feet of water available to it under two different Ruedi Reservoir Round II Water Sales Contracts with the Bureau of Reclamation ("USBR"). The terms for a District lease for in-channel water uses are set forth in the District's Water Marketing Policy dated January 20, 2021.

Discussion

ISF Rule 6e. requires the Board to evaluate the appropriateness of the acquisition and to determine how best to utilize the acquired water to preserve or improve the natural environment. ISF Rules 6e. and 6f. describe the Board's evaluation process, including specific factors that the Board must consider in determining the appropriateness of an acquisition. Information that the Board may use to evaluate the proposed lease is included below:

1. Amount and Source of Water Proposed for Lease

The water rights proposed to be leased to the CWCB would be up to 1,750 acre-feet of water available to the District in Ruedi Reservoir pursuant to its Ruedi Reservoir Round II Water Sales Contract No. 079D6C0106 that could be delivered to the Fryingpan River in Pitkin and Eagle Counties ("Leased Water"). The contract includes an explicit term that the water may be used "…to supplement winter instream flows in the Fryingpan River." After March 31, 2022, any remaining Leased Water could be delivered pursuant to the River District's Ruedi Reservoir Round II Water Sales Contract No. 139D6C0101 ("Remaining Leased Water"). That contract authorizes municipal uses in the Colorado River Basin; the contract's definition of "municipal uses" includes "use of water by . . . piscatorial users, including delivery of water

to supplement streamflow . . .” Ruedi Reservoir is decreed for several types of use: irrigation, domestic, municipal, generation of electrical energy, stockwatering, industrial, piscatorial, recreation, and other beneficial uses.

2. Location of Use

The reach of stream proposed for use of the Leased Water is the Fryingpan River from its confluence with Rocky Fork Creek, adjacent to the outlet of Ruedi Reservoir, down to its confluence with the Roaring Fork River in Pitkin and Eagle Counties. The Remaining Leased Water would be used on the 15-Mile Reach of the Colorado River. The reaches are described below and shown on the attached Location Map.

3. Existing ISF Water Rights

The CWCB currently holds ISF water rights on the following reaches of the Fryingpan and Colorado Rivers on which it would use the Leased Water and Remaining Leased Water, respectively:

Case No.	Stream	Segment	Length (miles)	Amount CFS Rates (Dates)	Appropriation Date
W-1945 (1973)	Fryingpan River	confl Rocky Fork Creek to confl Roaring Fork River	Approx. 14 miles	39 cfs (11/1 - 4/30) 110 cfs (5/1 - 10/31)	07/12/1973
5-92CW286	Colorado River (15 mile reach)	Tailrace of Grand Valley Pumping Plant to confl Gunnison River	Approx. 15 miles	581cfs (7/1-9/30)	3/5/1992
5-94CW330	Colorado River (15 mile reach)	27.5 Road Gage to confl Gunnison River	Approx. 2 miles	300 cfs (7/1-9/30)	11/4/1994

4. Natural Flow Regimes

The Fryingpan River originates in the central Rocky Mountains of Colorado northeast of Aspen in Pitkin County. The headwaters of the Fryingpan River are at the Continental Divide in the Hunter Fryingpan Wilderness at an elevation of about 12,000 feet. Streamflow in the Fryingpan River is primarily from snowmelt and local precipitation and influenced by reservoir operations and transmountain diversions. The largest storage facility in the basin is the Bureau of Reclamation’s Ruedi Reservoir, located in the lower portion of the watershed approximately 11 miles above the point at which the Fryingpan River flows in to the Roaring Fork River near the town of Basalt. Peak flows typically occur in May, June, and early July and diminish down to base flows in July through September; streamflow is characteristically low and steady from November through March of most years. The watershed above Ruedi Reservoir is approximately 230 square miles with an extensive tributary network; several of these tributaries are diverted to the eastern slope via facilities associated with the Fryingpan-Arkansas project. The Fryingpan River below Ruedi Reservoir flows in a westerly direction

through a confined canyon fed by only a few small tributary streams. The streamflow of the Fryingpan River in this canyon is almost entirely made up of Ruedi Reservoir releases, especially during the winter months. The thermal effects of the reservoir releases create open water conditions virtually year round, making the river a very popular fishery for both local residents and visitors to the area.

The Colorado River originates in the southern Rocky Mountains of Colorado over 2 miles above sea level, flows past Glenwood Springs and Grand Junction, running parallel to I-70, and flows west out of Colorado into Utah. The 15-Mile Reach includes the portion of the river from the Grand Valley Diversion (River Mile 185.1) to the confluence with the Gunnison River in Grand Junction. Streamflow is primarily from snowmelt and local precipitation. Peak flows typically occur in May and June, and drop off quickly in July-September most years. Significant tributaries include the Blue, Eagle, and Roaring Fork Rivers.

5. Existing Natural Environments

The Fryingpan River is a Gold Medal trout fishery renowned for its abundant quality-sized trout, specifically a robust brown trout population and a burgeoning rainbow trout population recovering from the impacts of whirling disease. Mottled sculpin and aquatic invertebrates are the foundation of the diet that supports the Gold Medal fishery. The daily aquatic invertebrate hatches are well known for the consistency and timing such that anglers can “set their watches” to virtually guaranteed fish feeding frenzies and predictable conditions for dry fly fishing. The anglers drawn to this fishing opportunity provide a significant economic driver for local communities and the quality fishery is pivotal to the high quality of life for residents and visitors. Winter flow conditions below the reservoir and the thermal effects of the reservoir have, over time, created fairly predictable conditions for anchor ice formation when streamflow is below 70 cfs and when air temperatures are in the single digits. Extensive anchor ice deposits can have dramatic impacts on aquatic macroinvertebrate numbers and can disrupt their life cycles. Impacts on trout fry in the interstitial spaces in the substrate can also occur with the formation and accumulation of anchor ice deposits.

The 15-Mile Reach of the Colorado River provides critical habitat for two species of endangered fish: the Colorado pikeminnow and razorback sucker. This reach is sensitive to water depletions because of its location downstream of several large diversions. It provides spawning habitat for these endangered fish species as well as high-quality habitat for adult fish.

Due to development on the Colorado River, this reach has experienced declining flows and significant dewatering during the late summer months, and at times there are shortages in the springtime. As a result, the USFWS has issued flow recommendations for the 15-Mile Reach since 1989 to protect instream habitat for the endangered fish.

6. Proposed Method of Acquisition

Under this proposal, the CWCB would lease 1,750 acre-feet of Ruedi Reservoir water from the District. The District and the CWCB will need to negotiate the terms of the short term lease

and work through each agency's respective contracting processes. Any final lease agreement will become effective after approval by both the CWCB and District's boards of directors. Issues that the lease would address include: (1) the lease term; (2) amount of water to be leased; (3) timing of and coordination on releases; (4) payments to District for the leased water; (5) the potential for the USBR to suspend releases when necessary to meet its legal and regulatory obligations; and (6) any other provisions deemed necessary by the parties. The use of the water under the lease is authorized by the Ruedi Reservoir decrees, the District contract with USBR, and CWCB Board findings and acceptance of the acquired water.

7. Proposed Use of the Leased Water

Upon finalizing the agreement, from that date until March 31, 2022, the Leased Water would be used to supplement the existing 39 cfs ISF water right in the Fryingpan River to preserve the natural environment, to bring the stream flow up to 70 cfs to meet the RFC and CPW flow recommendations to improve the natural environment to a reasonable degree. The objective of the lease would be to maintain Fryingpan River flows at a rate of 70 cfs to prevent the formation of anchor ice at times when temperatures and low flows could otherwise combine to create anchor ice. See RFC letter and memo attached as **Exhibit C.**

Based upon its river monitoring system and analysis of weather conditions, the RFC will inform the CWCB of when conditions are conducive to the formation of anchor ice. The CWCB, CRWCD, RFC, and USBR will coordinate on the timing and amount of releases of Ruedi water, requesting such releases, and recording and accounting for the releases.

From April 1 – June 30, any Remaining Leased Water would be used on the 15-Mile Reach of the Colorado River to provide an incremental amount of water to preserve the natural environment by helping meet or reduce shortfalls to the USFWS flow recommendations.

From July 1 – September 30, any Remaining Leased Water would be used to supplement existing ISF water rights in the 15-Mile Reach to preserve the natural environment, and to provide water to help meet or reduce shortfalls to the USFWS flow recommendations for the endangered fish critical habitat. The CWCB's use of the Remaining Leased Water above the decreed ISF rates to meet the USFWS flow recommendations will improve the natural environment to a reasonable degree.

CPW has confirmed that the USFWS flow recommendations and related biological studies, developed in 1989, refined in 1995, and incorporated into the 1999 Programmatic Biological Opinion ("PBO") for the Upper Colorado River above its confluence with the Gunnison River, formed the basis for the ISF water rights held by the Board on the 15-Mile Reach of the Colorado River. Based upon the numerous actions of the State over the years supporting the Upper Colorado River Recovery Program and the PBO, and the ongoing need for water in the 15-Mile Reach, CPW recommends moving forward with this proposal and its letter of recommendation is attached as **Exhibit D**.

8. Historical Use and Historical Return Flows

Because this is a release of stored water and does not involve a change of water right, or other mechanism through which return flows would be owed, the Board does not need to consider this factor.

9. Location of Other Water Rights

There are many other water rights located on the Fryingpan River and Colorado River; however, they will not be affected by this release of stored water for ISF use on the Fryingpan River and delivery to and use on the 15-Mile Reach.

10. Material Injury to Existing Rights

There will be no injury to existing rights. Under this lease, water previously stored in priority under the Ruedi Reservoir water rights would be released during times when temperature and flow conditions are conducive to the formation of anchor ice in the winter months, and when needed to supplement flows in the 15-Mile Reach.

11. Stacking Evaluation

When the Leased Water is available under this lease for ISF use on the Fryingpan River or Remaining Leased Water is available for ISF use on the 15-Mile Reach, it can be used to supplement the Board's decreed ISF water rights and may be combined, or "stacked," with the existing ISF water right to achieve a greater level of protection for the natural environment and to help meet the USFWS flow targets for the endangered fish.

12. Effect of Proposed Acquisition on Any Relevant Interstate Compact Issue

The proposed lease does not negatively affect any interstate compact.

13. Effect on Maximum Utilization of Waters of the State

This proposed lease will promote maximum utilization of waters of the State by generating hydropower at the Ruedi power plant, supporting the recovery of endangered fish within the Upper Colorado River Basin, and making water available to downstream users.

14. Availability for Downstream Use

The Leased Water would be available for use below the confluence with the Roaring Fork River and the Remaining Leased Water would be available for use downstream of the 15-Mile Reach of the Colorado River.

15. Administration

Discussions with the Division 5 Division Engineer indicates that the release and delivery of the Leased Water and Remaining Leased Water from Ruedi Reservoir to and through the Fryingpan River and the 15-Mile Reach pursuant to a lease agreement between the District and the CWCB will be administrable.

16. Cost to Complete Transaction

The District's Water Marketing Policy indicates costs for project year 2021 at $69.75/AF, which, for 1,750 AF, would total $122,062.50. The CWCB would pay for the lease with funds authorized by section 37-60-123.7, C.R.S. (2021) for acquisitions of water for ISF use to preserve or improve the natural environment.

17. Policy 19 Funding Request

Because staff is requesting the Board to approve an expenditure of funds authorized by section 37-60-123.7, information required by CWCB's Financial Policy 19, which governs such expenditures, is set forth below:

Financial Aspects of the Proposal

The price for this lease is based upon the CRWCD's Water Marketing Policy, which sets a price of $69.75/AF for Ruedi water used in-channel in the Fryingpan and Roaring Fork Rivers to the confluence with the Colorado River. Costs related to negotiating and finalizing the lease agreement can be absorbed as part of the ordinary course of business of the CWCB staff. Consequently, staff will recommend that the Board authorize an expenditure of up to $122,062.50 for this lease.

Required Information from Colorado Parks and Wildlife

Because the acquired water will be used to improve the natural environment to a reasonable degree on the Fryingpan River and on the 15-Mile Reach of the Colorado River, Policy 19 requires CPW to provide the following information regarding the subject ISF reaches:

a. The degree to which the acquired water will add useable habitat to riffles, pools and runs within the subject ISF reach; and **b.** the amount of additional useable area for fish and macroinvertebrates that the acquired water will provide:

Fryingpan River: Flows up to 70 cfs resulting from the Leased Water will benefit brown trout adults and egg incubation over the winter. IFIM/PHABSIM studies show that flows up to 100 cfs provide benefits for brown trout adults and egg incubation and flows up to 250 cfs provide benefits for multiple life stages of rainbow trout. Additional site-specific studies have found that flows higher than 40 cfs are beneficial for invertebrates below Ruedi Reservoir, supporting a diverse food base for resident fish.

15-Mile Reach: Any Remaining Leased Water above the decreed ISF flow rates will improve the natural environment by helping meet USFWS flow recommendations during low flow or baseflow conditions both before and after peak spring runoff. USFWS flow recommendations are based on IFIM/PHABSIM which models the relationship between flow and preferred habitat for the Colorado pikeminnow and razorback sucker. This modeling indicates that increases in preferred habitat are anticipated for any Remaining Leased Water added to the 15-mile reach.

c. Where applicable, the amount of protection from high temperatures and low oxygen levels in hot summer months that the acquired water will provide:

Fryingpan River: Because Leased Water will be used in the Fryingpan River only in the winter, CPW concluded that this information is not relevant to this acquisition.

15-mile Reach: Because Leased Water will be used for warm-water fish species, CPW concluded that this information is not relevant to this acquisition.

d. An analysis of the degree to which the additional water resulting from the acquisition: (1) benefits the natural environment, and (2) does not result in hydraulic conditions that are detrimental to the aspects of the natural environment intended to be benefited by the acquired water, such as habitat requirements for a particular life stage of a fish species:

Fryingpan River: Flows up to 70 cfs resulting from the Leased Water will benefit brown trout adults and egg incubation over the winter. IFIM/PHABSIM studies show that flows up to 100 cfs provide benefits for brown trout adults and egg incubation and flows up to 250 cfs provide benefits for multiple life stages of rainbow trout.

15-mile Reach: Any Remaining Leased Water above the decreed ISF flow rates will improve the natural environment by helping meet the USFWS flow recommendations. USFWS flow recommendations are based on PHABSIM/IFIM studies, which model the relationship between flow and preferred habitat, specifically showing where habitat is increasing and/or declining for adult Colorado pikeminnow and razorback sucker. USFWS flow recommendations vary by hydrologic year type, but seek to maximize preferred habitat without detrimental hydraulic conditions for the endangered fish.

e. Where applicable, an estimate of the degree to which the acquired water will increase moisture levels in the alluvial aquifer to support the riparian vegetation in the subject stream reach**:**

Fryingpan River: Because Leased Water will be used in the Fryingpan River only in the winter, CPW concluded that this information is not relevant to this acquisition.

15-mile Reach: Because Leased Water will be used for warm-water fish species, CPW concluded that this information is not relevant to this acquisition.

Additional information provided by CPW relevant to Policy 19 can be found in Exhibit D.

Potential Benefits of This Proposed Lease

During the duration of this short-term lease when Leased Water is available for ISF use, such water will be protected through the subject reach of the Fryingpan River down to the confluence with the Roaring Fork River. The proposed acquisition would increase stream flows in the Fryingpan River and provide benefits to the fish species that live in this reach. In addition to mitigating the effects of anchor ice formation, CPW has observed that increased flows on the Fryingpan River during the winter months improve fish habitat, increase

spawning success and fry emergence for brown trout, promote a more robust macroinvertebrate food base for fish. These observations confirm the results of previous studies that are also described in CPW's letter of recommendation in Exhibit D. Additionally, releases will also increase the efficiency of hydropower production at the City of Aspen's hydropower plant located at the base of Ruedi Reservoir. A letter of support from the Ruedi Water and Power Authority is attached as **Exhibit E**.

Any Remaining Leased Water will be used in the Colorado River and be protected through the 15-Mile Reach, down to the confluence with the Gunnison River. The proposed acquisition would increase stream flows in the Colorado River and provide benefits to the two species of endangered fish that live in this reach.

Procedure and Timeline for Temporary Loan Acquisition

ISF Rule 6. governs the Board's procedures for acquiring water for ISF use. Section 37-92-102(3), C.R.S. provides 120 days for the Board to determine what terms and conditions it will accept in an acquisition 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 taking final action on a proposed acquisition. The Board's initial consideration of this proposal at its November 2021 meeting initiates the 120-day time period for the Board to consider the terms and conditions of the proposed acquisition. Final action on the proposal could occur at the January 2022 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 request must be filed within twenty days of this Board meeting.

As required by statute, CWCB staff requested recommendations CPW, the U.S. Department of Agriculture, and the U.S. Department of Interior. Pursuant to ISF Rule 6m.(1), CWCB staff provided notice of the proposed acquisition to all persons on the appropriate ISF Subscription Mailing Lists, and provided notice to the State Engineer's Substitute Supply Plan Notification List for Water Division 5.

ATTACHMENTS

Exhibit A: Location Map
Exhibit B: District's Offer Letter
Exhibit C: Roaring Fork Conservancy Memo
Exhibit D: CPW Letter of Recommendation
Exhibit E: Ruedi Water and Power Authority Letter of Support

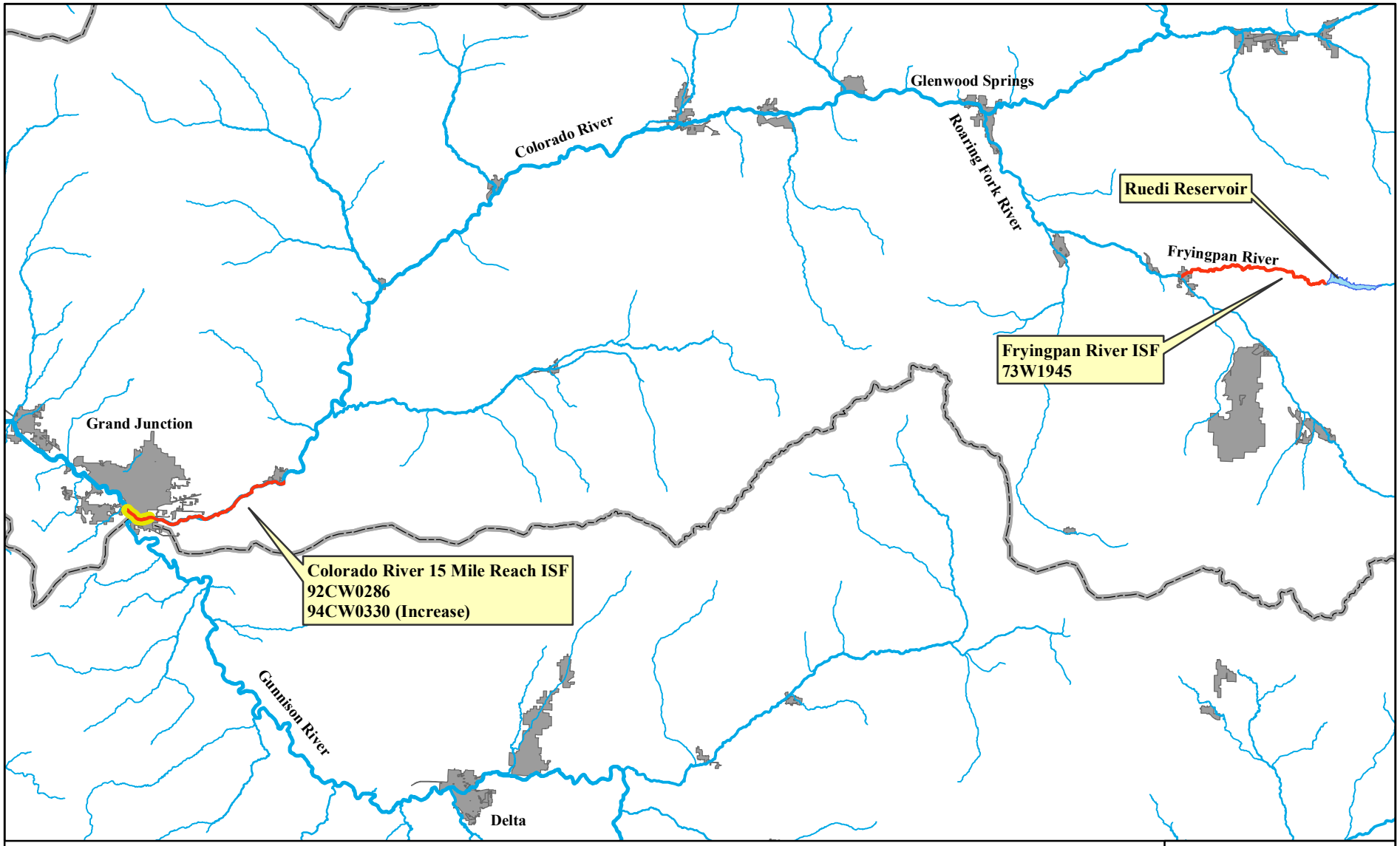

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Exhibit A. November 17-18, 2021 CWCB Board Meeting
Agenda Item 21: Lease of Ruedi Reservoir Water for Instream Flow Use on the Fryingpan River and 15-Mile Reach of the Colorado River (Water Division 5)

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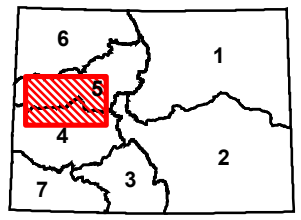

COLORADO RIVER DISTRICT
PROTECTING WESTERN COLORADO WATER SINCE 1937

October 26, 2021

Rob Viehl
Chief, Stream and Lake Protection Section
Colorado Water Conservation Board
1313 Sherman St., Rm. 721
Denver, CO 80203

Dear Rob:

By this letter the Colorado River Water Conservation District (River District) acting through its Colorado River Water Projects Enterprise ("Enterprise"), expresses its willingness to lease up to 1,750 acre-feet (AF) of Ruedi Reservoir water to the CWCB for Fryingpan River winter instream flow enhancement during the 2022 calendar year.

Background – 2018 and 2020 Lease with the CWCB

In 2018 the CWCB, in collaboration with Roaring Fork Conservancy, entered into a contract with the River District for 3,500 AF of Ruedi Reservoir water for the primary purpose of enhancing the instream flow in the Fryingpan below Ruedi Reservoir between January 1 and March 31, 2019 to prevent anchor ice formation. 3,200 AF was delivered between January 1 and March 7, increasing Fryingpan flows approximately 25 cubic feet per second (cfs) above the 39 cfs decreed instream flow. The 300 AF balance was used later in the 2019 calendar year to enhance flows in the 15-Mile Reach of the Colorado River for endangered fish recovery purposes. In 2021, a similar operation occurred with all 3,500 AF utilized between January 1 and February 28.

The need for this enhanced winter flow is outlined in more detail in the companion letter provided by the Roaring Fork Conservancy.

Colorado River District Applicable Ruedi Contracts

The River District's Enterprise maintains five perpetual Ruedi contracts with the Bureau of Reclamation. The requested 1,750 AF lease volume will be credited to two River District contracts.

Exhibit B
Nov 17-18, 2021
CWCB Board Meeting
Item 21: Lease of Ruedi Res. for ISF Use-Fryingpan and Colorado Rivers

970.945.8522
201 Centennial Street | Suite 200
Glenwood Springs, CO 81601
ColoradoRiverDistrict.org

Water delivered to supplement winter instream flows from January 1 – March 31, 2022 will be delivered pursuant to the River District's Ruedi Reservoir Round II Water Sales Contract No. 079D6C0106 with the Bureau of Reclamation. This contract at ¶6. b. explicitly provides that leased water may be used "…*to supplement winter instream flows in the Fryingpan River."*

In the event only a portion of the 1,750 AF is delivered to supplement winter instream flows the balance may be delivered to the 15-Mile Reach between April 1 and December 31, 2021. The balance will be delivered pursuant to the River District's Ruedi Reservoir Round II Water Sales Contract No. 139D6C0101 with the Bureau of Reclamation

Contract Term and Pricing

The River District proposes to enter into a lease with the CWCB essentially identical to the 2018 and 2020 lease. Key terms include:

1. The contract will be for the 2022 calendar year (January 1 – December 31).

2. The cost for a contract for year 2022 be $69.75/AF as set forth in the River District's Water Marketing Policy. Note that the price is slightly higher than the $68.50/AF paid for the 2020 lease. The higher price is consistent with the Water Marketing Policy which provides for annual price increases not to exceed the sum of the Consumer Price Index plus the New Growth Index.

The River District is pleased to have this opportunity to work with the CWCB on a lease that would benefit winter stream flows in Fryingpan River below Ruedi Reservoir. We look forward to working with you to complete this transaction. Please let us know if we can provide any additional information to assist in CWCB's consideration of this proposal.

Respectfully,

Brendon Langenhuizen, P.E.
Director of Technical Advocacy
Colorado River District

Cc: Heather Tattersall Lewin, Roaring Fork Conservancy
April Long, Ruedi Water and Power Authority

ROARING FORK CONSERVANCY
Bringing People Together to Protect Our Rivers

MEMORANDUM

TO: CWCB Board and Staff
FROM: Heather Lewin, Roaring Fork Conservancy
RE: Lease of Water in Ruedi Reservoir for Winter Release
Date: October 25, 2021

Increased pressure on streams due to growing population, recreation, and climate change has led to the need for strategic management, where possible, to ensure the long-term health and viability of Colorado's rivers and fisheries. The Lower Fryingpan River runs 13 miles from the outflow of Ruedi Reservoir to its confluence with the Roaring Fork River in Basalt. World renowned for its gold medal fishery, the Fryingpan valley draws thousands of visitors annually, contributing nearly $4 million to the local economy. The continued ecological and economic benefits of a vibrant stream system are dependent on Ruedi Reservoir management that benefits local and downstream West Slope needs. In recent years, the Lower Fryingpan River has seen increased angling pressure as the Roaring Fork, Colorado, and Eagle Rivers have all experienced temperature related closures in summer, pushing anglers further upstream to the Fryingpan. Additionally, lower snowpack and higher temperatures in the winter bring increased angling as a winter recreation alternative, enhancing year-round pressures on the resource. Maintaining minimum winter flows at 60-70cfs increases both recreational opportunities and resiliency and translates into "a potential increase in economic activity in the region of $1.5 million in output, 15 jobs and $944,401 in value added." In addition, water flowing downstream could be used to help ensure winter flow targets on the 15-mile reach are met. In short, using contract water held by the Colorado River Water Conservation District in Ruedi Reservoir will have long and short term ecological and economic benefits to the Fryingpan community, and Colorado recreation and tourism.

The Colorado River Water Conservation District ("District") has been in discussions with Roaring Fork Conservancy ("RFC") regarding the possibility of leasing water currently held under contract by the District for release from Ruedi Reservoir during the winter months under certain conditions. We would like to propose that this lease be held and funded by the CWCB using funds from the Board's Construction Fund as allowed under section 37-60-123.7, C.R.S..

Exhibit C
Nov 17-18, 2021
CWCB Board Meeting
Item 21: Lease of Ruedi Res. for ISF Use-
Fryingpan and Colorado Rivers

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The parameters of the lease would be as follows:

1. The District currently holds contracts with the US Bureau of Reclamation for a total of 11,413.5 af of water in Ruedi Reservoir, of which 3500 af is available to supplement instream flows on the Fryingpan River. This lease requests 1750 af.
2. RFC has provided information showing the potential environmental impacts of low winter flows on the Fryingpan River and the benefits of augmenting those flows as detailed below. The objective of the lease would be to maintain Fryingpan River flows at a between 60 and 70 cfs or up to 31 cfs above the current minimum flow of 39 cfs, where temperatures and low flows are more likely to combine to create anchor ice.
3. A combination of flow levels and temperature influence icing conditions, so it is difficult to predict with certainty when, or in what amount releases would be necessary. For instance, extremely low temperatures could create anchor ice even when flows are already above the minimum of 39 cfs, while high temperatures could lead to ice-free conditions even when flows are at 39 cfs or below.
4. Releases would be limited to the amount necessary to bring Fryingpan flows at Ruedi Dam between 60 and 70 cfs. Releases would continue until anchor ice conditions abated, at which time RFC will notify the Bureau of Reclamation to halt additional releases. RFC will keep the District informed of the timing and amount of all releases with total releases between January and April not to exceed 1,750 af.
5. The CWCB will contract with the District pursuant to the District's current water marketing policy.
6. Releases may be suspended by Bureau of Reclamation when those releases preclude the Bureau from managing Ruedi Reservoir consistent with the Bureau's legal and regulatory obligations. Any such suspension will be accompanied by written communications to RFC, the CWCB and the District detailing the reason(s) for that suspension.
7. An extension or renewal of the lease may be negotiated between the parties at their discretion.
8. The following summarizes the findings of previous studies of anchor ice and its impact on the Fryingpan River fishery:

   From **Summary Report: A Study of Macroinvertebrate Community Response to Winter Flows on the Fryingpan River - August 11, 2004 (Bill Miller):**

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- *Aquatic macroinvertebrate communities were evaluated as a means to elucidate the relationships between winter base flows, anchor ice and macroinvertebrates community structure. The magnitude of discharge may be the most important factor that influences macroinvertebrates during the winter months. (p16)*

- *The formation and frequency of occurrence of anchor ice at FPR-TC appears to be a contributing influence on macroinvertebrate community structure and function. Recent data suggests that two or more concurrent winters with higher flows may be necessary to achieve an optimum balance in the macroinvertebrate community.(p18)*

- *Results of this study suggest that magnitude of discharge and air temperature work together to influence anchor ice formation. The lower discharge at site FPR-TC in 2002-2003 was much more conducive to the formation of anchor ice than the higher flows during the following winter.(p.22)*

- *The available data suggest that anchor ice was at least partially responsible for the degraded condition of the macroinvertebrate community at FPR-TC during the spring of 2003. To alleviate anchor ice related stress to the macroinvertebrate community, an effort should be made to avoid low wintertime releases out of Ruedi Reservoir.(p.23)*

From **Summary Report: A Study of Macroinvertebrate Community Response to Winter Flows on the Fryingpan River - September 10, 2006 (Bill Miller):**

- *Results of this study suggest that magnitude of discharge and air temperature work together to influence anchor ice formation.(p.17)*

- *It appears that macroinvertebrate diversity and evenness recover in one to two years after severe anchor ice formation if winter flows remain greater than 70 cfs.*

- *Flows greater than 70 cfs seem to result in less anchor ice in the upper half of the river than flows of approximately 40 cfs. (p. 22)*

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From **Lower Fryingpan River and Ruedi Reservoir Economic Impact Study 2015 (Martin Shields, John Loomis, Rebecca Hill):**

- *This (per day expenditures associated with angling) translates to total expenditures for the year of $3.3 million. This spending translates to almost $3.8 million in output, 38 jobs, and $2.4 million in value added to the three-county region.*
- *First, we looked at the management of winter stream flows to reduce the occurrence of anchor ice…. In the case of winter flows, this translated to a potential increase in economic activity in the region of $1.5 million in output, 15 jobs and $944,401 in value added. The added economic output from increased trips due to increased winter river flow management translated to a 40% increase in the regional economic impacts from angler recreation on the Lower Fryingpan River.*

9. Agreement from the U.S. Bureau of Reclamation that these releases will not interfere with or compromise their ability to manage the reservoir under most circumstances.
10. Agreement from Colorado Parks and Wildlife that these releases will not degrade or compromise habitat, biomass or other environmental conditions in and adjacent to the Fryingpan River.

COLORADO
Parks and Wildlife
Department of Natural Resources

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

November 4, 2021

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

SUBJECT: Potential Contractual Interest in Water from Ruedi Reservoir for the Benefit of Instream Flows in the Fryingpan River and 15-Mile Reach of the Colorado River

This letter is in response to your request for recommendations from Colorado Parks and Wildlife (CPW) on the proposed acquisition of a contractual interest in water from the Colorado River Water Conservation District (CRWCD). The proposal is for a one-year renewable lease of up to 1,750 acre-feet of Ruedi Reservoir water the CRWCD holds. This lease proposal will be presented to the CWCB at their November regular meeting as the first Board meeting in a two meeting process to obtain Board approval. The CRWCD in collaboration with Roaring Fork Conservancy (RFC) identified this leasing arrangement in 2018 to improve winter flows in the Fryingpan River. The lease was operated in the winter of 2018/19, and remaining water at the end of the winter period was delivered to the 15-Mile Reach of the Colorado River. Similarly, in the winter of 2020/21, the lease was implemented to the benefit of the Fryingpan River. The proposed 2021 lease would operate so that the leased water could be used for wintertime releases to the Fryingpan River to supplement winter flows and improve upon anchor ice condition. Any remaining water at the end of the winter period on March 31 will be used to supplement flows in the 15-Mile Reach to help reduce shortfalls to the U.S. Fish and Wildlife Service (USFWS) flow recommendations for the endangered species. The following represents CPW's final opinions and recommendations on the proposal.

Fryingpan River Wintertime Releases

The Fryingpan River is a highly regarded fishery resource designated as a Gold Medal Trout fishery. It is a renowned fishery that draws anglers locally and from outside of the area. A Colorado State University and RFC economic impact study (2015) documented that millions of dollars and numerous jobs locally are generated from fishing on the Gold Medal section on the Lower Fryingpan River. Furthermore, it identified flow management, including anchor ice mitigation in the winter and wadeability in the summer, as notable contributors to the number of trips taken by anglers surveyed.

The Fryingpan River has an existing 1973 instream flow water right for 39 cfs (November through April) and 110 cfs (May through October). This is one of the first instream flow water rights that the CWCB Board appropriated following the original passage of legislation creating the instream flow program. Per the statute, the CWCB followed the recommendation of the Division of Wildlife (CDOW) and made the determination that these flows were "necessary to preserve the natural environment to a reasonable degree." The CWCB also has the authority to acquire water, water rights, or interests in water to "preserve or improve the natural

environment to a reasonable degree". The stated goal of this acquisition is to boost flows from 39 cfs to approximately 70 cfs. While 39 cfs meets the criteria to be the "minimum amount necessary to preserve the natural environment to a reasonable degree," various studies have determined that more flow during the winter months improves fish habitat, increases spawning success and fry emergence for brown trout, promotes a more robust macroinvertebrate food base for fish, and addresses issues related to anchor ice formation and accumulation.

Anchor ice is a problem that can occur downstream of reservoirs when a combination of air and water temperatures cause ice to become anchored to the bottom of the river channel, as opposed to on top of the water column. Anchor ice is generally detrimental to aquatic invertebrates and incubating fish eggs. Studies conducted by Bill Miller in 2003 & 2006 show higher flows are less conductive to formation of anchor ice, and anchor ice is less prevalent at flows greater than approximately 70 cfs than at flows near 40 cfs. Miller's studies suggest that the magnitude of the effect of anchor ice on the macroinvertebrate community may be amplified as the length of the event increases.

Miller notes that magnitude of streamflow may be the most important factor that influences macroinvertebrates during the winter months. In the winter of 2002/03, average baseflows were approximately 40 cfs from December through February. Macroinvertebrate sampling was conducted the following spring 2003, and metrics of diversity, evenness, and EPT taxa (mayflies, stoneflies, and caddisflies) declined, showing degradation in diversity and impact to the community. The next winter, 2003/04 the average discharge was approximately 85 cfs and some recovery of macroinvertebrate community metrics were observed over Miller's sites. Results from Miller's studies show that flows higher than 40 cfs would be beneficial for the invertebrates in the Fryingpan River, and that macroinvertebrate diversity recovers after severe anchor ice formation within one to two years if flows remain greater than 70 cfs.

Using the PHABSIM methodology, CDOW researcher Barry Nehring identified 100 cfs as the flow that supports optimal habitat for both rainbow trout and brown trout in the Fryingpan River. Furthermore, observational data collected by CDOW and CPW staff have confirmed studies by Miller, putting a preference on flows between 70 cfs and 100 cfs in the winter, noting that flows in excess of 70 cfs minimize anchor ice formation and creates additional useable habitat for resident fish. CPW is supportive of using this leased water to supplement flows in the Fryingpan River up to 70 cfs from the time period of late-January (after the lease is approved by the CWCB at their second meeting) through March 31. This proposed acquisition will help alleviate anchor ice related stress to the macroinvertebrate community that has been observed with low wintertime flows out of Ruedi Reservoir. It will also improve the angler experience by supporting a more robust macroinvertebrate community that serves as a food base for fish and is known to support key hatches that greatly improve the angling experience of the Fryingpan River.

15-Mile Reach Releases

This lease proposal seeks to use any remainder of the 1,750 AF of water in Ruedi Reservoir for deliveries to incrementally meet the USFWS flow recommendations for endangered fish habitat in the 15-Mile Reach from April 1 to December 31.

Flow recommendations for the 15-Mile Reach have been quantified by the USFWS and are well documented in several reports prepared by Osmundson and others (1989, 1991, 1995). Osmundson's 1995 study developed relationships between flow and habitat for the Colorado pikeminnow and razorback sucker in the 15-Mile Reach. The study recommends monthly flow targets which vary by hydrological year type and quantifies

minimum occurrences of these flows that are critical to recovery of these two species in the 15-Mile Reach. These flow recommendations were included in the Final Programmatic Biological Opinion for the 15-Mile Reach and are used to inform annual 10,825 releases and other coordinated reservoir operations in the basin above the critical habitat.

The USFWS reports confirm that there is a demonstrated need for supplemental releases should additional water exist in the 1,750 AF pool. Typically, 10,825 releases are focused on supplementing flows in the late-irrigation season. The USFWS has increasingly seen an additional need in April because of a low flow condition referred to as the "April Hole." Particularly in years following a dry year, storage levels in the Colorado River basin are below average and diversions to storage in April are more significant, causing low flow conditions in the 15-Mile Reach. Low flows in the month of April have proven to be problematic for fish – resulting in decreased habitat availability, increased vulnerability to avian and terrestrial predation, and increased sun damage. Below average flows in April also decrease riverine productivity and can cause declining abundance of macroinvertebrates in the 15-Mile Reach.

The CWCB has existing instream flow water rights for the 15-Mile Reach in amounts that vary from 581 cfs to 881 cfs from July through September. The leased Ruedi water would be used to supplement the CWCB's instream flow water rights to preserve the natural environment, and when possible, meet the USFWS flow recommendations for razorback sucker and Colorado pikeminnow. The USFWS flow recommendations for the 15-Mile Reach range from 810 cfs to 15,660 cfs for April through December depending on the month and hydrologic year type. The CWCB's 1992 and 1994 instream flow water rights were reduced due to water availability considerations. The leased water from Ruedi Reservoir would be used to meet both the CWCB's water rights and, when possible, to meet the USFWS flow recommendations on a more frequent basis.

CPW is of the opinion that should there be a remaining balance from the CRWCD pool of water in Ruedi Reservoir, this water could best be used to preserve and/or improve the natural environment in the 15-Mile Reach starting in April. Specifically:

- Between the April 1 to June 30, the leased water would incrementally contribute towards preserving the natural environment by helping meet or reduce shortfalls to the published USFWS flow recommendations.
- From July 1 to September 30, the water could be used to supplement the CWCB's decreed instream flow water right in the 15-Mile Reach to preserve the natural environment and contribute to meeting or reducing shortfalls to the published USFWS flow recommendations to improve the natural environment to a reasonable degree.
- Between October 1 to December 31 time periods, the leased water would incrementally contribute towards preserving the natural environment by helping meet or reduce shortfalls to the published USFWS flow recommendations.

CPW is appreciative of the ongoing consultation on releases from Ruedi Reservoir to the 15-Mile Reach. We are supportive of this water acquisition proposal so long as continued coordination occurs between CPW aquatic biologists and CWCB staff prior to and during releases of leased water for instream flow uses in the 15-Mile Reach.

CWCB Policy 19 Considerations

Since this proposal will be funded with monies authorized by 37-60-123.7 to acquire water to improve the natural environment to a reasonable degree, CWCB Policy 19 must be followed. Specifically, Policy 19 asks CPW to provide data and information to the Board that addresses the following:

> a. The degree to which the acquired water will add useable habitat to riffles, pools and runs within the subject ISF reach;
> b. The amount of additional useable area for fish and macroinvertebrates that the acquired water will provide;
> c. Where applicable, the amount of protection from high temperatures and low oxygen levels in hot summer months that the acquired water will provide;
> d. An analysis of the degree to which the additional water resulting from the acquisition: (1) benefits the natural environment, and (2) does not result in hydraulic conditions that are detrimental to the aspects of the natural environment intended to be benefited by the acquired water, such as habitat requirements for a particular life stage of a fish species; and
> e. Where applicable, an estimate of the degree to which the acquired water will increase moisture levels in the alluvial aquifer to support the riparian vegetation in the subject stream reach.

Fryingpan River

Since this proposal is to provide water for the winter season, CPW believes that c. and e. do not apply in this case. In addition to the benefits of reduced anchor ice formation, there are a number of sources of information that exist to address a, b, and d.

- Policy 19, criteria a, b and d(1): Long-term research conducted by CDOW researcher Barry Nehring included the reach of the Fryingpan River below Ruedi. These PHABSIM investigations concluded that wintertime flows in the Fryingpan River of up to 100 cfs are optimum for brown trout adults and for egg incubation. Optimum flows for various life stages of rainbow trout are also between 100 and 250 cfs.
- Policy 19, criteria a, b and d(1): The Ruedi Round II Water Marketing Program Final Supplemental EIS (1989) contains additional PHABSIM data curves that also show brown and rainbow trout habitat improving as flows increase up to 100 cfs.
- Policy 19, criterion d(2): The Ruedi Round II Water Marketing Program Final Supplemental EIS also shows that for nearly all trout life stages flows have to exceed 100 cfs before there is any reduction in overall habitat.
- Policy 19, criterion b: Miller and others evaluated the impact of low winter flows below Ruedi Reservoir and found that flows higher than 40 cfs are beneficial for the invertebrates in the Fryingpan River, supporting a diverse food base for resident fish.

15-Mile Reach of the Colorado River

Since this proposal will provide supplemental water for the warm-water endangered fish species in the 15-Mile Reach, CPW believes that c. and e. do not apply in this case. There are a number of sources of information that exist to address Policy 19 considerations and quantify the benefits of this proposal to the Colorado pikeminnow and razorback sucker specifically:

- Policy 19, criteria a., b. and d.(1): USFWS flow recommendations are based on research conducted by Osmundson and Kaeding using PHABSIM and mesohabitat modeling to assess flows that maximize preferred habitat of eddies, pools, and deep backwaters. Osmundson and Kaeding research also indicated slow and fast runs were preferred at low flow levels, so flow recommendations in below average hydrologic year types maximize preferred low flow

habitat of runs. The lease proposal will result in increases in preferred low flow habitat for Colorado pikeminnow and razorback sucker.

- Policy 19, criterion a: USFWS flow recommendations are based in part on a 1989 Kaeding and Osundson report which uses PHABSIM modeling to relate flows to preferred habitat for adult Colorado pikeminnow. Flow recommendations in July through September maximize weighted useable area for Colorado pikeminnow. Note, summer use of the 15-Mile Reach is regarded as important habitat for adult Colorado pikeminnow throughout the year and for razorback sucker during spring runoff with July considered a transitional month between runoff and baseflow. The lease proposal will result in increases in preferred habitat for adult Colorado pikeminnow and razorback sucker.
- Policy 19, criterion d(2): USFWS flow recommendations are based on PHABSIM/IFIM studies, which model the relationship between flow and preferred habitat, specifically showing where habitat is increasing or decreasing for adult Colorado pikeminnow and razorback sucker. USFWS flow recommendations seek to maximize preferred habitat without detrimental hydraulic conditions for the endangered fish.

Conclusions and Recommendations

CPW is of the opinion that the proposed acquisition of water from Ruedi Reservoir will result in benefits to the fishery in the Fryingpan River. This conclusion is based on multiple studies finding that magnitude of flows in the winter is a key factor influencing macroinvertebrate community, reduction of anchor ice formation, and an overall increase in habitat for several life stages of both rainbow and brown trout. Direct observations by CPW staff indicate that supplemental winter flows directly impact angling experience by supporting a robust macroinvertebrate community that serves as a food base for fish and is known to support key hatches that greatly improve the angling experience.

Additionally, should there be remaining water at the end of March, the proposed lease will benefit the Colorado pikeminnow and razorback sucker in the 15-Mile Reach. Benefits will also be provided to the sympatric 3-species in the 15-Mile Reach, the roundtail chub, flannelmouth sucker, and bluehead sucker. Additionally, releases are likely to provide benefits for the cold-water trout in the Fryingpan, Roaring Fork, and Middle Colorado Rivers on its way downstream to the Critical Habitat.

CPW therefore believes that CWCB should proceed with this acquisition while continuing to coordinate with USFWS and CPW throughout the lease period. CPW looks forward to working with the Board's staff, RFC, USFWS, the Colorado River District, and others as this lease is implemented.

As always, CPW staff will be available at the virtual November 2021 CWCB meeting to answer any questions that the Board might have relating to this agenda item. Thank you for the opportunity to assist in this matter.

Sincerely,

Katie Birch

Katie Birch
Instream Flow Program Specialist
cc: Bakich, Logan, Felt, Martin, Crockett, Harris, DeWalt, Watson, Brey

RUEDI WATER & POWER AUTHORITY

Jessica Brody, Chair
Colorado Water Conservation Board
1313 Sherman Street
Room 718
Denver, CO 80203

Dear Ms. Brody,

I am writing to express Ruedi Water and Power Authority's (RWAPA) support for the lease of Ruedi Reservoir water for winter instream flow use on the Fryingpan River and 15-Mile Reach of the Colorado River.

RWAPA is a regional water agency in the Roaring Fork Watershed, directed by a Board with an elected official from each local government within the watershed – Aspen, Snowmass Village, Basalt, Carbondale, Glenwood Springs, Pitkin and Eagle Counties. Our mission is to mobilize resources and influence to protect and enhance the waters and communities of the Roaring Fork Watershed.

The Fryingpan River is an extremely valuable resource for our communities because of its natural beauty, rich environment, and recreational opportunities. In 1979, the lower Fryingpan River became the first recognized "Gold Medal" trout stream in the state and in 2015 it was determined to generate nearly $4 million in local economic value annually. Water released from Ruedi Reservoir influences the quality of the instream and riparian habitat of this river. Low flows, especially in winter, can contribute to the formation of anchor ice and compromise the quality of trout habitat, resulting in environmental and economic impacts to the area.

In the last two years, the CWCB, in collaboration with Roaring Fork Conservancy, have entered a contract with the Colorado River District using water stored in Ruedi Reservoir for the primary purpose of enhancing the instream flow in the Fryingpan below Ruedi Reservoir between January 1 and March 31 to prevent anchor ice formation by increasing the flows from the 39 cfs decreed instream flow to flows of approximately 55 – 80 cfs. Anecdotally, anchor ice formed in December of 2018 and December of 2019 in the lower Fryingpan and nearby in the Roaring Fork River. When the additional releases began in January of both of those years, the anchor ice in the Fryingpan slowly melted and no other formation or damage was observed. However, anchor ice nearby in the Roaring Fork River, regularly broke apart, ripped river bottom, and reformed throughout that winter, potentially damaging the macroinvertebrate populations of the riverbed.

Additionally, these increases in flow increase the efficiency of hydropower production at the City of Aspen's hydropower plant (located at the base of Ruedi Reservoir), which cannot operate when flows are less than approximately 50 cfs.

RWAPA greatly appreciated the efforts and expenses of the state in 2018-2019 and 2019-2020. And, upon seeing the success of this operation achieved and preparing for another low base flow in the Fryingpan this winter, RWAPA encourages the CWCB to support this lease to enhance flows and protect the environment of the Fryingpan River again this year.

Sincerely,

April B. Long

April Long, Executive Director
Ruedi Water and Power Authority

Exhibit E
Nov 17-18, 2021
CWCB Board Meeting
Item 21: Lease of Ruedi Res. for ISF Use-Fryingpan and Colorado Rivers