COLORADO
Colorado Water Conservation Board
Department of Natural Resources

1313 Sherman Street
Denver, CO 80203

P (303) 866-3441
F (303) 866-4474

John Hickenlooper, Governor

Robert Randall, DNR Executive Director

Rebecca Mitchell, CWCB Director

TO: Colorado Water Conservation Board Members

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

DATE: July 18-19, 2018 Board Meeting

AGENDA ITEM: 11. Colorado River Water Conservation District Lease of Ruedi Water for Winter Instream Flow Use in the Fryingpan River (Water Div. 5)

The Colorado River Water Conservation District, acting through its Colorado River Water Projects Enterprise ("District"), has offered the CWCB an opportunity to enter into a one-year renewable short-term lease of a portion of water that the District holds in Ruedi Reservoir for instream flow ("ISF") use to boost winter flows in the Fryingpan River below Ruedi Reservoir. The CWCB would use the leased water to supplement its existing decreed ISF water right to preserve, and to increase flows to improve the natural environment to a reasonable degree on the Fryingpan River. See Vicinity Map at **Attachment 1**. The CWCB's decreed ISF water right could benefit from this water, and the reach would benefit from additional flows above the existing decreed ISF rate to help meet winter flow targets set primarily to prevent formation of anchor ice in the river. This is the second meeting of the two-meeting process required by ISF Rule 6 for considering water acquisitions.

Staff recommends that the Board:

1. Conclude that the proposed acquisition of an interest in water by lease from the Colorado River Water Conservation District is appropriate to preserve and improve the natural environment of the Fryingpan River from the confluence with Rocky Fork Creek to the confluence with the Roaring Fork River to a reasonable degree;
2. Determine that the acquired interest in water would be best utilized by: (a) using it to preserve the natural environment of the Fryingpan River at rates up to the existing decreed ISF water right in that reach; and (b) using it to improve the natural environment in that reach by protecting flows above the decreed ISF rates at rates not to exceed 70 cfs;
3. Approve the expenditure of up to $228,775 from the Construction Fund for the lease; and
4. Authorize the Director to execute a Water Lease Agreement with the Colorado River Water Conservation District.

1. The Board's Water Acquisition Procedures

ISF Rule 6. governs the Board's procedures for acquiring water for ISF use. Section 37-92-102(3), C.R.S. (2017) 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 May 2018 meeting initiated the 120-day time period for the Board to consider the terms and conditions of the proposed acquisition. Because no hearing was requested, the Board may take final action on the proposal at this Board meeting. 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 Rule 6. lists several factors the Board may consider in its evaluation of the acquisition that are addressed in this memo.

As required by statute, CWCB staff requested recommendations from the Colorado Division of Parks and Wildlife (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.

2. Background

The District has been working with the Roaring Fork Conservancy ("RFC") to evaluate needs and potential available supply to enhance instream flow in the Fryingpan River below Ruedi Reservoir during the winter months under certain conditions. The Fryingpan River ISF water right is decreed for 39 cfs from November 1 – April 30. Studies indicate that winter flows of 70 cfs (31 cfs above the decreed ISF rate of 39 cfs) would benefit the natural environment. The objective of the lease would be to maintain Fryingpan River flows at a minimum of 70 cfs when temperatures and low flows could otherwise combine to create anchor ice, which adversely impacts aquatic macroinvertebrates and trout fry.

3. Water Proposed for Leased Acquisition

The District's Enterprise has offered to lease up to 5,000 acre-feet of water available to it in Ruedi Reservoir under a perpetual contract with the Bureau of Reclamation ("Ruedi water"). The contract includes an explicit term that the water may be used "…to supplement winter instream flows in the Fryingpan River." Ruedi Reservoir is decreed for several types of use: irrigation, domestic, municipal, generation of electrical energy, stockwatering, industrial, piscatorial, recreation, and other beneficial uses. Based upon discussions among the District, RFC, Colorado Parks and Wildlife ("CPW"), and CWCB staff regarding the need for and use of leased water, staff will recommend that the CWCB lease up to 3,500 acre-feet of the Ruedi water.

4. Reach of Stream Proposed for Use of the Leased Rights

The reach of stream proposed for use of the District's Ruedi 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, described below and shown on the attached Vicinity Map.

5. Existing ISF Water Rights

The CWCB holds an ISF water right on the following reach of the Fryingpan River on which the leased water would be used:

Case Number	Stream	Upper Terminus	Lower Terminus	CFS Rate (Dates)	Approp. Date
W-1945 (73)	Fryingpan River	confl Rocky Fork Creek	confl Roaring Fork River	39 (11/1 - 4/30) 110 (5/1 - 10/31)	07/12/1973

6. Natural Flow Regime

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. The hydrology of the basin is 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 into 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 July through September; streamflows are characteristically low and steady November through March of most years. The upper basin of the Fryingpan River (above Ruedi Reservoir) is approximately 230 square miles with an extensive tributary network; several of the upper basin 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 create open water conditions virtually year round, making the river a very popular fishery for both local residents and visitors to the area.

7. Existing Natural Environment

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 their consistency and timing such that anglers can "set their watches" to virtually guarantee 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 stream flows are 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.

8. Proposed Method of Acquisition

To implement this proposal, the CWCB would enter into a water lease agreement with the District for up to 3,500 acre-feet of Ruedi water. CWCB staff has initiated discussions with the District on drafting the water lease agreement to meet both entities' contracting requirements. Any final lease agreement will become effective after approval by both the CWCB and the District's board of directors, and by the Department of Natural Resources Controller. Issues that the lease agreement would address include: (1) the lease term; (2) amount of water to be leased; (3) payments to the District for the leased water; (4) the potential for the Bureau of Reclamation to suspend releases when necessary to meet its legal and regulatory obligations; (5) timing of and coordination on releases and on ramping rates if circumstances require reservoir releases to be tapered off or discontinued; (6) acknowledgment by the CWCB and District that the lease agreement will be implemented in accordance with the Fryingpan-Arkansas Act and Operating Principles; and (7) 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 findings and acceptance of the acquired water.

9. Proposed Use of the Acquired Water

The leased water would be used to supplement the existing 39 cfs ISF water right in the Fryingpan River to preserve the natural environment, and used at rates up to 70 cfs to meet RFC and CPW flow recommendations to improve the natural environment to a reasonable degree.

CPW has provided a letter setting forth its final opinions and recommendations regarding this proposal (see **Attachment 2**). CPW has observed that increased flows 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, and most importantly, address issues related to anchor ice formation and accumulation, which adversely impacts aquatic macroinvertebrates and trout fry. 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.

The RFC estimates that eight weeks, or fifty-six days, is the maximum length of time that the use of leased water would be necessary during any given winter season. That time period

would translate to approximately 3,500 AF (31 cfs = 61.487 af/day X 56 days – 3,443 af). 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, District, CPW, RFC, and USBR will coordinate on the timing and amount of releases of Ruedi water; requests for such releases; end of season operations, including, but not limited to ramping down releases; and recording and accounting for the releases. The time period during which the eight weeks of use would occur is from January 1 – March 31.

10. 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.

11. Location of Other Water Rights

There are many other water rights located on the Fryingpan River; however, they will not be affected by this release of storage water.

12. 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.

13. Stacking Evaluation

When water is available under this lease for ISF use in the Fryingpan River, 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 meet the RFC and CPW flow recommendation to help prevent formation of anchor ice in the winter.

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

The proposed lease does not negatively affect any interstate compact.

15. 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, preserving and improving the natural environment of the Fryingpan River, and making water available to downstream users.

16. Availability for Downstream Use

Water leased from the District would be available for use downstream of the Fryingpan River's confluence with the Roaring Fork River.

17. Administrability

Preliminary discussions with the Division 5 Division Engineer indicate that the release and delivery of this water from Ruedi Reservoir through the Fryingpan River pursuant to a contract between the District and the CWCB will be administrable.

18. Potential Benefits of This Proposed Lease

During the duration of this short-term lease, when water is available for ISF use, the released Ruedi 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 and macroinvertebrate species that live in this reach by preventing the formation of anchor ice.

19. Cost to Complete Transaction

The District's Water Marketing Policy, dated January 17, 2018, set costs for project year 2018 as $65.25/AF plus a $400 non-reimbursable application fee, which, for 3,500 AF, would total $228,775.00. The CWCB would pay for the lease with funds authorized by section 37-60-123.7, C.R.S. (2018) for acquisitions of water for ISF use to preserve or improve the natural environment.

20. 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.

A. Financial Aspects of the Proposal

The price for this lease is based upon the District's Water Marketing Policy, which sets a price of $65.25/AF for Ruedi water used in-channel in the Fryingpan and Roaring Fork Rivers to the confluence with the Colorado River, plus a $400 non-reimbursable application fee. 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 $228,775.00 for this lease.

B. 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, Policy 19 requires CPW to provide data and information regarding the subject ISF reach of the River that addresses the following criteria:

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.

Since this proposal is to provide water during the winter season, CPW has concluded that criteria 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 criteria a., b., and d.:

- During the 1980s and 1990s, CDOW researcher R. Barry Nehring conducted long-term research projects that included the reach of the Fryingpan River below Ruedi. These investigations included IFIM and PHABSIM studies where Nehring concluded, among other things, 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 IFIM/PHABSIM data curves that also show brown and rainbow trout habitat improving as flows increase up to 100 cfs (Policy 19, criteria a., b., and d.(1)).

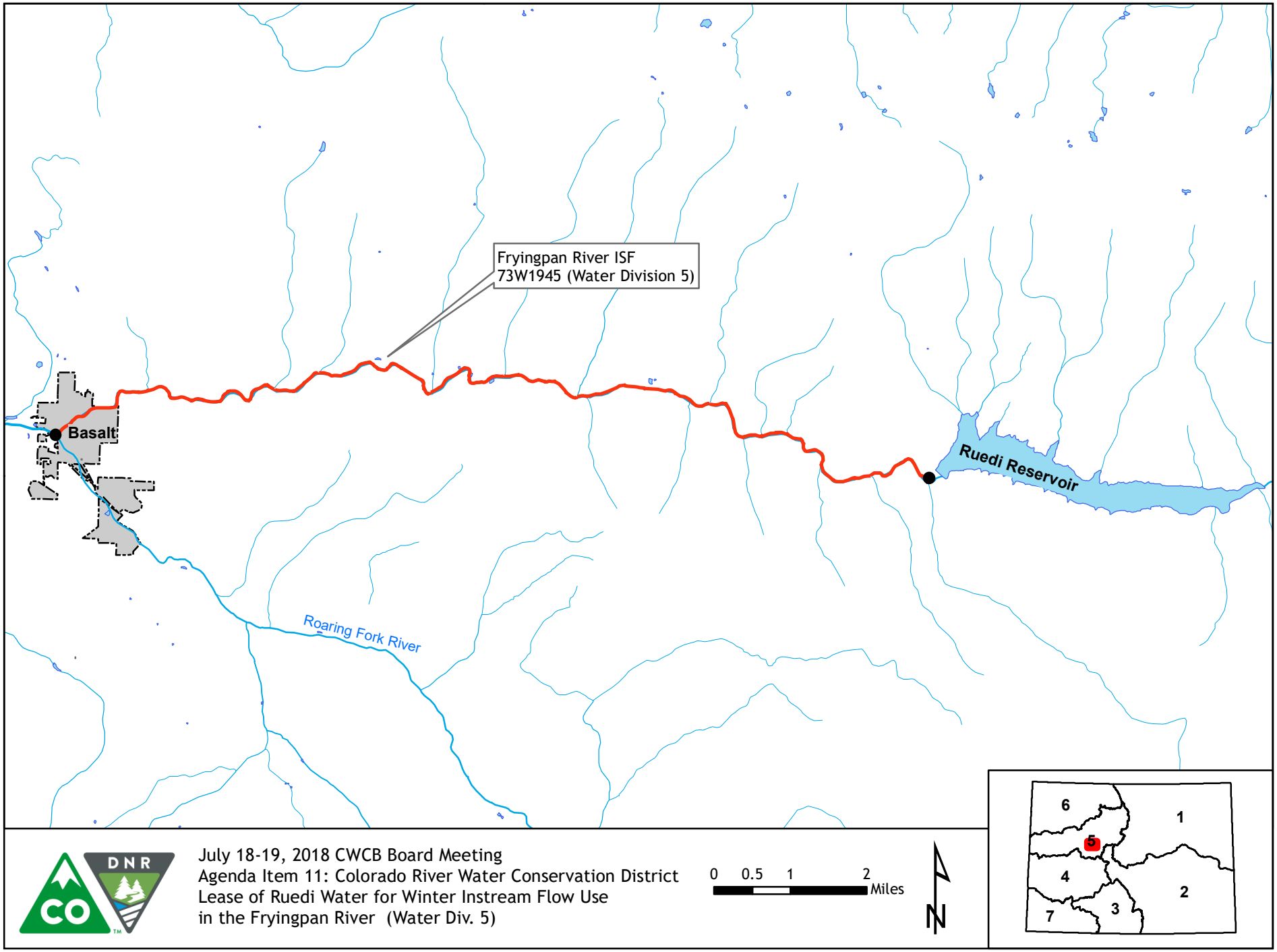
- The Ruedi Round II Water Marketing Program Final Supplemental EIS also shows that for nearly all trout life stages flows have to exceed 100 cfs before there is any reduction in overall habitat. This point addresses criterion d.(2) of Policy 19.

Staff's recommendation is set forth on page 1 of this memo.

Attachment 1: Vicinity Map

Attachment 2: Colorado Parks and Wildlife Letter dated July 2, 2018

Attachment 1



July 18-19, 2018 CWCB Board Meeting
Agenda Item 11: Colorado River Water Conservation District
Lease of Ruedi Water for Winter Instream Flow Use
in the Fryingpan River (Water Div. 5)

COLORADO
Parks and Wildlife
Department of Natural Resources

Water Resources Section – Capital,
Parks, and Trails Branch
6060 Broadway
Denver, CO 80216

July 2, 2018

Linda Bassi
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 the Fryingpan River Instream Flow

Linda and Kaylea:

Colorado Parks and Wildlife (CPW) is responding to a request by the Colorado Water Conservation Board (CWCB) that we review and analyze a proposal from the Roaring Fork Conservancy and the Colorado River Water Conservation District to acquire, by lease, an interest in water stored in Ruedi Reservoir for a release to the Fryingpan River during winter months. We have reviewed historical operations, the written proposal documents, and various scientific reports that document flow/habitat relationships. Also, we have discussed the proposed lease with our Glenwood Springs biological staff, and have had meetings with the proponents. At the May, 2018 CWCB meeting, the proposal was presented to the CWCB Board, as part of a two meeting process, to obtain Board approval; CPW provided a letter to the Board that highlighted a few operational issues that will be either incorporated into the final contractual lease or will be addressed by CWCB staff when finalizing the lease. Specifically, we have raised concerns relating to including CPW's role in operational coordination when decisions are made relating to ramping rates at the end of the lease period and circumstances that may cause reservoir releases to be stopped, tapered off, or discontinued for any reason. The following represents CPW's final opinions and recommendations on the Ruedi/Fryingpan River proposal.

The Fryingpan River is a highly regarded fishery resource with a designation as a Gold Medal Fishery. It has a widespread reputation as a premier trophy brown and rainbow trout fishery with high use among the angling public. 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 and made the determination that these flows were "necessary to preserve the natural environment to a reasonable decree."

The CWCB now has the authority to acquire water, water rights, or interests in water to "preserve or improve the natural environment to a reasonable decree." The above described proposal contemplates a one-year renewable lease of up to 3,500 acre-feet of Ruedi Reservoir water to be released during the winter months; 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 decree," various studies have determined that more flow during the winter months improves fish habitat, increasing spawning success and fry emergence for brown trout, promotes a more robust macroinvertebrate food base for fish, and most importantly, addresses issues related to anchor ice formation and accumulation.

Anchor ice is a problem that can occasionally occur downstream of reservoirs where a combination of air and water temperatures can cause ice to become anchored to the bottom of the river channel, as opposed to on top of the water column. Anchor ice formation is, in general, detrimental to aquatic invertebrates and to incubating fish eggs. Anchor ice in the Fryingpan River has been observed to be less prevalent at flows greater than approximately 70 cfs than at flows near 40 cfs (see *Summary Report of Macroinvertebrate Community Response to Winter Flows of the Fryingpan River* conducted by Bill Miller in 2006). Miller also noticed that macroinvertebrate diversity recovers after severe anchor ice formation within one to two years if flows remain greater than 70 cfs.

Observational data collected by CDOW and CPW staff have confirmed this opinion 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.

CWCB Policy 19 Considerations

CWCB staff has informed us that 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.

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.

- During the 1980s and 1990s, CDOW researcher R. Barry Nehring conducted long-term research projects that included the reach of the Fryingpan River below Ruedi. These investigations included IFIM and PHABSIM studies where Nehring concluded, among other things, 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 IFIM/PHABSIM data curves that also show brown and rainbow trout habitat improving as flows increase up to 100 cfs (Policy 19, criteria a., b. and d.(1)).
- 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. This point addresses criterion d.(2) of Policy 19.

Conclusions and Recommendations

CPW is of the opinion that the proposed acquisition of water from Ruedi Reservoir will result in an increase in flow from approximately 39 cfs to approximately 70 cfs and this additional water will result in an improvement to the natural environment. This conclusion is based on the reduction of anchor ice formation and an overall increase in habitat for several life stages of both rainbow and brown trout.

CPW therefore believes that CWCB should proceed with this acquisition subject to the conditions relating to ramping rates and flow reductions (planned and unforeseen) at the end of the flow enhancement period. CPW looks forward to working with the Board's staff, the Roaring Fork Conservancy, and the Colorado River District next winter when this lease is finalized and implemented.

As always, CPW staff will be in attendance at the July, 2018 CWCB meeting in Glenwood Springs to provide testimony or 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,

Jay Skinner, CPW Instream Flow Program Coordinator

CC: Graf, Bakich, Martin, Will, Romatski