COLORADO
Parks and Wildlife
Department of Natural Resources

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

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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

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cc: Bakich, Logan, Felt, Martin, Crockett, Harris, DeWalt, Watson, Brey