DRAFT RECOMMENDATION – SUBJECT TO CHANGE

Mr. Rob Viehl
Colorado Water Conservation Board
1313 Sherman Street, Room 721
Denver, Colorado 80203

Dear Mr. Viehl:

The Bureau of Land Management (BLM) is writing this letter to formally communicate its instream flow recommendation for Vermillion Creek, located in Water Division 6.

Location and Land Status. Vermillion Creek is tributary to the Green River in Brown's Park National Wildlife Refuge. This recommendation covers three different stream reaches on Vermillion Creek as follows:

> Reach #1 - Confluence with Talamantes Creek to Ink Springs – This reach is approximately 18.3 miles in length. BLM manages 15.7 miles of this reach while the Colorado State Land Board manages 2.6 miles.
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> Reach #2 - Ink Springs to Headgate of Vermillion Ditch – This reach is approximately 10.4 miles in length. BLM manages 7.5 miles of this reach, the Colorado State Land Board manages 1.0 miles, and 1.9 miles are in private ownership.
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> Reach #3 - Vermillion Ditch to Confluence with Green River – This reach is approximately 7.2 miles in length. BLM manages 4.4 miles of the reach, the U.S. Fish and Wildlife Service manages 2.2 miles, and 0.6 miles are in private ownership.

Biological Summary. The biological and physical characteristics of each of the three reaches is described below:

> Reach #1 - Confluence with Talamantes Creek to Ink Springs – Overall, this reach has high sinuosity, low gradient, and generally small substrate size. Riffles are limited and high percentage of the habitat is comprised of runs. An exception to this character occurs in Vermillion Canyon, where the creek is confined by bedrock, has higher gradient, and more riffle habitat. The riparian community includes cottonwood, willow, Russian olive and Phragmites. Cattle usage of the creek is evident, but the banks and riparian area appear to be stable. Water temperatures and conductivity are close to the upper range of tolerance for native fishes. Fishery surveys indicate a self-sustaining population of native mountain suckers.
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> Reach #2 - Ink Springs to Headgate of Vermillion Ditch – This reach flows through a canyon that ranges from ¼ to ½ mile in width. The stream has low gradient and small to medium substrate size. Riffles are limited and high percentage of the habitat is comprised of runs. The riparian community includes cottonwood, willow, Russian olive and

Phragmites. Cattle usage of the creek is evident, but the banks and riparian area appear to be stable. Water temperatures and conductivity are well within the ranges tolerated by native fishes. Fishery surveys indicate a self-sustaining population of mottled sculpin, speckled dace and mountain suckers.

Reach #3 - Vermillion Ditch to confluence with the Green River – This reach flows through a wide valley bottom. In some of the reach, the stream exhibits downward cutting and the stream surface is significantly below the overall floodplain elevation. The stream has low gradient and small substrate size. Riffles are limited, and a high percentage of the habitat is comprised of runs. The riparian community includes cottonwood, willow, Russian olive and Phragmites. Water temperatures and conductivity are well within the ranges tolerated by native and sport fishes. Fishery surveys indicate seasonal use of the creek by brown trout, white sucker, mountain sucker, speckled dace, creek chub, fathead minnow and red shiner. The Green River has few tributaries in Colorado which provide the opportunity for fish populations to find slower, warmer waters that provide refuge from large predator species. Vermillion Creek may also provide a forage base for native predatory fish species such as Colorado Pikeminnow that have been documented as using the mouth of Vermillion Creek. Accordingly, seasonal use of Vermillion Creek by some species may play an important role in helping to maintain fish populations in the Green River.

R2Cross Analysis. This section summarizes the data that BLM collected from each of the three stream reaches on Vermillion Creek and provides BLM's recommended flow rates for an instream flow appropriation.

Reach 1 - Confluence with Talamantes Creek to Ink Springs

Cross Section Date	**Discharge Rate**	**Top Width**	**Winter Flow Recommendation (meets 2 of 3 hydraulic criteria)**	**Summer Flow Recommendation (meets 3 of 3 hydraulic criteria)**
4/01/2021 #2	0.86 cfs	17.25 feet	0.98 cfs	Out of range
5/13/2021 #1	0.63 cfs	8.70 feet	0.90 cfs	1.21 cfs
		Averages:	**0.94 cfs**	**1.21 cfs**

BLM's data analysis indicates that the following flows are needed to protect the fishery and natural environment to a reasonable degree:

1.20 cubic feet per second is recommended during the warm portion of the year, from April 16 to October 15. This period covers spawning activities by native fishes. The recommended flow rate is driven by the average velocity criteria. Protecting average velocity for spawning habitat is important because many portions of this reach that have very low velocities. Without suitable velocity, the limited riffles may be unsuitable for spawning.

0.9 cubic feet per second is recommended from October 16 to April 15, the base flow

period during the cold portion of the year. This recommendation is driven by the average depth criteria and wetted perimeter criteria. During low flow periods, it is important that the fish population be able to move between pools, and during winter, this flow rate should prevent pools from freezing.

Reach 2 - Ink Springs to Headgate of Vermillion Ditch

Cross Section Date	**Discharge Rate**	**Top Width**	**Winter Flow Recommendation (meets 2 of 3 hydraulic criteria)**	**Summer Flow Recommendation (meets 3 of 3 hydraulic criteria)**
6/14/2018 #1	0.96 cfs	14.00 feet	1.29 cfs	Out of range
6/14/2018 #2	0.82 cfs	15.06 feet	1.94 cfs	Out of range
4/01/2021 #1	2.76 cfs	9.28 feet	Out of range	1.98 cfs
		Averages:	**1.62 cfs**	**1.98 cfs**

BLM's data analysis indicates that the following flows are needed to protect the fishery and natural environment to a reasonable degree:

2.00 cubic feet per second is recommended from April 16 to July 31. This period covers spawning activities by native fishes. The recommended flow rate is driven by the average velocity criteria. Protecting average velocity for spawning habitat is important because many portions of this reach that have very low velocities. Without suitable velocity, the limited riffles may be unsuitable for spawning.

1.60 cubic feet per second is recommended from August 1 to April 15, the base flow period. This recommendation is driven by the average depth criteria. BLM believes that maintaining 1.60 cfs will prevent stress on the fish population during high temperature periods during late summer, and 1.60 cfs should keep pools sufficiently free of ice to allow overwintering of fish.

Reach 3 - Vermillion Ditch to confluence with Green River

Cross Section Date	**Discharge Rate**	**Top Width**	**Winter Flow Recommendation (meets 2 of 3 hydraulic criteria)**	**Summer Flow Recommendation (meets 3 of 3 hydraulic criteria)**
4/02/2021 #1	2.68 cfs	10.23 feet	Out of range	2.88 cfs
4/02/2021 #2	2.57 cfs	8.40 feet	1.21 cfs	1.51 cfs
		Averages:	**1.21 cfs**	**2.20 cfs**

BLM's data analysis indicates that the following flows are needed to protect the fishery and natural environment to a reasonable degree:

2.20 cubic feet per second is recommended from October 16 to April 15. This recommendation is driven by the average velocity criteria. BLM's goal is to provide as much usable physical habitat as possible for fish during the period when this reach typically has flows. Meeting the velocity criteria also provides approximately 68% wetted perimeter period and depths ranging from 0.32 to 0.4 feet, meaning that much of the stream channel is usable.

BLM has no recommendation for the remainder of the year because of limited water availability caused by upstream diversions.

Water Availability. Vermillion Creek has three hydrologic variables that must be considered in any water availability analysis:

- Reach #1 receives flows from multiple tributaries to Vermillion Creek, including Talamantes Creek, Canyon Creek and Shell Creek. Flow in Talamantes Creek is heavily diverted, but even when existing water rights sweep Talamantes Creek, BLM has observed irrigation returns flow reaching Vermillion Creek. Water does not appear to be diverted from Canyon Creek or Shell Creek within Colorado.

- Multiple spring orifices in the vicinity of Ink Springs contribute substantial flow to Reach #2 and Reach #3. In early April 2021, before irrigation season began, BLM measured flows in Vermillion Creek slightly above Ink Springs and at the Highway 318 crossing below Ink Springs. The additional flow that accrued to the creek between these two points was 1.90 cfs, and BLM believes almost all of that increase is attributable to spring discharge.

- Vermillion Ditch can sweep the creek during much of the irrigation season. However, a small amount of flow returns to the creek from ditch seepage.

When calculating water availability, BLM is aware of four data sources that may be useful:

- USGS Gage 09235490 (Vermillion Creek below Douglas Draw) operated for a short period in 1994 and 1995. This record was collected during a period of above average precipitation. The gage was located upstream from Vermillion Ditch.

- USGS Gage 09235450 (Vermillion Creek at Ink Springs Ranch) was operated from 1977 through 1981. This gage is located downstream from the spring orifices associated with Ink Springs and upstream from Vermillion Ditch.

- Vermillion Ditch (WDID 5601180) has a long history of diversion records from 1989 through 2020.

- Upper Buffham Ditch (WDID 5600528) and Middle Buffham Ditch (WDID 5600527) have a long history of diversion records from 1970 through 2020, but there are many years in which diversion data was not collected.

BLM is aware of the following rights within the recommended reaches:

Reach #1:

There are no surface diversions.

Reach #2:

Upper Buffham Ditch – 3.0 cfs, absolute
Middle Buffham Ditch – 1.0 cfs, absolute
Moffat County Pump Diversion – 2.0 cfs, absolute

Reach #3:

Vermillion Ditch – 10.0 cfs, absolute

Relationship to Management Plans. The Little Snake Resource Management Plan identifies management of streams supporting native fish species as a priority for BLM. The plan specifies that BLM will work to improve aquatic conditions in these streams and will also work to prevent surface disturbances close to them. In addition, the plan specifies that BLM will work with the Colorado Water Conservation Board to appropriate instream flow water rights to protect these fisheries. Vermillion Creek also represents a major riparian habitat resource in an extremely arid area. BLM's plan specifies that BLM will take actions to stabilize and improve riparian habitat. Appropriation of an instream flow water right would assist BLM in meeting its aquatic and riparian management objectives.

Data sheets, R2Cross output, fishery survey information, and photographs of the cross section were included with BLM's draft recommendation in February 2022. We thank both Colorado Parks and Wildlife and the CWCB for their cooperation in this effort.

If you have any questions regarding this instream flow recommendation, please contact Roy Smith at 303-239-3940.

Sincerely,

Alan Bittner
Deputy State Director
Resources and Fire

cc: Bruce Sillitoe, Little Snake Field Office
Eric Scherff, Little Snake Field Office
Elijah Waters, Northwest District Office