Milk Creek Executive Summary

CWCB STAFF INSTREAM FLOW RECOMMENDATION
March 18-19, 2025

UPPER TERMINUS:	confluence with Wilson Creek at UTM North: 4470717.77	UTM East: 265448.43
LOWER TERMINUS:	confluence with Yampa River at UTM North: 4475273.74	UTM East: 265917.99
WATER DIVISION/DISTRICT:	6/44	
COUNTY:	Moffat	
WATERSHED:	Lower Yampa	
CWCB ID:	18/6/A-002	
RECOMMENDER:	Bureau of Land Management (BLM), Colorado Parks & Wildlife (CPW)	
LENGTH:	4.1 miles	
FLOW RECOMMENDATION:	7.8 cfs (01/01 - 02/29) 18 cfs (03/01 - 03/31) 40 cfs (04/01 - 06/30) 8.0 cfs (07/01 - 07/31) 4.5 cfs (08/01 - 09/30) 5.2 cfs (10/01 - 12/31)	

COLORADO
Colorado Water Conservation Board
Department of Natural Resources

BACKGROUND

Colorado's General Assembly created the Instream Flow and Natural Lake Level Program in 1973, recognizing "the need to correlate the activities of mankind with some reasonable preservation of the natural environment" (see 37-92-102 (3), C.R.S.). The statute vests the Colorado Water Conservation Board (CWCB or Board) with the exclusive authority to appropriate and acquire instream flow (ISF) and natural lake level (NLL) water rights. Before initiating a water right filing, the Board must determine that: 1) there is a natural environment that can be preserved to a reasonable degree with the Board's water right if granted, 2) the natural environment will be preserved to a reasonable degree by the water available for the appropriation to be made, and 3) such environment can exist without material injury to water rights.

The information contained in this Executive Summary and the associated supporting data and analyses form the basis for staff's ISF recommendation to be considered by the Board. This Executive Summary provides sufficient information to support the CWCB findings required by ISF Rule 5i on natural environment, water availability, and material injury. Additional supporting information is located at: https://cwcb.colorado.gov/2024-isf-recommendations.

RECOMMENDED ISF REACH

BLM recommended that the CWCB appropriate an ISF water right on a reach of Milk Creek at the ISF Workshop in January, 2017. CPW became a co-recommender for Milk Creek in 2023. Milk Creek is located within Moffat County and is approximately 14 miles southwest from the City of Craig, CO (See Vicinity Map). The stream originates near the Sleepy Cat Peak and flows northwest and north until it reaches the confluence with the Yampa River. The proposed ISF reach extends from the confluence with Wilson Creek downstream to the confluence with the Yampa River for a total of 4.1 miles. Sixy-one percent of the land on the proposed reach is BLM property and the remaining 39% is privately owned (See Land Ownership Map).

Agency Goals

BLM and CPW are interested in protecting Milk Creek because it provides known spawning and rearing habitat for native Flannelmouth Sucker, Bluehead Sucker, and Roundtail Chub (known as the Three Species). The Three Species are large-bodied native fishes endemic to rivers and streams of western Colorado. The Three Species are exhibiting a downward trend and collectively occupy less than half of their native range in the Colorado River Basin (Bezzerides and Bestgen, 2002). The importance of this reach of Milk Creek for native fishes led to cooperation between the BLM and CPW to document use by native species, implement fish stocking programs, and complete cooperative studies to determine the flow rates needed to support the natural environment.

CPW is a signatory, along with the BLM, other federal agencies, and multiple tribes to the Range-Wide Conservation Agreement and Conservation Strategy for the Three Species (UDWR, 2019). The goal of the Conservation Strategy is to ensure the persistence of populations of the Three Species throughout their respective ranges. CPW and BLM seek to reduce the imperiled status of these species across their historic range in Colorado in order to protect the species and to reduce the risk of a federal listing as threatened or endangered under the Endangered Species Act (ESA). Factors contributing to their decline include hydrologic alteration, lack of connectivity, and predation by and hybridization with non-native species.

CPW and BLM have dedicated significant resources to bolstering these populations through non-native fish control, reservoir screening projects, research on movement patterns and spawning behavior in tributaries like Milk Creek, and supplemental stocking to augment populations. From 2015 to 2024, CPW has proactively stocked over 20,000 Bluehead Sucker and over 3,500 Flannelmouth Sucker in Milk Creek to bolster populations in both Milk Creek and the Yampa River. This effort was the first of its kind to stock small numbers of Bluehead and Flannelmouth Suckers with the goal of augmenting the Milk Creek population and hopefully reestablishing populations of these species throughout the Yampa River basin via dispersal from Milk Creek. By boosting populations in unique tributary environments like Milk Creek, additional populations may also become established in the Yampa River mainstem where non-natives are suppressed by non-native fish control efforts. In addition, CPW tags stocked native fish with Passive Integrated Transponders, also known as PIT tags, to track annual movement patterns throughout the Upper Colorado River Basin, as well as growth rates.

Milk Creek provides unique habitat characteristics such as sporadic high-flow events, appropriate water temperature, suitable geomorphology, and high turbidity that support native fish populations. Protecting flows in a unique tributary environment like Milk Creek is complementary to other agency actions. Both CPW and BLM believe working with the CWCB to secure an ISF water right is an appropriate tool for protecting streamflows that are critically important for the persistence of the Three Species.

OUTREACH

Stakeholder input is a valued part of the CWCB staff's analysis of ISF recommendations. Currently, more than 1,100 people subscribe to the ISF mailing list. Notice of the potential appropriation of an ISF water right on Milk Creek was sent to the mailing list in November 2024, March 2024, March 2023, March 2022, March 2021, March 2020, March 2019, March 2018, and March 2017. A public notice about this recommendation was also published in the Craig Press on 12/11/2024. Staff spoke with former District 44 Water Commissioner, Kathy Bower, on 05/17/2017 regarding water availability and water rights on Milk Creek. CWCB staff also talked with Sarah Myer on 4/6/2023 when she was the District 44 Water Commissioner about water rights and water administration.

Staff presented information about the ISF program and this recommendation to the Moffat County Board of County Commissioners and the Moffat County Land Board on 8/14/2017 where members of the public as well as representatives of Tri-State Generation and Transmission Association (Tri-State) were also in attendance. Staff discussed this recommendation with the Moffat County Land Use Board again on 9/10/2024. Staff also worked extensively with representatives of Tri-State to inform them about the proposal, update them on studies, and tour the proposed reach on 04/20/2022 and 06/09/2023. Staff discussed the proposed ISF on Milk Creek with Colorado River Water Conservation District staff on 1/6/2024; their staff followed up with local landowners and no issues were raised.

NATURAL ENVIRONMENT

CWCB staff relies on the recommending entity to provide information about the natural environment. In addition, staff reviews information and conducts site visits for each recommended ISF appropriation. This information provides the Board with a basis for determining that a natural environment exists.

Physical Habitat

Milk Creek is the largest tributary to the Yampa River between the confluence of the Williams Fork and Little Snake Rivers. The proposed reach on Milk Creek is a low to moderate gradient stream in a canyon approximately 0.5 miles in width. In some locations, there is sufficient width in the canyon bottom for the stream to meander over time. In other locations, stream movement is confined by bedrock. The creek has a stable channel but has a highly variable substrate size, including fine sediment, gravels, and large 2-foot diameter boulders. The stream has a good mix of riffle, run, and pool habitat to support native fish populations. Water quality, water temperatures, and food sources are also suitable for native species.

Native Fishery

Fishery surveys indicate that the lowest 4.1 miles of Milk Creek provides habitat for native species, including Flannelmouth Sucker *(Catostomus latipinnis)*, Bluehead Sucker (*Catostomus discobolus*), Roundtail Chub (*Gila robusta*), and Speckled Dace (*Rhinichthys osculus*), see Table 1. The Three Species are considered sensitive species by the BLM. Criteria that apply to BLM sensitive species include the following: 1) species under status review by the U.S. Fish and Wildlife Service; or 2) species with numbers declining so rapidly that federal listing may become necessary; or 3) species with typically small and widely dispersed populations; or 4) species inhabiting ecological refugia or other specialized or unique habits. The Three Species meet the first two of the criteria listed above, qualifying them as BLM "sensitive species" (BLM, 2025). The Three Species are also listed in the Colorado State Wildlife Action Plan (2015) as Tier 1 Species of Greatest Conservation Need, or "species which are truly of highest conservation priority in the state."

Table 1. List of native fish species identified in Milk Creek.

Species Name	Scientific Name	Status
flannelmouth sucker	*Catostomus latipinnis*	State - Species of Greatest Conservation Need BLM – Sensitive Species
bluehead sucker	*Catostomus discobolus*	State - Species of Greatest Conservation Need BLM – Sensitive Species
roundtail chub	*Gila robusta*	State - Species of Greatest Conservation Needn BLM – Sensitive Species
speckled dace	*Rhinichthys osculus*	None

As a significant low elevation perennial tributary to the Yampa River, Milk Creek provides important year-round and seasonal habitat for the Three Species. Very few similar tributaries enter the Yampa River in this area, so it is critical for restoring native fish populations in the Yampa River watershed. Tributary habitats provide unique refugia for juvenile native fish where threats of predation and hybridization with non-native species may be substantially lower than those in the mainstem Yampa River.

Based on CPW data, there is heavy use by adult Three Species during the spring high-flow period and receding limb, specifically Bluehead Sucker and Flannelmouth Sucker. Flannelmouth Suckers and Bluehead Suckers have been known to travel long distances toward habitual spawning areas. During the rising limb of the hydrograph when the water temperature reaches approximately 13°C, Flannelmouth Sucker migrate into tributaries to spawn. Bluehead Suckers follow shortly after, once water temperature reaches 16°C. In Milk Creek this window typically occurs between April to mid-May annually but can vary significantly from year-to-year. Roundtail Chub can be found in Milk Creek and its tributary Stinking Gulch, but their densities are low near the Yampa River confluence. This is likely driven by low densities of Roundtail Chub in the Yampa River. Most of the Roundtail Chub in lower Milk Creek are juveniles. Roundtail Chub of all life stages are present higher in the drainage above Axial Basin. For additional information about fish movement patterns and research in Milk Creek please see CPW's recommendation letter and attached report.

Nonnative Fishery

Non-native fish species that utilize Milk Creek include Black Bullhead (*Ameiurus melas*), Brook Stickleback (*Culaea inconstans*), Brown Trout (*Salmo trutta*), Common Carp (*Cyprinus carpio*), Creek Chub (*Semotilus atromaculatus*), Fathead Minnow (*Pimephales promelas*), Green Sunfish (*Lepomis cyanellus*), Iowa Darter (*Etheostoma exile*), Northern Plains Killifish (*Fundulus kansae*), Red Shiner (*Cyprinella lutrensis*), Sand Shiner (*Miniellus stramineus*), Smallmouth Bass (*Micropterus dolomieu*), White Sucker (*Catostomus commersonii*), White x Bluehead Sucker Hybrid, and White x Flannelmouth Sucker Hybrid.

Macroinvertebrate Community

Aquatic macroinvertebrates are an important component of aquatic food webs and serve as an important food source for fish. In October 2023, CPW staff collected macroinvertebrate samples at two sites within the proposed ISF reach. Analysis of the macroinvertebrate data results show both sites are attaining and meeting the state standards for macroinvertebrate health and biodiversity. Other metrics indicate that Milk Creek has relatively few pollution tolerant species. Both sites also had a high number of unique species demonstrating a community that is species rich with relatively high biodiversity. Additional details on the macroinvertebrate sampling and results are available in CPW's recommendation letter.

Riparian Community

Milk Creek supports a riparian community comprised primarily of willows, sedges, cottonwoods, and rushes. The riparian community has been impacted by historical grazing practices but is now on an upward trend in lower portions of the reach and is static farther upstream. This reach also hosts mature cottonwood trees and substantial cottonwood regeneration has been observed.

ISF QUANTIFICATION

CWCB staff relies on the biological expertise of the recommending entity to quantify the amount of water required to preserve the natural environment to a reasonable degree. CWCB staff performs a thorough review of the quantification analyses completed by the recommending entity to ensure consistency with accepted standards.

Quantification Methodology

Instream Flow Incremental Methodology (IFIM) using System for Environmental Flow Analysis (SEFA)

CPW and BLM utilized professional judgement and past experiences to determine the appropriate methodology for the Milk Creek ISF recommendation. The BLM and CPW decided to use a methodology that is species-specific and can be tailored to assessing flow and habitat relationships specific to Flannelmouth Sucker and Bluehead Sucker. BLM and CPW used IFIM, a widely accepted method for quantifying suitable hydraulic habitat as a function of discharge for specific species and life stages of fish. In 2023, CWCB hired Bill Miller to provide field support and technical training necessary to complete a hydraulic habitat model on Milk Creek using SEFA. The SEFA software is a modern version of the Physical Habitat Simulation software (PHABSIM), a program which was historically used for all of Colorado's ISF evaluations using the IFIM framework. As legacy software, PHABSIM was not updated for compatibility to Windows Operating System 11. The SEFA software is the modern equivalent with additional features, one of which is the predicting fish passage across transects. Bill Miller trained BLM, CPW, and CWCB staff in field methods and use of the SEFA software, developed the models, and completed a summary report (Miller, 2024a).

Habitat Suitability Criteria (HSC)

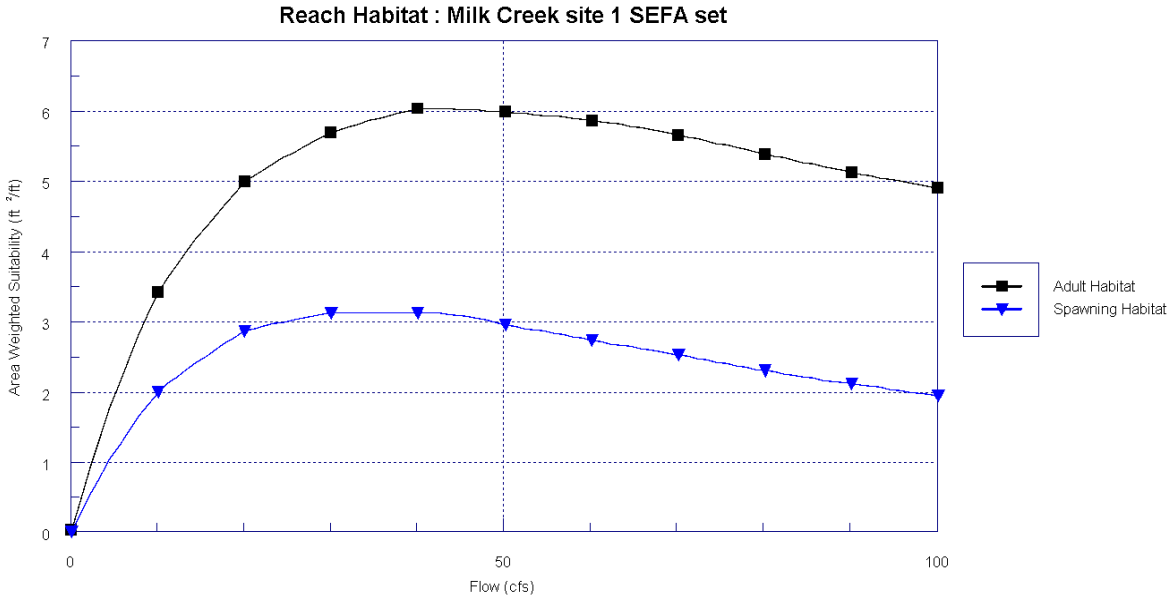
HSC represent a fish species' preference for habitat variables such as depth, velocity, substrate, or cover. For this ISF evaluation, HSC for adult Flannelmouth Sucker and Bluehead Sucker were updated in early 2024 (Miller, 2024b). A combination of data was used including radio telemetry studies on the Colorado River near Grand Junction, existing occupancy data from a range of rivers, and a literature review of habitat and population studies. There is relatively limited habitat suitability data specific to Bluehead Sucker, so HSC for Flannelmouth Sucker were used as a surrogate. Bluehead Sucker have different feeding preferences than Flannelmouth Sucker and are known to feed by scraping algae and periphyton from cobble-sized substrates in faster riffle habitats. Flannelmouth Sucker tend to feed on aquatic invertebrates and detritus found in finer substrates in habitats with relatively low velocities. Given these differences, the habitat response shown for Flannelmouth Sucker approximates habitat response to flow for Bluehead Sucker but will not fully depict all areas suitable for Bluehead Sucker. The suitability indices used in the hydraulic-habitat modeling are a combination of the data from Flannelmouth Sucker and Bluehead Sucker studies on the Colorado River and literature from the U.S. Fish and Wildlife Service (Miller, 2024b).

Flannelmouth Sucker and Bluehead Sucker spawn in riffle habitat over gravel and cobble substrate. Spawning habitat use is generally restricted to shallower depths and higher velocity than the broader habitat types used by adults. The spawning HSC for both species were based on a combination of literature review and existing habitat suitability criteria from the U.S. Fish and Wildlife Service (Miller, 2024b). Suitable spawning substrate material was restricted to gravel and cobble substrate types in the model to accurately reflect the use of these sites during spawning.

Data Collection and Analysis

In fall of 2023, Bill Miller, BLM, CPW, and CWCB staff performed site selection and field data collection to build a hydraulic habitat model for the Milk Creek ISF reach in SEFA. After assessing the four-mile ISF reach, a study area was selected that is representative of the ISF reach. Two study sites were surveyed on BLM lands – Site 1 was approximately 0.5 miles above the confluence with the Yampa River and Site 2 was approximately 0.9 miles above the confluence. The two study sites include a variety of riffle, run and pool habitat types with bed substrate that ranges in size from fine silt to large cobble. Surveys were conducted in October 2023 to establish bed topography. An initial hydraulic habitat-discharge relationship was analyzed under baseflow conditions (approximately 6 cfs). In spring 2024, two additional sets of measurements were made to calibrate the model over a range of flows, these include measurements at a mid-flow (approximately 45-50 cfs in April) and a high flow (approximately 127 cfs in June). Streamflow and habitat were modeled from 5 cfs to 300 cfs.

In SEFA, the amount of suitable habitat computed at various flow rates is referred to as Area Weighted Suitability (AWS). The AWS is the Combined Suitability Index (CSI) for depth, velocity and substrate for each measurement point weighted by the area the point represents. Results for combined AWS for depth, velocity, and substrate are shown below for the two study areas (Figure 1).



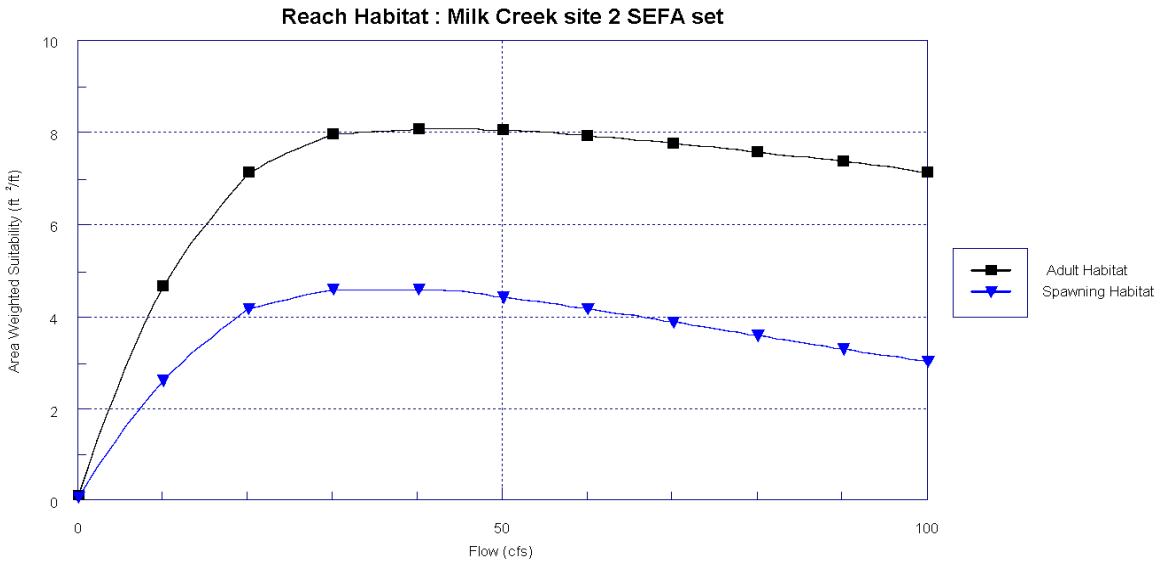


Figure 1. Hydraulic Habitat Modeling Results Graphs for site 1 (top) and site 2 (bottom)

The hydraulic habitat modeling results for both sites were comparable with maximum AWS for occurring at a flow of 40 cfs for adult sucker species. For spawning habitat, the maximum AWS occurs from 30 cfs to 40 cfs for both sites. For both general adult habitat and spawning habitat, AWS decreases rapidly below 40 cfs, indicating that additional increments of discharge provide significant habitat response benefits as flows approach 40 cfs. At flows greater than 40 cfs, additional increments of discharge provide smaller habitat benefits.

Fish Passage

Longitudinal connectivity is important in riverine systems to allow migration and localized movement required by fish and other aquatic biota. Flannelmouth Sucker and Bluehead Sucker migrate from larger rivers into smaller tributary streams such as Milk Creek for spawning, and habitat connectivity is critical for that life stage. Analysis of fish passage is one means to assess connectivity and evaluate the flows needed to allow fish migration.

A fish passage assessment was conducted using a depth criteria of 0.6 feet (7 inches). This was chosen based on professional judgment as this depth is approximately double the body depth of an adult Flannelmouth Sucker. This is protective of Bluehead Sucker because Flannelmouth Sucker is the larger of the two species. The SEFA fish passage connectivity evaluation showed that at a flow of 8.0 cfs, all cross-sections measured show a continuous pathway for fish passage that is at least 2 feet in width and at least 0.6 feet in depth at both study sites.

ISF Recommendation

Using the approach and results summarized above, biological expertise, and staff's water availability analysis, CPW and BLM developed the following instream flow recommendations.

7.8 cfs – January 1 through February 29
This recommended flow rate is based on limited water availability during the baseflow period. This flow rate will provide conditions to enable longitudinal movement of resident fish to find more advantageous habitat.

18.0 cfs - March 1 through March 31
A flow rate of 18 cfs will provide enabling conditions during the beginning of the spawning period for native fish, a critical period for completing their life cycle. As low elevation snowmelt runoff begins in the early part of spring, it is important to preserve flows that begin to cue native fish and allow longitudinal movement between habitat types in order to reach suitable spawning areas.

40.0 cfs – April 1 through June 30
A flow rate of 40 cfs supports preferred habitat for adult Bluehead and Flannelmouth Sucker across both sites. This flow rate also supports preferred spawning habitat for these species. Preserving this flow rate during the spring runoff period (including the rising and receding limb of the hydrograph) will support native fish by providing optimal depth, velocity, and substrate conditions to enable spawning migrations, as well as optimal overall habitat conditions for adult species. The snowmelt runoff peak can occur anytime between April and June on Milk Creek and is critically important in cueing native fish species to spawn, as well as providing geomorphic functions that support life cycle requirements of these fish. The higher flow rate supports sediment mobilization in the stream which supports habitat diversity and healthy spawning beds by flushing fines from interstices to support clean cobble and gravel substrate in the channel (the preferred spawning substrate for these species). Higher flows also support recruitment of woody debris and organic materials that can facilitate healthy stream function as well as a robust macroinvertebrate food base for fish. Protecting this flow rate over this extended spring runoff time period will provide a ramp during and after peak flows that helps with drift, dispersal, and incubation of eggs in the channel.

8.0 cfs - July 1 through July 31
The SEFA fish passage evaluation showed that 8 cfs will preserve a pathway for fish that is at least 2 feet wide and 0.6 feet deep across all modeled cross-sections at both study sites. The recommended flow rate (8 cfs) will maintain longitudinal connectivity of habitat and will enable large-bodied adult fish to move throughout Milk Creek to find suitable habitat or to emigrate into the Yampa River without being stranded. Additionally, this flow rate will support larvae development and emergence by maintaining wetted area in the channel and channel margins. This flow rate will support both fish passage for all life stages of native fish and habitat for larvae development and young-of-the-year fish to grow and mature in channel margins, creating refuge habitat for larvae, young-of-the-year, and juvenile fish.

4.5 cfs – August 1 through September 30
This recommended flow rate is based on limited water availability during the late irrigation season. Despite low flow conditions and limited mobility between habitat types, native species will use available habitat within Milk Creek during this period. Preserving this flow rate is important because it enables rearing of juvenile and young-of-the-year fish. Growth during this late summer period is critical to their survival over the winter period. There is reduced occupancy by non-native species and less competition foraging in Milk Creek than in the mainstem Yampa River.

5.2 cfs – October 1 through December 31
This recommended flow rate is based on limited water availability during the baseflow period. Baseflow during the winter months is necessary to provide enough habitat variety to overwinter resident native fish.

WATER AVAILABILITY
CWCB staff conducts hydrologic analyses for each recommended ISF appropriation to provide the Board with a basis for determining that water is available.

Water Availability Methodology
Each recommended ISF reach has a unique flow regime that depends on variables such as the timing, magnitude, and location of water inputs (such as rain, snow, and snowmelt) and water losses (such as diversions, reservoirs, evaporation and transpiration, groundwater recharge, etc.). This approach focuses on streamflow and the influence of flow alterations, such as diversions, to understand how much water is physically available in the recommended reach.

Staff's hydrologic analysis is data-driven, meaning that staff gathers and evaluates the best available data and uses the best available analysis method for that data. Whenever possible, long-term stream gage data (period of record 20 or more years) are used to evaluate streamflow. Other streamflow information such as short-term gages, temporary gages, spot streamflow measurements, diversion records, and regression-based models are used when long-term gage data is not available. CSUFlow18 is a multiple regression model developed by Colorado State University researchers using streamflow gage data collected between 2001 and 2018 (Eurich et al., 2021). This model estimates mean-monthly streamflow based on drainage basin area, basin terrain variables, and average basin precipitation and snow persistence. Diversion records are used to evaluate the effect of surface water diversions when necessary. Interviews with water commissioners, landowners, and ditch or reservoir operators can provide additional information. A range of analytical techniques may be employed to extend gage records, estimate streamflow in ungaged locations, and estimate the effects of diversions. The goal is to obtain the most detailed and reliable estimate of hydrology using the most efficient analysis technique.

The final product of the hydrologic analysis used to determine water availability is a hydrograph, which shows streamflow and the proposed ISF rate over the course of one year. The hydrograph will show median daily values when daily data is available from gage records; otherwise, it will present mean-monthly streamflow values. Staff will calculate 95% confidence intervals for the median streamflow if there is sufficient data. Statistically, there is 95% confidence that the true value of the median streamflow is located within the confidence interval.

Basin Characteristics
The contributing basin of the proposed ISF on Milk Creek is 223 square miles, with an average elevation of 7,336 feet and average annual precipitation of 21.4 inches. The drainage basin is snowmelt driven. Snowmelt runoff can initiate early relative to other basins due to the generally low elevation of the watershed. Baseflow conditions are low, while runoff can be several orders of magnitude higher.

Water Rights Assessment

There are no active water rights within the proposed reach on Milk Creek. There are a large number of water rights influencing hydrology in the drainage basin upstream. This includes 338 cfs in active direct flow diversions, 2,606 acre-feet in storage, 152 springs totaling 5.9 cfs, and a number of wells. A significant portion of the water rights in the lower portion of the basin are owned by Tri-State which then lease the water rights to farms and ranches. Private ranches and water right owners are generally located higher in the basin. There is one transbasin import, the Highline Ditch (WDID 4400814, 3.3 cfs with a 1897 appropriation date, and 3.0 cfs with a 1914 appropriation date) that brings water to Milk Creek from the basin to the east (diversion point is on Deer Creek which is a tributary to Morapas Creek) which is used to irrigate lands along Stinking Gulch, a tributary of Milk Creek just above the proposed upper terminus. There is also a large conditional right on the Yampa River at the mouth of Milk Creek for a potential pipeline (Yampa River Milk Ck PL WDID 4402029, 400 cfs appropriated in 1975)

Data Collection and Analysis

Representative Gage Analysis

There is not a long-term gage within the proposed reach on Milk Creek. There was a historic gage (USGS 0925000, Milk Creek near Thornburg) which was located about 14 miles upstream from the proposed reach and operated from 1952-1986. This gage was determined not to be suitable to evaluate water availability due to the large percentage of the basin area and water rights located downstream from the gage. There were short-term historic gages on several of the tributaries that join Milk Creek within a few miles of the proposed upper terminus (Jubb Creek near Axial, CO (USGS 09250610, 1975-1981; Morgan Gulch near Axial, CO, USGS 09250700, 1980-1981; Wilson Creek near Axial, CO, USGS 09250600, 1974-1980). Staff explored these datasets but determined that there was insufficient data on enough of the system to understand water availability in the proposed reach.

Due to insufficient representative streamflow data, CWCB staff installed a temporary gage on Milk Creek in July of 2017 (See the Site Map). This gage was subsequently moved a short distance upstream in 2018 and remains in operation. The gage consists of a staff plate, HOBO MX2001 pressure transducer which recorded water level in 15 min intervals, and a camera. There are a number of data gaps due to several high streamflow events that disrupted the gage equipment, equipment failures, and ice affected data.

The CWCB gage record was compared to a nearby climate station to evaluate how the historical record compares to a longer record. The closest climate station was located approximately 14 miles to the northeast at the Craig Airport (USC00024046 Craig Moffat CO Airport). Daily precipitation data was available through CDSS from 4/1/1998 to 7/31/2024 with full years of data missing in 2003, 2007, and 2013 and partial years of data missing in 1998 and 2024. Over the CWCB gage record that could be evaluated (2018-2023), three years had below 25th percentile annual precipitation (2020, 2021, and 2023), two years were just under the median (2018 and 2022), and 2019 was above the 75th percentile. Therefore, the CWCB gage data likely includes a range of low flow conditions and higher flow conditions, but most of the data is duirng years when the precipitation in the area was less than median.

Based on the CWCB gage data, streamflow typically begins to increase in March and recede by late June. Most years of data show peak flows above 50 cfs and in 2019 the instantaneous peak was above 500 cfs. The Milk Creek gage data from 7/14/2024 to 12/19/2024 was used to

calculate mean-monthly streamflow. No adjustments were made for the small change in gage location or to extrapolate flow slightly downstream to the lower terminus.

Site Visit Data

CWCB staff made 41 streamflow measurements on the proposed reach of Milk Creek as part of operating the CWCB Milk Creek gage (Table 3).

Table 3. Summary of streamflow measurements for Milk Creek.

Visit Date	Flow (cfs)	Collector
07/13/2017	3.92	CWCB
08/01/2017	4.66	BLM
08/14/2017	2.43	BLM
10/05/2017	14.13	BLM
11/27/2017	9.77	BLM
05/08/2018	170.01	CWCB
06/04/2018	6.63	CWCB
08/15/2018	0.34	BLM
09/13/2018	0.57	CWCB
11/14/2018	3.83	BLM
04/19/2019	105.50	BLM
05/07/2019	263.26	CWCB
07/12/2019	22.08	BLM
07/30/2019	11.33	CWCB
10/08/2019	4.72	BLM
12/05/2019	13.10	CWCB
11/19/2020	6.31	CWCB
04/05/2021	17.13	CWCB
05/13/2021	17.47	CWCB
06/16/2021	1.31	CWCB
07/22/2021	1.24	CWCB
08/19/2021	3.08	CWCB
09/15/2021	1.15	CWCB
11/01/2021	5.11	CWCB

04/20/2022	38.46	BLM, CPW, CWCB
05/24/2022	47.20	CPW, CWCB
08/18/2022	1.82	CWCB
11/01/2022	6.63	CWCB
06/07/2023	146.00	CWCB
07/25/2023	5.73	CWCB
08/16/2023	8.24	CWCB
10/10/2023	4.84	CWCB
10/24/2023	5.72	CPW, CWCB
11/10/2023	4.99	CWCB
03/28/2024	28.21	CWCB
04/12/2024	52.22	CPW
05/29/2024	127.60	CWCB
06/27/2024	13.13	CWCB
08/06/2024	4.37	CWCB
10/09/2024	2.27	CWCB
12/18/2024	5.34	CWCB

Water Availability Summary

The hydrograph shows mean-monthly streamflow for the CWCB Milk Creek gage and the proposed ISF rate (See Complete Hydrograph). The proposed ISF flow rate is below the mean-monthly streamflow. Staff concludes that water is available for appropriation on Milk Creek.

MATERIAL INJURY

If decreed, the proposed ISF on Milk Creek would be a new junior water right. This ISF water right can exist without material injury to other senior water rights. Under the provisions of section 37-92-102(3)(b), C.R.S., the CWCB will recognize any uses or exchanges of water in existence on the date this ISF water right is appropriated.

ADDITIONAL INFORMATION

Common Acronyms and Abbreviations

Term	Definition
af	acre feet
BLM	Bureau of land management
cfs	cubic feet per second
CWCB	Colorado Water Conservation Board
CPW	Colorado Parks and Wildlife
DWR	Division of Water Resources
HCCA	High Country Conservation Advocates
ISF	Instream Flow
NLL	Natural Lake Level
USGS	United States Geological Survey
USFS	United States Forest Service
XS	Cross section

Citations

Bezzerides, N. and K. Bestgen, 2002, Status review of Roundtail Chub, Flannelmouth Sucker, and Bluehead Sucker in the Colorado River Basin. Larval Fish Laboratory, Colorado State University, Fort Collins.

Bureau of Land Management, 2025, BLM special status species. Retrieve from URL: https://www.blm.gov/programs/wildlife/threatened-and-endangered/blm-special-status-species

Colorado Parks and Wildlife, 2015, State Wildlife Action Plan: A strategy for conserving wildlife in Colorado. https://cpw.widencollective.com/assets/share/asset/nbenjdfemj

Colorado Water Conservation Board, 2022, R2Cross model- User's manual and technical guide. Retrieve from URL: https://r2cross.erams.com/

Colorado Water Conservation Board, 2024, R2Cross field manual. Retrieve from URL: https://dnrweblink.state.co.us/cwcbsearch/0/edoc/224685/R2Cross%20Field%20Manual%202024.pdf

Eurich, A., Kampf, S.K., Hammond, J.C., Ross, M., Willi, K., Vorster, A.G. and Pulver, B., 2021, Predicting mean annual and mean monthly streamflow in Colorado ungauged basins, River Research and Applications, 37(4), 569-578.

Ferguson, R.I., 2007. Flow resistance equations for gravel- and boulder-bed streams. Water Resources Research 43. https://doi.org/10.1029/2006WR005422

Ferguson, R.I., 2021. Roughness calibration to improve flow predictions in coarse-bed streams. Water Res 57. https://doi.org/10.1029/2021WR029979

Miller, B., 2024a, Final Milk Creek Instream Flow Study Report, September 30, 2024

Miller, B., 2024b, Proposed Habitat Suitability Criteria for Flannelmouth Sucker and Bluehead Sucker for use in Milk Creek Instream Flow Study, January 26, 2024

Nehring, B.R., 1979, Evaluation of instream flow methods and determination of water quantity needs for streams in the state of Colorado, Colorado Division of Wildlife.

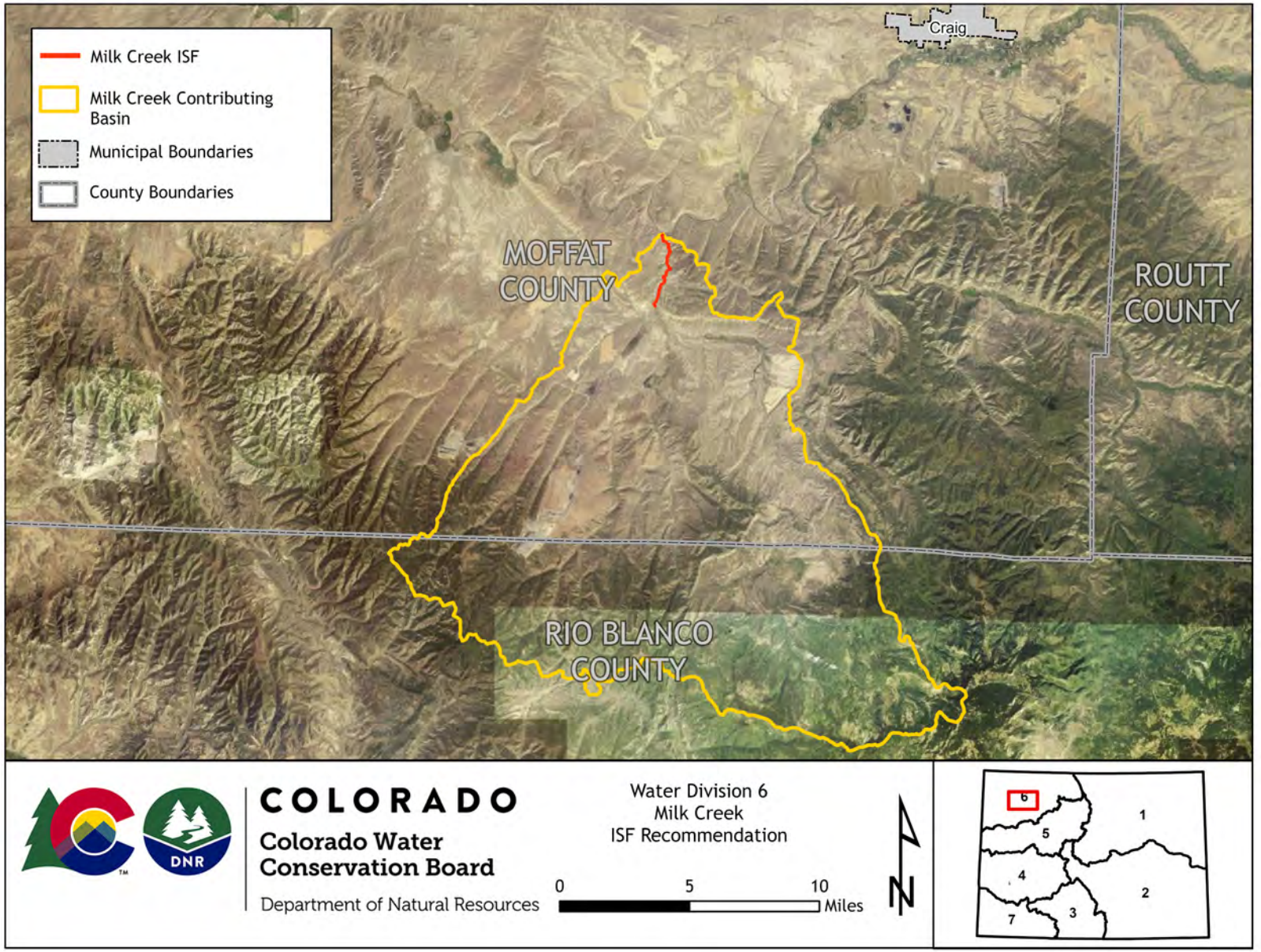
Utah Division of Wildlife Resources (UDWR), 2019, Range-wide conservation agreement and strategy for Roundtail Chub, Bluehead Sucker, and Flannelmouth Sucker. Publication Number 06-18. Prepared for Colorado River Fish and Wildlife Council. Utah Department of Natural Resources, Division of Wildlife Resources, Salt Lake City, Utah

Metadata Descriptions

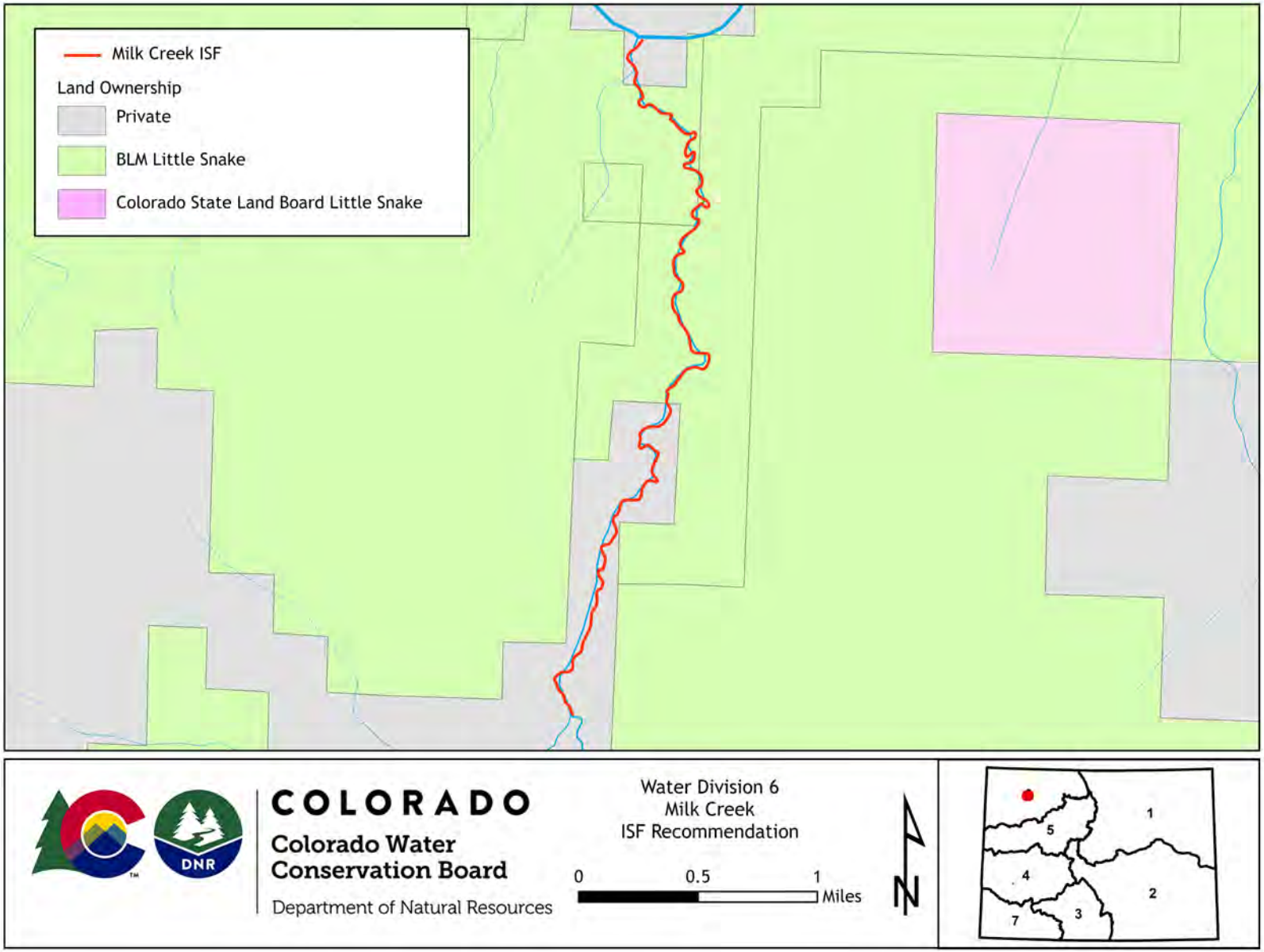
The UTM locations for the upstream and downstream termini were derived from CWCB GIS using the National Hydrography Dataset (NHD).

Projected Coordinate System: NAD 1983 UTM Zone 13N.

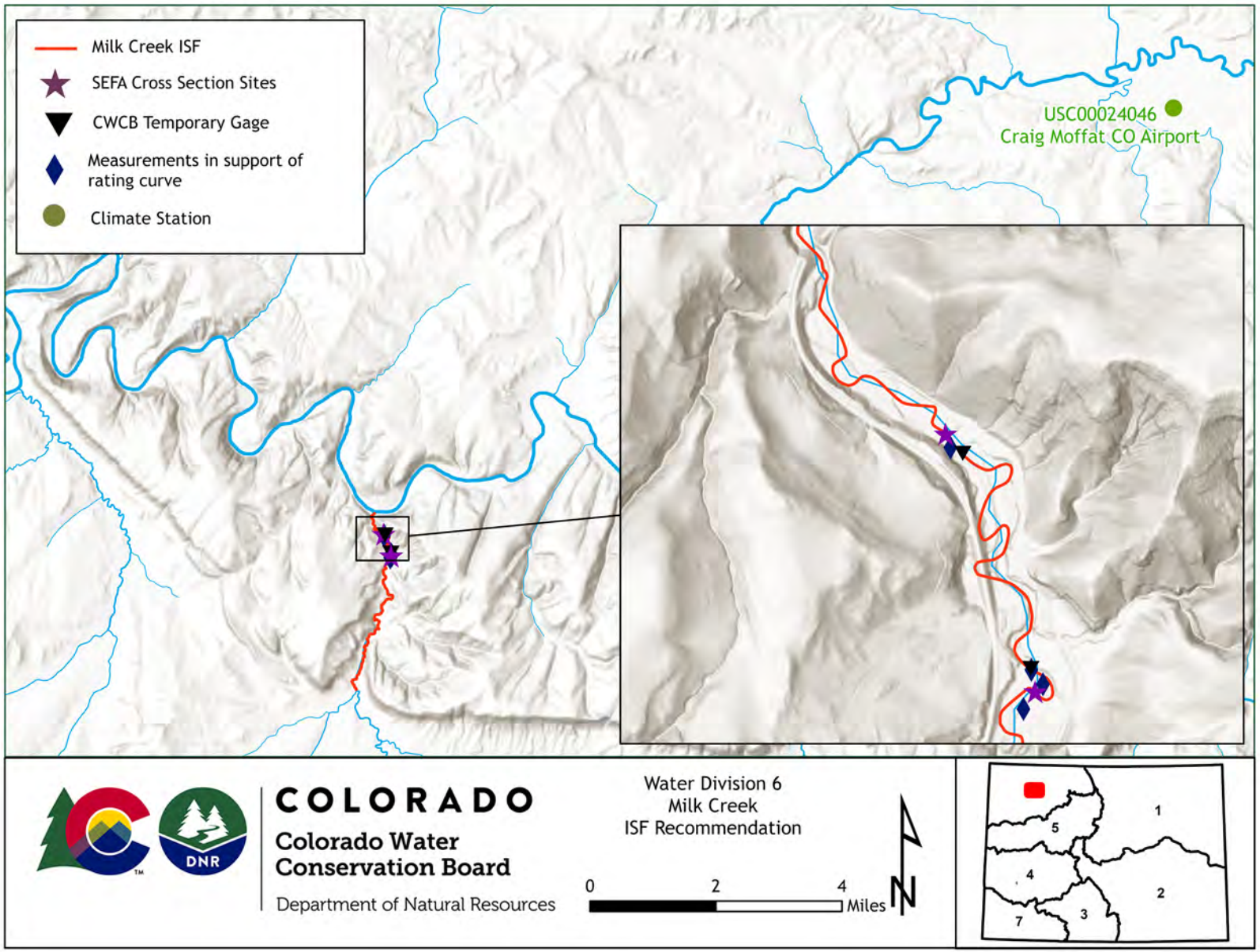
VICINITY MAP



LAND OWNERSHIP MAP



SITE MAP


Milk Creek ISF
SEFA Cross Section Sites
CWCB Temporary Gage
Measurements in support of rating curve
Climate Station
USC00024046
Craig Moffat CO Airport
COLORADO
Colorado Water Conservation Board
Department of Natural Resources
Water Division 6
Milk Creek
ISF Recommendation
0
2
4
Miles
N
1
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3
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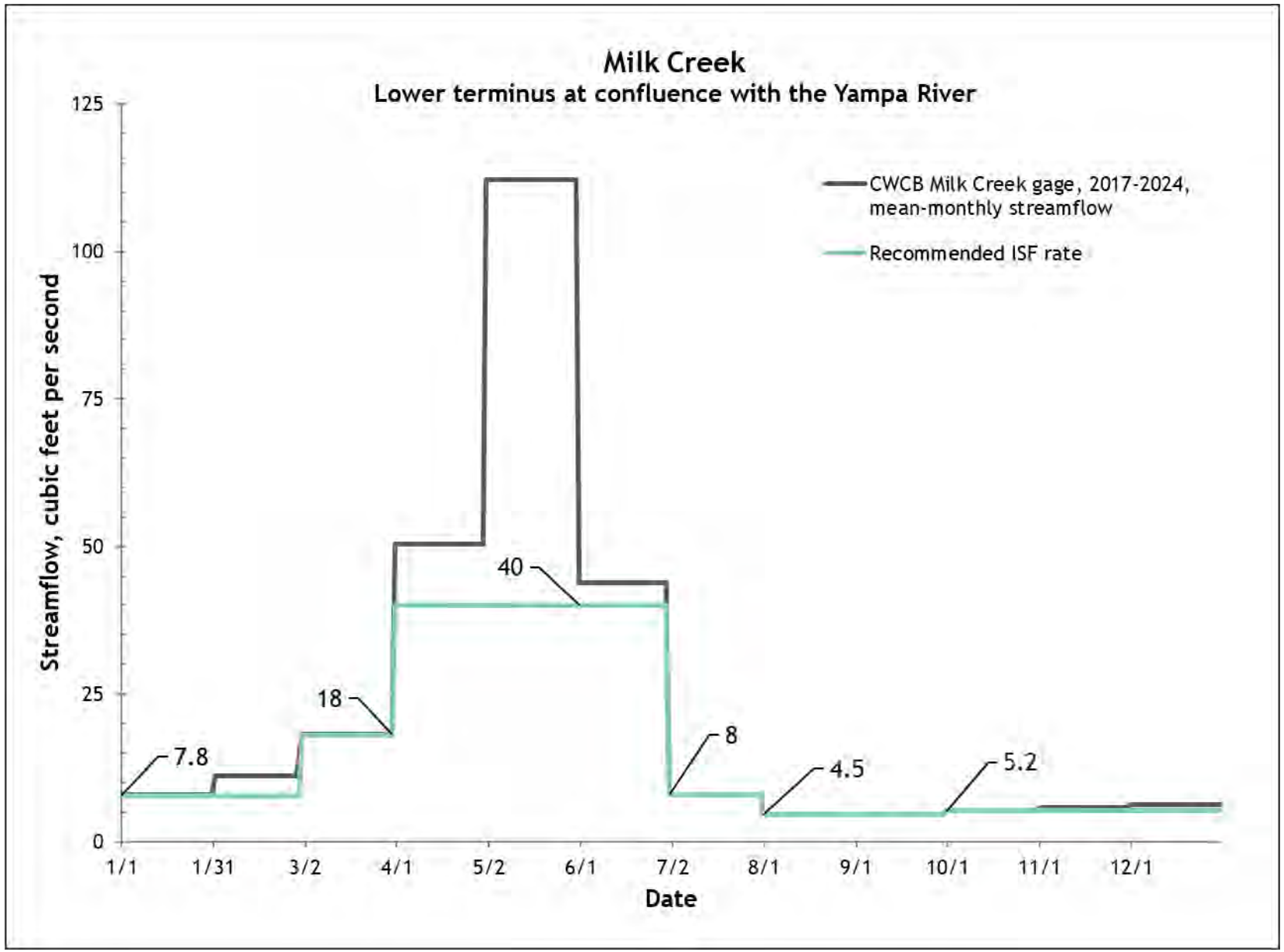
5
7

COMPLETE HYDROGRAPH



DETAILED HYDROGRAPH