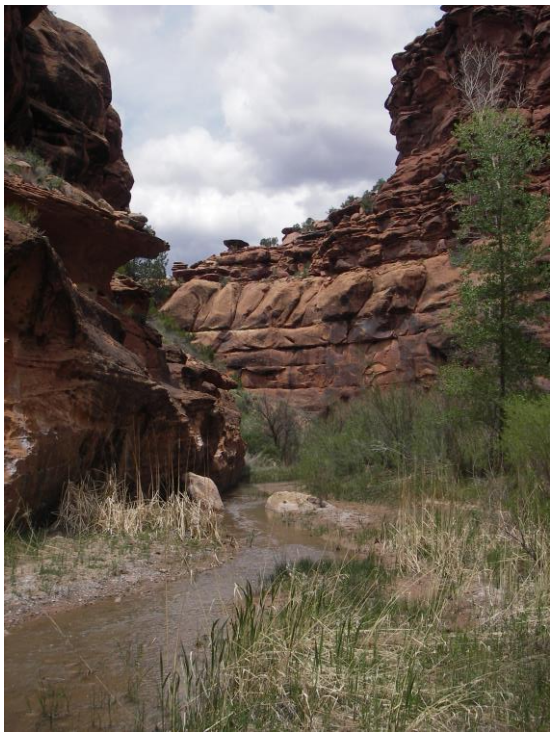
COLORADO
Colorado Water Conservation Board
Department of Natural Resources

Coyote Wash
EXECUTIVE SUMMARY



CWCB STAFF INSTREAM FLOW RECOMMENDATION

UPPER TERMINUS:	Colorado/Utah Stateline UTM North: 4236977.92 UTM East: 145400.51
LOWER TERMINUS:	Confluence with the Dolores River UTM North: 4238974.99 UTM East: 154771.65
WATER DIVISION:	4
WATER DISTRICT:	61
COUNTY:	Montrose
WATERSHED:	Upper Dolores
CWCB ID:	18/4/A-001
RECOMMENDER:	Bureau of Land Management (BLM)
LENGTH:	10.48 miles
FLOW RECOMMENDATION:	0.8 cfs (09/01 - 02/29) 2.2 cfs (03/01 - 08/31)

Coyote Wash

Introduction

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 water rights (NLL). 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 Bureau of Land Management (BLM) recommended that the CWCB appropriate an ISF water right on a reach of Coyote Wash. Coyote Wash originates in Lisbon Valley and the southern slope of the La Sal Mountains in Utah. At the Colorado/Utah Stateline, Coyote Wash has an elevation of approximately 6,900 feet. It flows in a northeasterly direction for about ten miles and joins the Dolores River at an elevation of approximately 5,500 feet. The proposed reach covers the entire reach of Coyote Wash in Colorado from the Colorado/Utah Stateline downstream to the confluence with the Dolores River. This proposed reach is entirely located within Montrose County (See Vicinity Map). The BLM owns and manages one hundred percent of the land on which the 10.48 mile proposed reach is located, with approximately eighty percent located in the Dolores River Canyon Wilderness Study Area (See Land Ownership Map). The BLM recommended this reach of Coyote Wash because it has a natural environment that can be preserved to a reasonable degree with an ISF water right.

The information contained in this report and the associated supporting data and analyses (located at http://cwcb.state.co.us/environment/instream-flow-program/Pages/2018ProposedISFRecommendations.aspx) form the basis for staff's ISF recommendation to be considered by the Board. This report provides sufficient information to support the CWCB findings required by ISF Rule 5i on natural environment, water availability, and material injury.

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 is used to provide the Board with a basis for determining that a natural environment exists.

Coyote Wash is a warm-water, low to moderate-gradient stream in a narrow canyon less than 0.25 mile wide. The stream is typically wide and shallow, with limited vegetative cover. Substrate size is highly variable, ranging from sand to 3-foot diameter boulders. Bank stability is generally good because the stream is confined in most locations by bedrock.

Fishery surveys indicate that Coyote Wash supports sand shiners, fathead minnows, and red shiners. One survey documented use of Coyote Wash by roundtail chub, but native species have not been consistently found in the creek. Intensive macroinvertebrate surveys have not been performed, but spot surveys have documented abundant midges, craneflies, damselflies, and mayflies. Surveys have also documented use of Coyote Wash by red spotted toads and Woodhouse's toads.

Very high flow events driven by thunderstorms limit the extent and vigor of the riparian community. The riparian community is comprised of coyote willow, giant reeds, bulrushes, Baltic rush, sedges, Fremont cottonwood, reed grass, and tamarisk.

Table 1. List of species identified in Coyote Wash.

Species Name	Scientific Name	Status
fathead minnow	*Pimephales promelas*	None
red shiner	*Cyprinella lutrensis*	None
sand shiner	*Notropis stramineus*	None
speckled dace	*Rhinichthys osculus*	None
roundtail chub	*Gila robusta*	Federal - Sensitive Species State - Species of Greatest Conservation Need

ISF Quantification

CWCB staff relies upon 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.

Methodology

BLM staff used the R2Cross methodology to develop the initial ISF recommendation. The R2Cross method is based on a hydraulic model and uses field data collected in a stream riffle (Espegren, 1996). Riffles are most easily visualized as the stream habitat types that would dry up first should streamflow cease. The field data collected consists of streamflow measurements, surveys of channel geometry at a transect, and the longitudinal slope of the water surface.

The field data is used to model three hydraulic parameters: average depth, average velocity, and percent wetted perimeter. Maintaining these hydraulic parameters at adequate levels across riffle habitat types also will maintain aquatic habitat in pools and runs for most life stages of fish and aquatic macro-invertebrates (Nehring, 1979). BLM staff interprets the model results to develop an initial recommendation for summer and winter flows. The summer flow recommendation is based on meeting 3 of 3 hydraulic criteria. The winter flow recommendation is based on meeting 2 of 3 hydraulic criteria. The model's suggested accuracy range is 40% to 250% of the streamflow measured in the field. Recommendations that fall outside of the accuracy range may not give an accurate estimate of the hydraulic parameters necessary to determine an ISF rate.

The R2Cross methodology provides the biological quantification of the amount of water needed for summer and winter periods based on empirical studies of fish species preferences. The recommending entity uses the R2Cross results and biological expertise to develop an initial ISF recommendation. CWCB staff then evaluates water availability for the reach typically based on median hydrology (see the Water Availability section below for more details). The water availability analysis may indicate less water is available than the initial recommendation. In that case, the recommending entity either modifies the magnitude and/or duration of the recommended ISF rates if the available flows will preserve the natural environment to a reasonable degree, or withdraws the recommendation.

Data Analysis
R2Cross data was collected at 2 transects for this proposed ISF reach (Table 2). Results obtained at more than one transect are averaged to determine the R2Cross flow rate for the reach of stream. The R2Cross model results in a winter flow of 1.65 cfs, which meets 2 of 3 criteria and is within the accuracy range of the R2Cross model. The R2Cross model results in a summer flow of 2.19 cfs, which meets 3 of 3 criteria and is within the accuracy range of the R2Cross model.

Table 2. Summary of R2Cross transect measurements and results for Coyote Wash.

Entity	Date	Streamflow (cfs)	Accuracy Range (cfs)	Winter Rate (cfs)	Summer Rate (cfs)
BLM	05/12/2010 # 1	1.12	0.45 - 2.80	1.65	2.19
BLM	05/12/2010 # 2	1.04	0.42 - 2.60	Out of range	Out of range
			Mean	1.65	2.19

ISF Recommendation
The BLM recommends the following flows based on R2Cross modeling analyses, biological expertise, and staff's water availability analysis.

2.2 cubic feet per second is recommended for the high temperature period from March 1 through August 31. This recommendation is driven by the average velocity criteria. This creek experiences consistently low flows during fall and winter, so it is important to protect as much physical habitat as possible during the limited time when snowmelt runoff flows and monsoonal flows are available. This flow rate should also help maintain water in the rooting zone for the riparian community associated with this creek.

0.8 cubic feet per second is recommended for the base flow period between September 1 and February 29. This flow rate does not meet any of the instream flow criteria, but should provide sufficient flow to prevent pools from freezing during the winter. This flow rate reflects limited water availability in this watershed.

Water Availability
CWCB staff conducts hydrologic analyses for each recommended ISF appropriation to provide the Board with a basis for making the determination that water is available.

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). Although extensive and time-consuming investigations of all variables may be possible, staff takes a pragmatic and cost-effective approach to analyzing water availability. This approach focuses on streamflows 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) will be used to evaluate streamflow. Other streamflow information such as short-term gages, temporary gages, spot streamflow measurements, diversion records, and StreamStats will be used when long-term gage data is not available. StreamStats, a statistical hydrologic program, uses regression equations developed by the USGS (Capesius and Stephens, 2009) to estimate mean flows for each month based on drainage basin area and average drainage basin precipitation. Diversion records will also be 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; 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 drainage basin of the proposed ISF on Coyote Wash is 178 square miles, with an average elevation of 6,580 feet and average annual precipitation of 15.09 inches (See the Vicinity Map). Approximately 20% of the drainage basin is located in Colorado and two spring water rights were identified in this area. The remainder of the basin is located in Utah and has approximately 17.1 cfs in decreed surface water rights. At least one ditch appears to import water from headwater streams that would otherwise end up in West Coyote Wash, which drains westward to the Colorado River. The Coyote Wash basin supports agriculture and mining, among other uses. Hydrology is altered to some decree by water use within the basin.

Available Data

Coyote Wash does not have any current or historical gages and gage data in the region is very limited. Coyote Wash is also very remote, making data collection efforts difficult.

CWCB staff, the BLM, and the USGS each made one streamflow measurement on the proposed reach of Coyote Wash as summarized in Table 3.

Table 3. Summary of streamflow measurement visits and results for Coyote Wash

Visit Date	Flow (cfs)	Method
7/8/1981	1.2	unknown
4/22/2017	3.74	wading
6/10/2017	0.29	wading

Data Analysis

StreamStats provides the best available estimate of streamflow on Coyote Wash.

Water Availability Summary
The hydrograph (See Complete Hydrograph) shows StreamStats results for mean-monthly streamflow. Staff has concluded that water is available for appropriation.

Material Injury
Because the proposed ISF on Coyote Wash is a new junior water right, the ISF can exist without material injury to other water rights. Under the provisions of section 37-92-102(3)(b), C.R.S. (2017), the CWCB will recognize any uses or exchanges of water in existence on the date this ISF water right is appropriated.

Citations
Capesius, J.P. and V.C. Stephens, 2009, Regional regression equations for estimation of natural streamflow statistics in Colorado, Scientific Investigations Report 2009-5136.

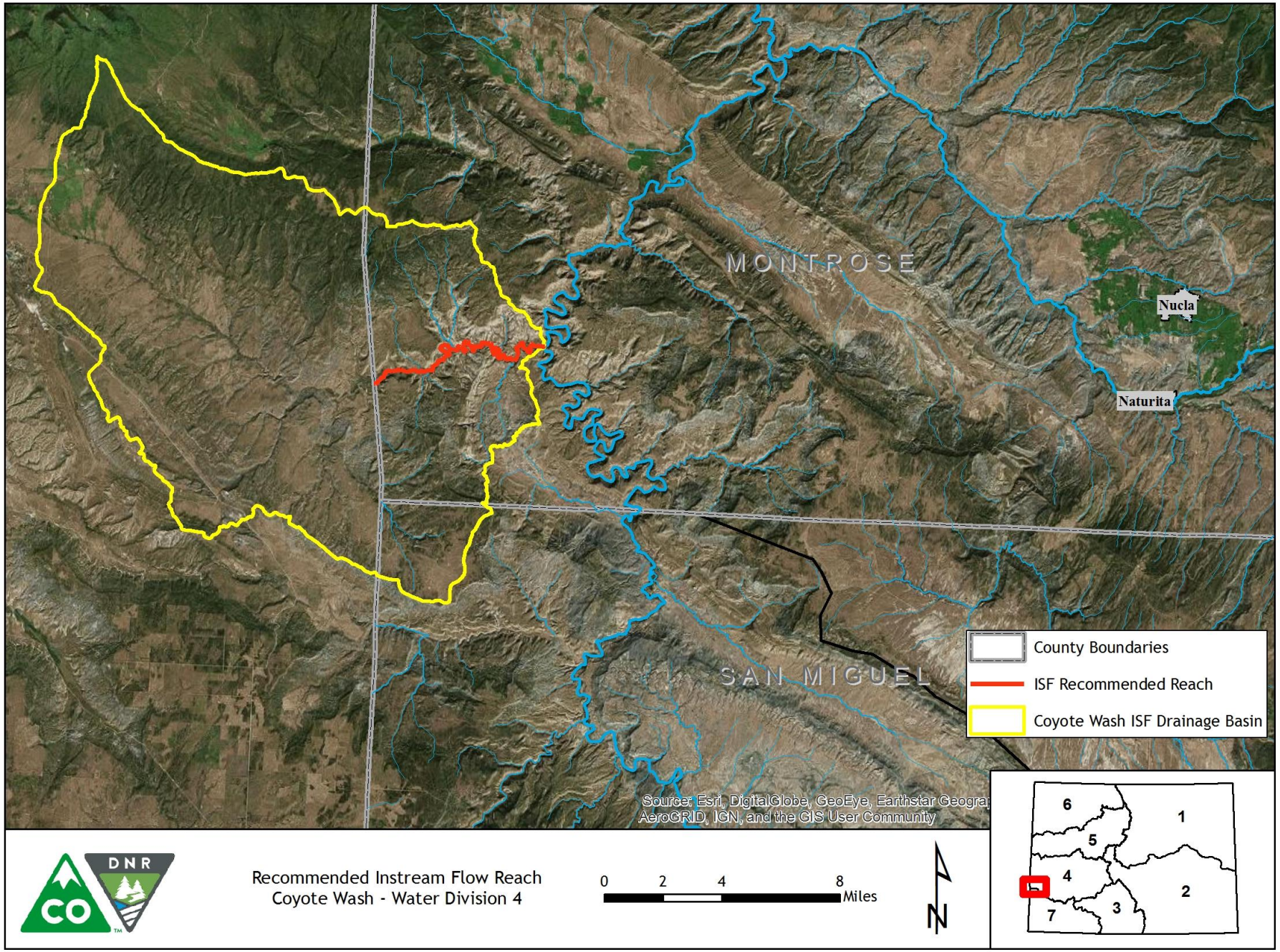
Espegren, G.D., 1996, Development of Instream Flow Recommendations in Colorado Using R2CROSS, Colorado Water Conservation Board.

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.

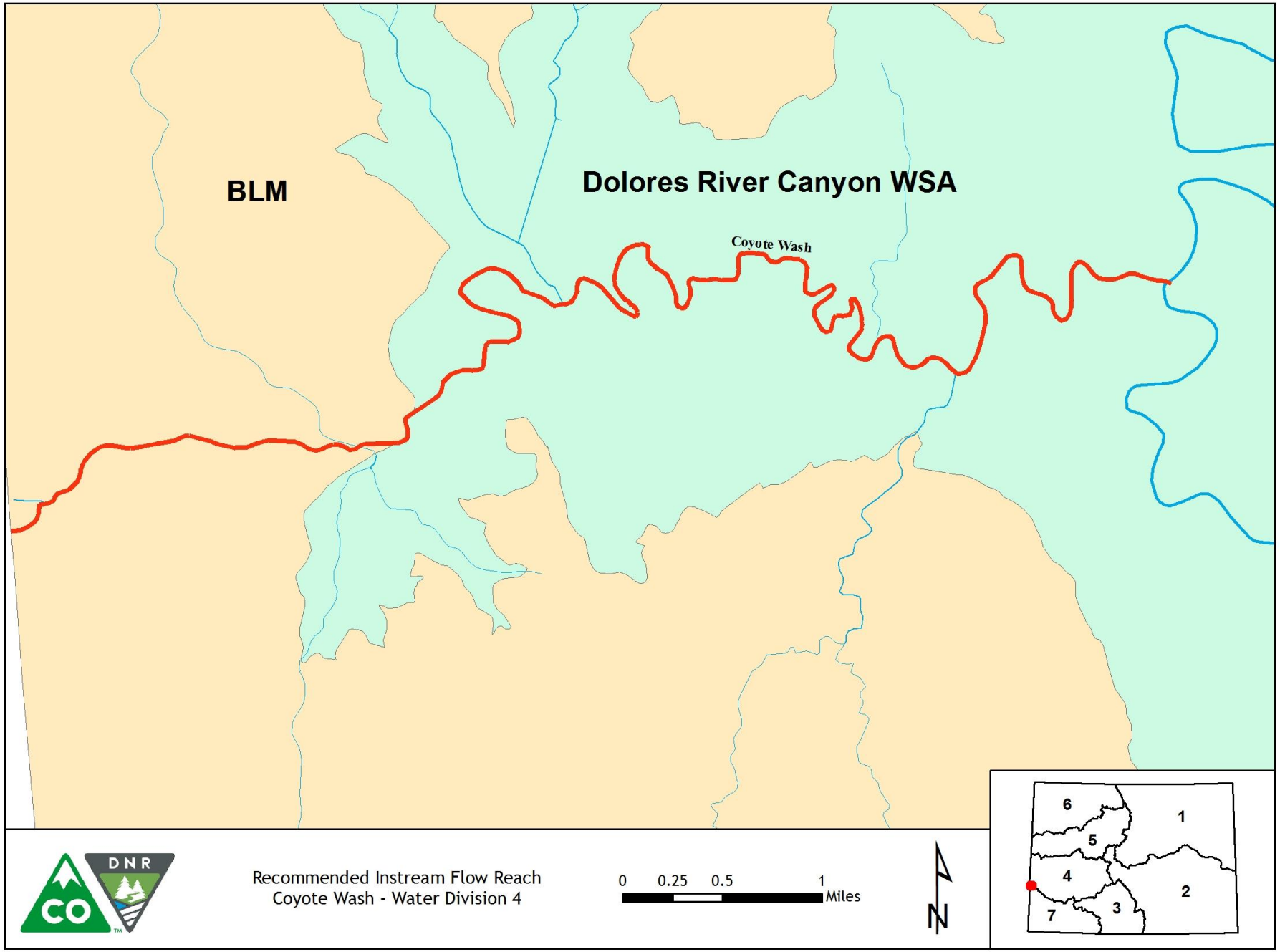
Metadata Descriptions
The UTM locations for the upstream and downstream termini were derived from CWCB GIS using the National Hydrography Dataset (NHD).

Projected Coordinate System: NAD 1983 UTM Zone 13N.

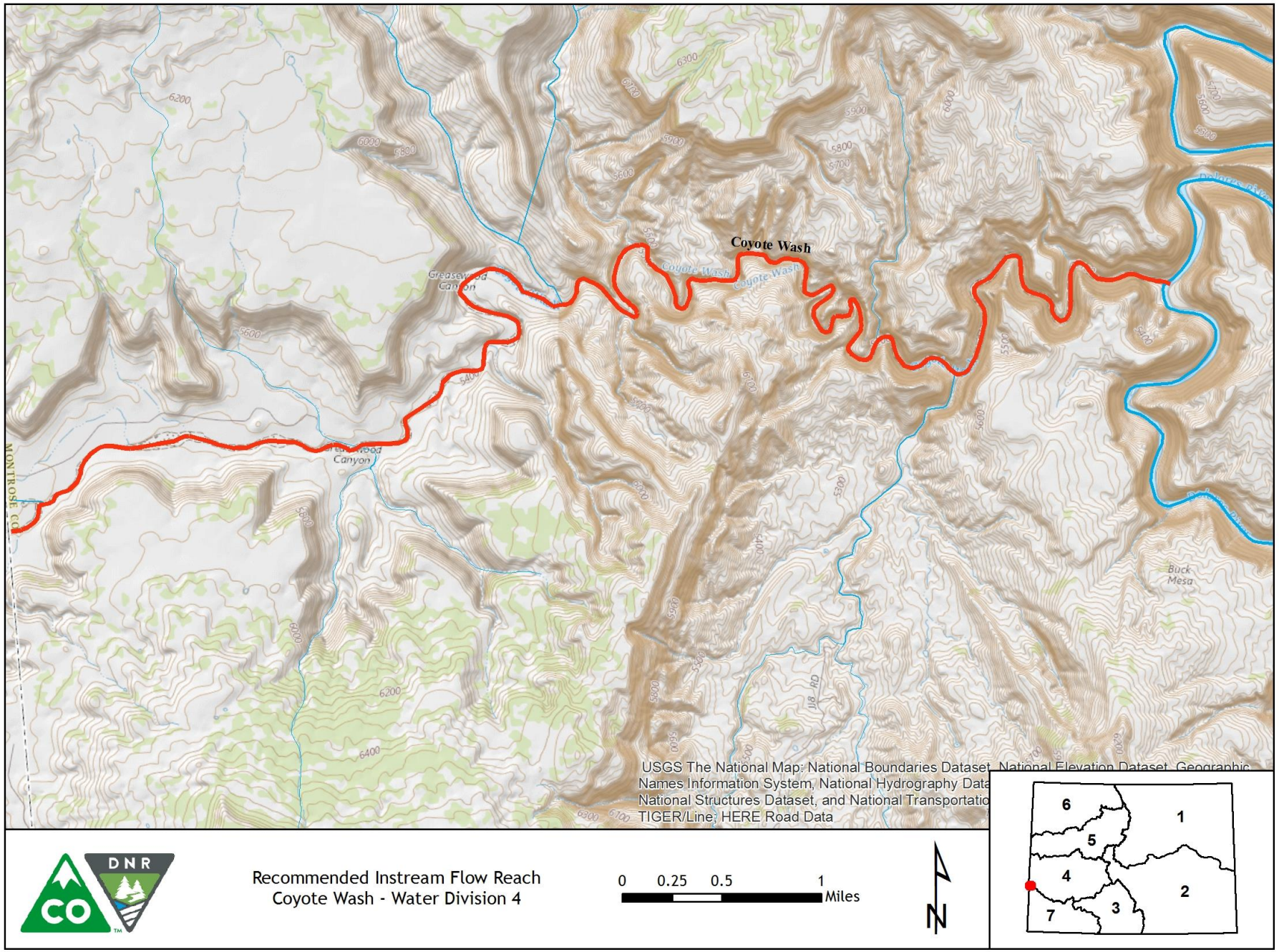
VICINITY MAP



LAND OWNERSHIP MAP



HYDROLOGIC FEATURES MAP



COMPLETE HYDROGRAPH