January 24, 2017

Ms. Linda Bassi
Mr. Jeff Baessler
Colorado Water Conservation Board
1313 Sherman Street
Denver, CO 80203

Dear Ms. Bassi and Mr. Baessler,

High Country Conservation Advocates (HCCA) and Western Resource Advocates (WRA) submit this instream flow recommendation for Dutchman Creek, located in Saguache County, Water Division 4.

HCCA's mission is to protect the health and natural beauty of the land, rivers, and wildlife in and around Gunnison County. Many of our members live and work here and enjoy recreational opportunities and a quality of life that is preserved by our valley's wildlife, habitat, and water resources. HCCA's 25-year-old water program has a long history of protecting waters in the Upper Gunnison Basin and in developing an environmental voice within key regional and state forums. In recent years, HCCA has partnered with the Bureau of Land Management to support instream flow proposals on the Slate River and Oh-Be-Joyful Creek. In 2016 HCCA submitted proposals to protect updated instream flows for Coal Creek and Brush Creek.

WRA is a non-profit conservation organization dedicated to protecting the Interior West's land, air, and water. WRA is a long-time member of the Upper Colorado River Endangered Fish Recovery Program—a large, multi-stakeholder effort to recover four endangered fish species in the Upper Colorado River Basin. In addition, WRA supports efforts to keep other

native fish species from becoming listed. WRA has a long history of work to protect river flows for the natural environment.

The headwaters of Dutchman Creek originate on United States Forest Service (USFS) lands in Saguache County. The Dutchman Creek riparian area is a popular recreational area and attracts a broad range of recreationalists that hike, bike, and hunt adjacent to the creek. The riparian area is healthy and features alders and willows. Dutchman Creek hosts a sustained fishery. Stream sampling conducted by the USFS in 2015 recorded a healthy population of brook trout. Alpine Environmental Consultants also reported brook trout when conducting stream sampling during September 2016.

Dutchman Creek does not have an existing instream flow protection. HCCA has coordinated with local consultants to arrive at a preliminary flow recommendation that would reasonably protect the health of the Dutchman Creek natural environment. The Colorado Water Conservation Board (CWCB) has an opportunity to protect an important stream ecosystem by moving forward with an instream flow protection that would preserve the natural environment to a reasonable degree.

Dutchman Creek is a relatively small creek and at the time of our sampling in late fall we were unable to meet one of the three parameters for the R2CROSS methodology. We were able to get measurements that satisfied two out of the three metrics used in the R2CROSS methodology. Thus, the recommendation below is a preliminary recommendation based on the measurements that we were able to obtain during this initial recommendation. HCCA will be working with the CWCB and our local consultants in spring of 2017 to further refine this recommendation.

Enclosed you will find copies of data sheets from Colorado Parks and Wildlife reflecting the Dutchman Creek aquatic environment. We have attached R2CROSS modeling runs, stream photos, and maps of the relevant reach. If you have any further questions regarding this recommendation, please feel free to contact Julie Nania at (509) 999-0012.

HCCA and WRA thank the USFS, Alpine Environmental Consultants, and the CWCB for their support in developing this recommendation.

Sincerely,

Julie Nania
High Country Conservation Advocates
Water Director

Laura Belanger
Western Resources Advocates
Water Resources Engineer

Enclosure

ENCLOSURE - INSTREAM FLOW RECOMMENDATION FOR DUTCHMAN CREEK

Below is a description of the proposed instream flow. Additional details can be found in Attachments A-E.

Location

Dutchman Creek is located within the Tomichi Creek watershed in Saguache County, Water Division 4. The headwaters originate at the top of the Continental Divide and the creek runs in a general north-westerly direction until it joins Owens Creek. The exact location of Dutchman Creek can be seen on the following United States Geologic Survey quad maps: Doyleville, Sargents, Sargents Mesa, and West Baldy. These maps are attached as Attachment E.

The stream segment identified for the proposed instream flow appropriation covers approximately seven miles, starting at the headwaters of Dutchman Creek and terminating at the confluence of Dutchman and Owens Creek.

Land Status

Upper Terminus	Lower Terminus	Total Length (miles)	Land Ownership	
			Private (%)	Public (%)
Headwaters	Confluence with Owens Creek.	Approx. 7 miles	Riparian Corridor > 2%	Riparian Corridor 98% USFS
			Watershed Composition > 2%	Watershed Composition 98% USFS

The riparian corridor is primarily managed by the USFS. The composition of the land in the watershed is approximately 2% private and 98% public lands.

Existing Instream Flow Right

There is no existing instream flow right on Dutchman Creek.

Water Availability

Physical Availability

There is no gage on Dutchman Creek. To assess whether water was physically available, the proponents referred to StreamStats, an online program developed by the USGS in collaboration with the CWCB. StreamStats uses a regionally specific regression equation based on nearby active and historical stream gages.

StreamStats modeling resulted in mean monthly flows for Dutchman Creek at the confluence that ranged from a high of 29.1 cfs in June to a low of 0.85 cfs in February. The

average monthly flows resulting from the StreamStats calculation show sufficient flows to meet the preliminary winter instream flow recommendation of .47cfs.

Legal Availability

Diversions on Owens Creek and below the proposed ISF reach are shown on the attached diversion map (Attachment D). There are no decreed active water rights within the proposed instream flow reach from the headwaters of Dutchman Creek to the confluence with Owens Creek. A copy of the water rights search on Dutchman Creek is included in Attachment D (these ditches refer to Dutchman and Owens as a source but are located off of the proposed instream flow reach). There is also a map of the headgate locations that demonstrates that these diversions are not on the proposed instream flow reach but are either located on Owens Creek above the confluence or below where Dutchman Creek joins Owens (Attachment D).

Biological Summary

Dutchman Creek is a coldwater, high gradient stream located in western Saguache County, Colorado. The stream generally has small-sized substrate consisting of fines, gravels, and small cobbles. There is a mixture of riffles and small pools.

The Dutchman Creek stream ecosystem supports a healthy aquatic ecosystem. USFS biologist Matt Dare and colleagues conducted stream sampling on Dutchman Creek in 2015. They identified a healthy brook trout population. Results from the 2015 stream sampling event are included in Attachment B. Several fish (salmonids ≤ 6 inches) were also observed by Alpine Environmental Consultants during field sampling at the assessment location.

In addition to supporting a healthy aquatic ecosystem, flows in Dutchman Creek support a robust riparian area. The riparian community is substantial and composed of willow and alder. The riparian zone is in good condition and provides shade and cover for the extant fish community. There are some active and abandoned beaver ponds and extensive wet meadows alongside the creek.

Preliminary R2CROSS Analysis

HCCA has relied on the expertise of Alpine Environmental Consultants to interpret output from the R2CROSS methodology and develop an instream flow recommendation that will protect Dutchman Creek's natural environment to a reasonable degree.

Field measurements were performed by Alpine Environmental Consultants on September 20, 2016. R2CROSS analysis and interpretation were completed following fieldwork. Data obtained were used to create preliminary recommendations for winter instream flows for

Dutchman Creek (Table 2). R2CROSS analysis outputs are attached for review (Attachment C).

Based on analysis of R2CROSS results (Table 2; and Attachment D), 0.47 cfs is initially recommended to satisfy the protection of biotic resources during winter months. This flow satisfies two of the three required hydrologic criteria (50 percent wetted perimeter, average depth) at the assessed cross section.

Currently, it is not possible to provide a recommendation for the summer months because the average velocity criteria is not met using the data collected on September 20, 2016. In September the wetted perimeter was approximately 90 percent and water velocities were low, on average approximately 0.5 ft/s. These factors prevented R2CROSS from modeling average velocities at or near 1 ft/s. Site selection may have further limited the model's performance. HCCA will collaborate with WRA and Alpine Environmental Consultants to resample in the spring of 2017.

Table 1. R2CROSS analysis summary and preliminary instream flow recommendations.

Date of Cross Section	Measured Discharge	Top Width	Winter Flow Recommendation	Summer Flow Recommendation
9/20/2016	0.46 cfs	5.42 ft	0.47 cfs	Out of Range: The velocity criterion was not met using September 2016 data. Additional data collection will occur in 2017 to refine recommendation.

In June 2017, or immediately following peak flow, field staff will collect additional flow and cross section data from Dutchman Creek. We plan to repeat data collection at the 2016 location and select additional upstream locations that exhibit more ideal channel geometry (i.e. channel form > wetted perimeter). Data collected during 2017 will be used to create updated instream flow recommendations for Dutchman Creek. The recommendations and analysis will be shared with CWCB staff during the summer of 2017.

Photographs

Photographs 1 and 2 show Dutchman Creek approximately two miles downstream from the headwaters during of May runoff. May mean flow according to StreamStats is 14.2 cfs.


Rationale for Instream Flow Water Right

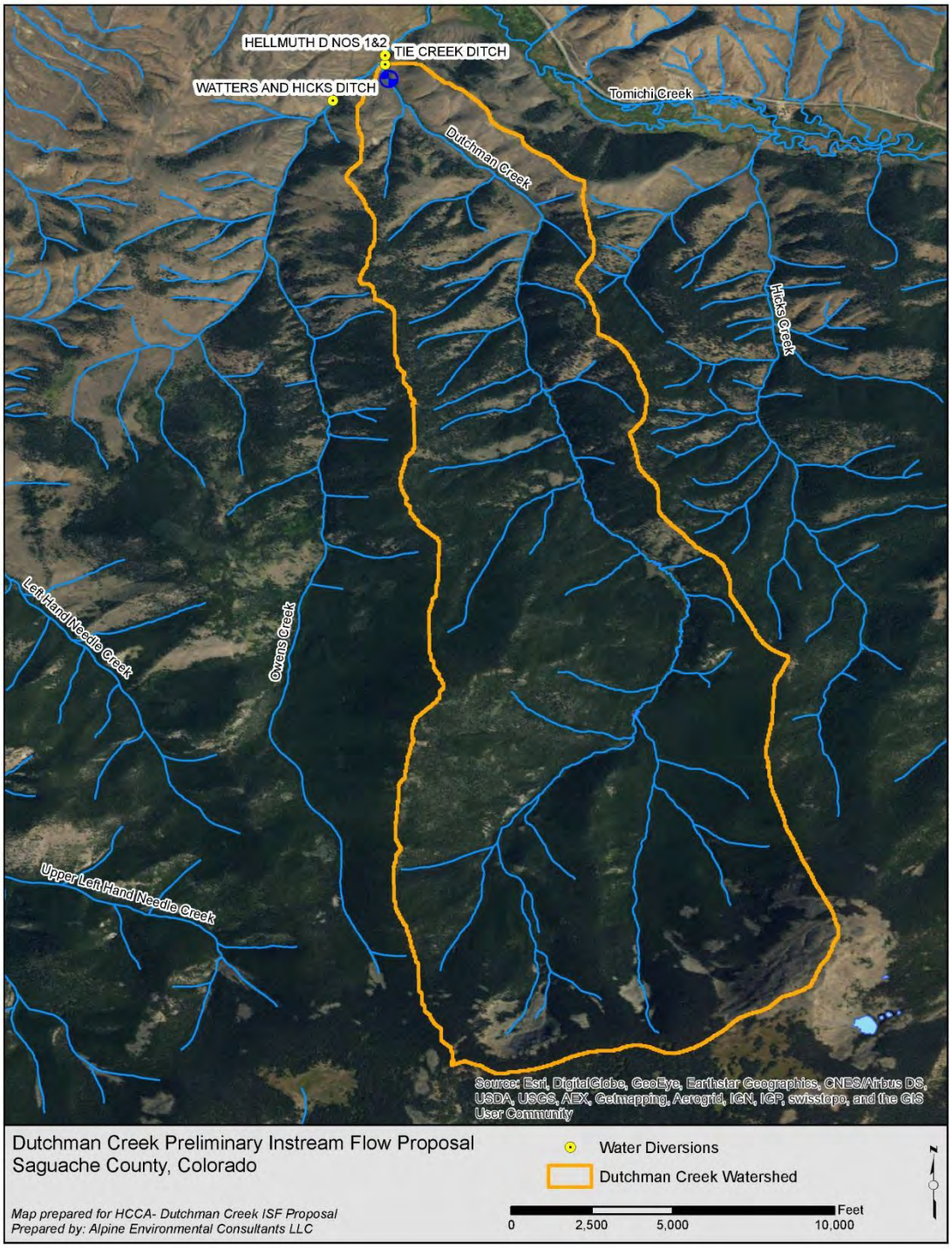
Dutchman Creek has no existing instream flow to protect the creek's natural environment.

Relationship to Existing State Policy

HCCA and WRA are proposing this instream flow to the CWCB in furtherance of the State of Colorado's policy "that the wildlife and their environment are to be protected, preserved enhanced, and managed for the use, benefit, and enjoyment of the people of this state and its visitors… and that, to carry out such program and policy, there shall be a continuous operation of planning, acquisition, and development of wildlife habitats and facilities for wildlife-related opportunities." C.R.S. 33-1-101(1).

Attachments:
A – Watershed Map
B – Biological Data
D – R2CROSS Analysis
E – Water Availability Analysis
F – USGS Topographic Quadrangle Maps

Attachment A- Watershed Map



Attachment B- Biological Data

Send Completed Reports to: mailto:Andrew.Treble@state.co.us
Any questions or issues about reporting data, please call:
Andrew Treble
Aquatic Research Data Analyst
970-472-4372

CPW Contacted Prior to Sampling: Eric Gardunio
Date of Contact:

*Required Fields:

End-of-Year Aquatic Scientific Collector's Data Submission

Water:	Dutchman Ck			Protocol:	TWO-PASS REMOVAL				
CPW Water Code:	45212	CPW Scientific Collector Permit #:				Units	Field Chemistry from Hach kit		
CPW Station Code:		Survey Purpose:	Standard Survey or Population Estimate	Water Temp:	60	F	pH:		
Date:	7/30/15			Air Temp:		F	DO:	mg/L	% Sat.
Location Dscrptn:		Target Species:		Gear:			Hardness:	mg/L	Units
Drainage:				Time:			1st conductivity:	µs @	F
UTM Zone:	13S	(NAD83, Zone 13)		Top of Station: UTM X:	369107		2nd conductivity:	µs @	F
UTM X:	369096	m		UTM Y:	4248969		Salinity:	ppt @	F
UTM Y:	4249031	m		Flow:		cfs	Phen Alkalinity:	mg/L	
Station Length:	243	ft		Wet/Dry:	W		Total Alkalinity:	mg/L	
Station Width:	5.659448819	ft							
Crew:	Melvin Woody, Mickala Palmer & Cassidy Parker								
Notes:	Pass #1: 716 sec; Pass #2: 498 sec;								

Species	Count	Length (mm)	Weight (g)	Status	Mark	TagID
BRK	1	183	69.5	1		
BRK	1	155	39.8	1		
BRK	1	107	16.5	1		
BRK	1	160	44.3	1		
BRK	1	145	32.9	1		
BRK	1	130	27.7	1		
BRK	1	110	13.9	1		
BRK	1	101	10.4	1		
BRK	1	102	11.1	1		
BRK	1	120	20.1	1		
BRK	1	140	38.5	2		
BRK	1	121	21.4	2		
BRK	1	107	14.5	2		

Observed YOY Length

Species	YOY Length (mm)
BRK	55
BRK	55
BRK	45
BRK	50
BRK	45
BRK	53
BRK	47
BRK	42

Attachment C- R2CROSS Analysis

COLORADO WATER CONSERVATION BOARD

FIELD DATA FOR INSTREAM FLOW DETERMINATIONS

LOCATION INFORMATION

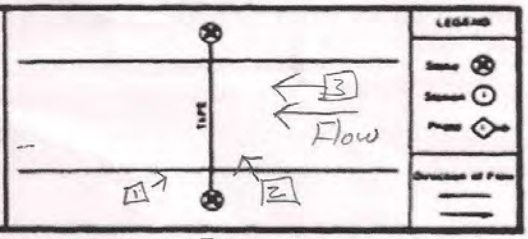
STREAM NAME: Dutchman Creek					CROSS-SECTION NO.
CROSS-SECTION LOCATION: 200 feet Downstream from Cabin					
DATE: 9/20/16.	OBSERVERS: Bembenek, Malik				
LEGAL DESCRIPTION: ¼ SECTION	SECTION	TOWNSHIP: N/S	RANGE: E/W	PM	
COUNTY: Saguache	WATERSHED	WATER DIVISION	DOW WATER CODE		
MAPS: USGS					
USFS					

SUPPLEMENTAL DATA

SAG TAPE SECTION SAME AS DISCHARGE SECTION (YES) NO	METER TYPE: Marsh FH950			
METER NUMBER	DATE RATED	CALIB/SPIN ____ sec	TAPE WEIGHT ____ lbs/ft	TAPE TENSION ____ lbs
CHANNEL BED MATERIAL SIZE RANGE: Gravel	PHOTOGRAPHS TAKEN (YES) NO	NUMBER OF PHOTOGRAPHS: 3		

CHANNEL PROFILE DATA

STATION	DISTANCE FROM TAPE (ft)	ROD READING (ft)
⊗ Tape @ Staff LB	0.0	
⊗ Tape @ Staff RB	0.0	
⊙ WS @ Tape LB/RB	0.0	
① WS Upstream	9ft 9 inch.	16.2cm
② WS Downstream	4ft 2 inch	22.6cm
SLOPE		



AQUATIC SAMPLING SUMMARY

4 5 + plus additional landscape photos

STREAM ELECTROFISHED YES/NO	DISTANCE ELECTROFISHED ____ ft	FISH CAUGHT YES/NO	WATER CHEMISTRY SAMPLED YES/NO

LENGTH - FREQUENCY DISTRIBUTION BY ONE-INCH SIZE GROUPS (1.0-1.9, 2.0-2.9, ETC.)

SPECIES (FULL NAME)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	>15	TOTAL

AQUATIC INSECTS IN STREAM SECTION BY COMMON OR SCIENTIFIC ORDER NAME

COMMENTS

Saw Brook Trout largest 6 inch

DISCHARGE/CROSS SECTION NOTES

STREAM NAME: Dutchman Creek	CROSS-SECTION #: 0	DATE: 9/20/16	SHEET 2 OF 2
BEGINNING OF MEASUREMENT: EDGE OF WATER LOOKING DOWNSTREAM (ELB AT STAKE) LEFT / RIGHT	Gage Reading: 4.9cm ft	TIME: 1410	

Features (Stake ID, Cross-section ID, Reference Point, Reach, etc.)	Stations From Initial Point (ft)	Width (ft)	Total Vertical Depth From Tape/Wad (ft)	Water Depth (ft)	Depth of Observation (ft)	Revolutions	Time (sec)	Velocity (ft/sec): At Point	Velocity (ft/sec): Mean of Vertical	Area (sq ft)	Discharge (cfs)
S, G	0		2.6cm								
W	9inch 7/8		15cm	0					0		
Too shallow to measure	1ft 2inch		18.7cm	4.6cm					0		
	1ft 5inch		18.3cm	4.1cm					0		
	1ft 8inch	6/8	18.0cm	3.8cm					0.092		
	2ft 3/8		18.2cm	4.2cm					0.232		
	2ft 3 3/8		17.2cm	3.2cm					.305		
	2ft 6 4/8		18.8cm	4.9cm					.805		
	2ft 9 3/8		18.9cm	5.0cm					.738		
	3ft 3/8		17.8cm	4.8cm					.872		
	3ft 3 1/8		18.0cm	5.0cm					.834		
	3ft 6 2/8		19.4cm	6.2cm					.701		
	3ft 9 4/8		20.4cm	7.7cm					.901		
	4ft 2/8		19.2cm	6.8cm					.852		
	4ft 3inch		20.2cm	7.8cm					.785		
	4ft 6 1/8		21.8cm	9.3cm					.536		
	4ft 9 5/8		21.4cm	7.8cm					.359		
	5ft 3/8		19.8cm	7.4cm					.432		
	5ft 3 1/8		19.4cm	6.8cm					.424		
	5ft 6inch		19.2cm	6.5cm					0.089		
Too shallow to measure	5ft 9 1/8		18.4cm	5.6cm					0		
W, G	6ft 1 4/8		13.2cm	0					0		
S	6ft 11		3.4cm								
TOTALS											

End of Measurement	Time: 1515	Gage Reading: 4.9cm ft	CALCULATIONS PERFORMED BY:	CALCULATIONS CHECKED BY:

Dutchman Creek Cross Section

Left bank facing towards cross section

Left bank facing downstream of cross section

Left bank facing downstream at the assessment site

Left bank facing perpendicular to assessment site

STREAM NAME: Dutchman Creek
XS LOCATION: UPSTREAM OF TOMICHI CREEK
XS NUMBER: 1

Constant Manning's n

STAGING TABLE

GL = lowest Grassline elevation corrected for sag
WL = Waterline corrected for variations in field measured water surface elevations and sag

	DIST TO WATER (FT)	TOP WIDTH (FT)	AVG. DEPTH (FT)	MAX. DEPTH (FT)	AREA (SQ FT)	WETTED PERIM. (FT)	PERCENT WET PERIM (%)	HYDR RADIUS (FT)	FLOW (CFS)	AVG. VELOCITY (FT/SEC)
GL	0.43	5.42	0.18	0.28	0.97	5.53	100.0%	0.18	0.47	0.48
WL	0.44	5.40	0.18	0.28	0.95	5.51	99.7%	0.17	0.45	0.48
	0.49	5.20	0.13	0.23	0.68	5.28	95.5%	0.13	0.27	0.40
	0.54	4.95	0.09	0.18	0.43	5.01	90.7%	0.09	0.13	0.30
	0.59	4.29	0.04	0.13	0.19	4.33	78.4%	0.04	0.04	0.19
	0.64	1.64	0.03	0.08	0.05	1.65	29.9%	0.03	0.01	0.16
	0.69	0.50	0.02	0.03	0.01	0.50	9.1%	0.02	0.00	0.10

LOCATION INFORMATION

STREAM NAME:	Dutchman Creek
XS LOCATION:	UPSTREAM OF TOMICHI CREEK
XS NUMBER:	1
DATE:	20-Sep-16
OBSERVERS:	Bembenek, Malick
1/4 SEC:	0
SECTION:	0
TWP:	0
RANGE:	0
PM:	0
COUNTY:	Saguache County
WATERSHED:	0
DIVISION:	0
DOW CODE:	0
USGS MAP:	0
USFS MAP:	0

SUPPLEMENTAL DATA

TAPE WT:	0.0106
TENSION:	99999

*** NOTE ***
Leave TAPE WT and TENSION at defaults for data collected with a survey level and rod

CHANNEL PROFILE DATA

SLOPE:	0.01508

INPUT DATA CHECKED BY: .....DATE.....

ASSIGNED TO: .....DATE.....

See map with R2CROSS location below in Attachment D, Legal Availability

STREAM NAME: Dutchman Creek
XS LOCATION: UPSTREAM OF TOMICHI CREEK
XS NUMBER: 1

DATA POINTS= 23

VALUES COMPUTED FROM RAW FIELD DATA

FEATURE	DIST	VERT DEPTH	WATER DEPTH	VEL	WETTED PERIM.	WATER DEPTH	AREA (Am)	Q (Qm)	% Q CELL
1 S, G	0.00	0.09			0.00		0.00	0.00	0.0%
W	0.82	0.49	0.00	0.00	0.00		0.00	0.00	0.0%
	1.17	0.61	0.15	0.00	0.36	0.15	0.04	0.00	0.0%
	1.42	0.60	0.13	0.00	0.25	0.13	0.04	0.00	0.0%
	1.73	0.59	0.12	0.09	0.31	0.12	0.04	0.00	0.8%
	2.03	0.60	0.14	0.23	0.30	0.14	0.04	0.01	1.9%
	2.28	0.56	0.10	0.31	0.25	0.10	0.03	0.01	1.8%
	2.54	0.62	0.16	0.81	0.27	0.16	0.04	0.03	7.0%
	2.78	0.62	0.18	0.74	0.24	0.18	0.04	0.03	7.2%
	3.03	0.58	0.16	0.87	0.25	0.16	0.04	0.03	7.2%
	3.26	0.59	0.16	0.83	0.23	0.16	0.04	0.03	7.3%
	3.52	0.64	0.20	0.70	0.26	0.20	0.05	0.04	8.2%
	3.79	0.67	0.25	0.90	0.27	0.25	0.06	0.06	12.4%
	4.02	0.63	0.22	0.85	0.23	0.22	0.05	0.04	9.5%
	4.25	0.66	0.26	0.79	0.23	0.26	0.06	0.05	10.7%
	4.51	0.72	0.31	0.54	0.27	0.31	0.08	0.05	9.8%
	4.80	0.70	0.26	0.36	0.29	0.26	0.07	0.02	5.2%
	5.03	0.65	0.24	0.43	0.24	0.24	0.06	0.02	5.2%
	5.26	0.64	0.22	0.42	0.23	0.22	0.05	0.02	4.8%
	5.50	0.63	0.21	0.09	0.24	0.21	0.05	0.00	1.0%
	5.76	0.60	0.18	0.00	0.26	0.18	0.06	0.00	0.0%
W, G	6.12	0.43	0.00	0.00	0.40		0.00	0.00	0.0%
S	6.91	0.11			0.00		0.00	0.00	0.0%
TOTALS					5.39	0.30504 (Max.)	0.95	0.46	100.0%

Manning's n = 0.1182
Hydraulic Radius= 0.17586792

STREAM NAME: Dutchman Creek
XS LOCATION: UPSTREAM OF TOMICHI CREEK
XS NUMBER: 1

WATER LINE COMPARISON TABLE

WATER LINE	MEAS AREA	COMP AREA	AREA ERROR
	0.95	0.81	-14.5%
0.21	0.95	2.27	139.6%
0.23	0.95	2.15	126.2%
0.25	0.95	2.02	113.0%
0.27	0.95	1.90	99.9%
0.29	0.95	1.78	87.1%
0.31	0.95	1.65	74.4%
0.33	0.95	1.54	62.0%
0.35	0.95	1.42	49.7%
0.37	0.95	1.31	37.6%
0.39	0.95	1.19	25.7%
0.41	0.95	1.08	14.0%
0.42	0.95	1.03	8.2%
0.43	0.95	0.97	2.5%
0.44	0.95	0.92	-3.2%
0.45	0.95	0.86	-8.9%
0.46	0.95	0.81	-14.5%
0.47	0.95	0.76	-20.0%
0.48	0.95	0.71	-25.6%
0.49	0.95	0.65	-31.0%
0.50	0.95	0.60	-36.5%
0.51	0.95	0.55	-41.8%
0.53	0.95	0.45	-52.4%
0.55	0.95	0.35	-62.8%
0.57	0.95	0.26	-72.9%
0.59	0.95	0.17	-82.2%
0.61	0.95	0.11	-88.8%
0.63	0.95	0.06	-93.5%
0.65	0.95	0.03	-96.5%
0.67	0.95	0.02	-98.2%
0.69	0.95	0.01	-99.4%
0.71	0.95	0.00	-100.0%

WATERLINE AT ZERO
AREA ERROR = 0.437

STREAM NAME: Dutchman Creek
XS LOCATION: UPSTREAM OF TOMICHI CREEK
XS NUMBER: 1

SUMMARY SHEET

MEASURED FLOW (Qm)=	0.46	cfs
CALCULATED FLOW (Qc)=	0.45	cfs
(Qm-Qc)/Qm * 100 =	1.4	%
MEASURED WATERLINE (WLm)=	0.46	ft
CALCULATED WATERLINE (WLc)=	0.44	ft
(WLm-WLc)/WLm * 100 =	5.6	%
MAX MEASURED DEPTH (Dm)=	0.31	ft
MAX CALCULATED DEPTH (Dc)=	0.28	ft
(Dm-Dc)/Dm * 100	8.8	%
MEAN VELOCITY=	0.48	ft/sec
MANNING'S N=	0.118	
SLOPE=	0.01508	ft/ft
.4 * Qm =	0.2	cfs
2.5 * Qm=	1.1	cfs

RECOMMENDED INSTREAM FLOW:
==========

FLOW (CFS)	PERIOD
==========	========
_____	_____
_____	_____
_____	_____
_____	_____

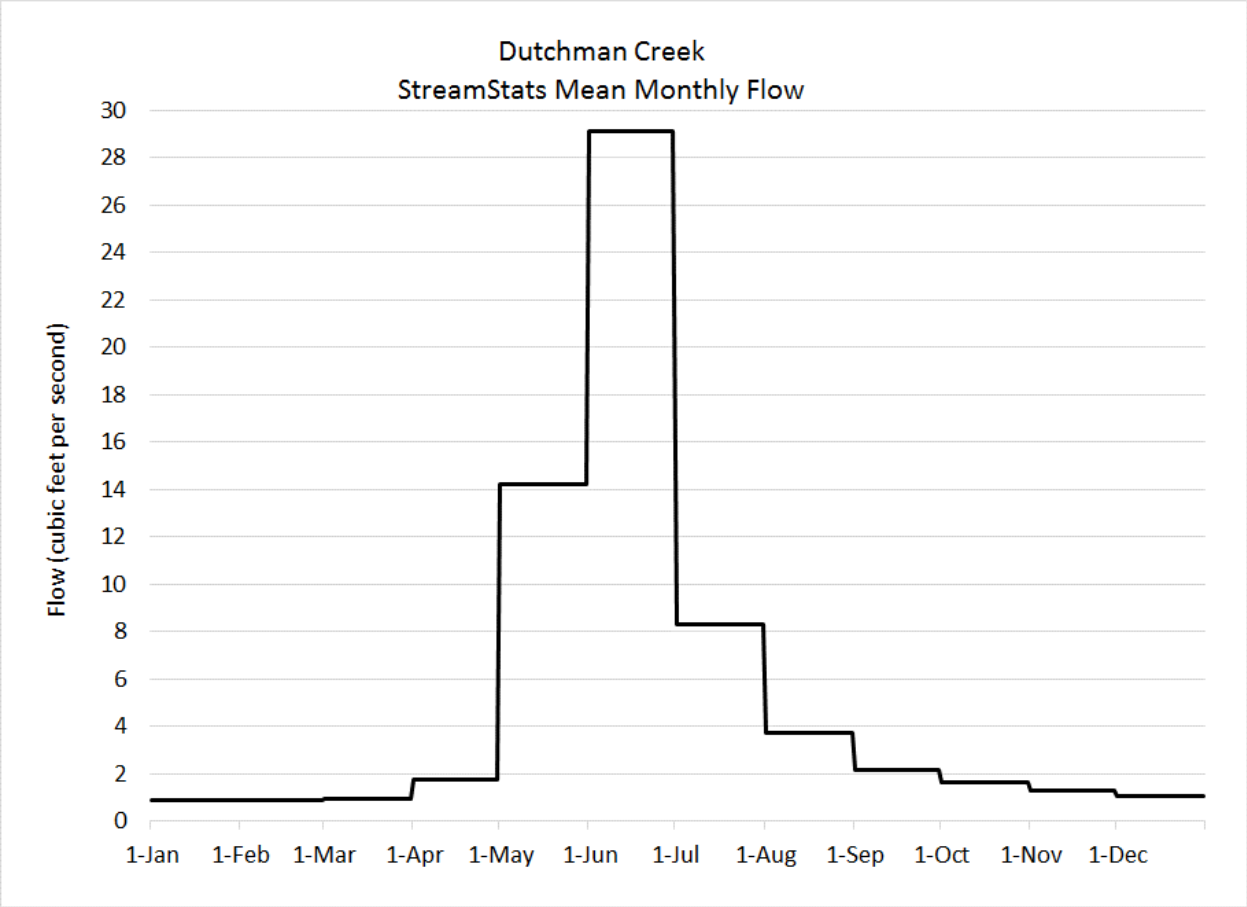
RATIONALE FOR RECOMMENDATION:
==========

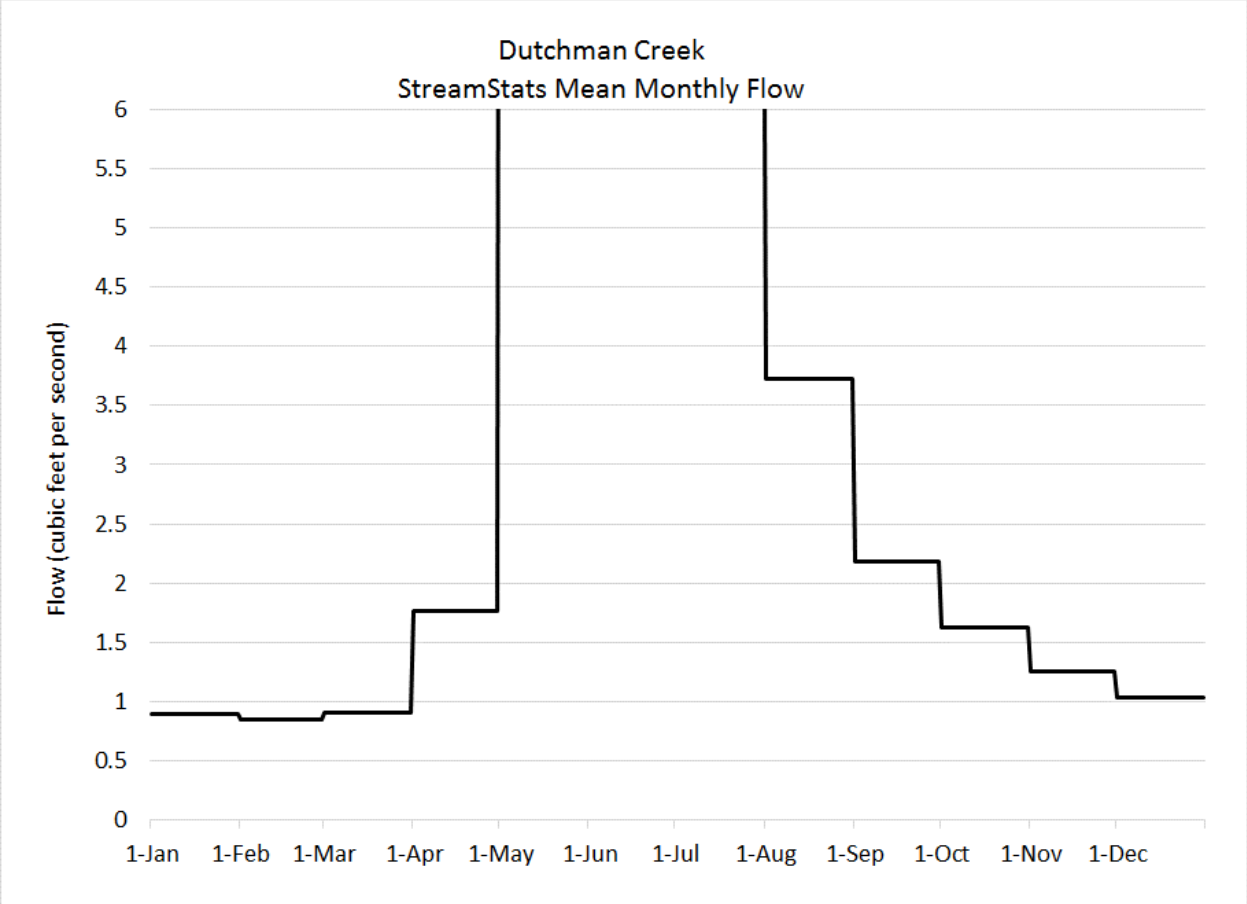
RECOMMENDATION BY: ..... AGENCY..... DATE:.....

CWCB REVIEW BY: ..... DATE:.....

Attachment D- Water Availability Analysis

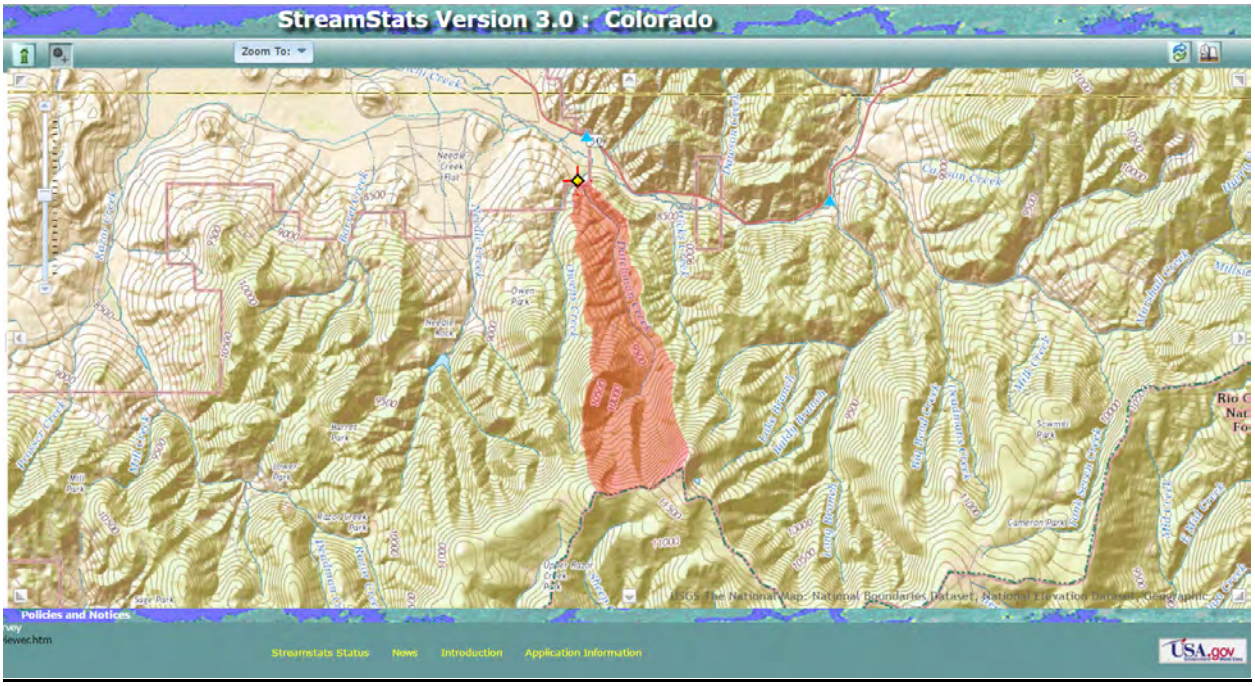
Physical Availability





Dutchman Creek: StreamStats Mean Monthly Flow	
Month	**Flow (cfs)**
Jan	0.9
Feb	0.85
Mar	0.91
Apr	1.76
May	14.2
Jun	29.1
Jul	8.3
Aug	3.72
Sep	2.18
Oct	1.62
Nov	1.26
Dec	1.03
Mean Annual	5.62

StreamStats Model Output



StreamStats Version 3.0

Basin Characteristics Ungaged Site Report

Date: Mon Jan 16, 2017 10:19:51 AM GMT-7
Study Area: Colorado
NAD 1983 Latitude: 38.4003 (38 24 01)
NAD 1983 Longitude: -106.5103 (-106 30 37)

Label	Value	Units	Definition
DRNAREA	7.61	square miles	Area that drains to a point on a stream
PRECIP	21.67	inches	Mean Annual Precipitation
I6H100Y	2.1	inches	6-hour precipitation that is expected to occur on average once in 100 years
ELEV	9900	feet	Mean Basin Elevation
BSLDEM10M	33	percent	Mean basin slope computed from 10 m DEM
EL7500	100	percent	Percent of area above 7500 ft
OUTLETELEV	8316	feet	Elevation of the stream outlet in feet above NAVD88.
STATSCLAY	20.2	percent	Percentage of clay soils from STATSGO

StreamStats Version 3.0

Flow Statistics Ungaged Site Report

Date: Mon Jan 16, 2017 10:21:15 AM GMT-7
Study Area: Colorado
NAD 1983 Latitude: 38.4003 (38 24 01)
NAD 1983 Longitude: -106.5103 (-106 30 37)
Drainage Area: 7.61 mi2

Peak-Flows Basin Characteristics

100% Mountain Region Peak Flow (7.61 mi2)

Parameter	Value	Regression Equation Valid Range	
		Min	Max
Drainage Area (square miles)	7.61	1	1060
Mean Basin Slope from 10m DEM (percent)	33	7.6	60.2
Mean Annual Precipitation (inches)	21.67	18	47

Low-Flows Basin Characteristics

100% Mountain Region Min Flow (7.61 mi2)

Parameter	Value	Regression Equation Valid Range	
		Min	Max
Drainage Area (square miles)	7.61	1	1060
Mean Annual Precipitation (inches)	21.67	18	47
Mean Basin Elevation (feet)	9900	8600	12000

Flow-Duration Basin Characteristics

100% Mountain Region Flow Duration (7.61 mi2)

Parameter	Value	Regression Equation Valid Range	
		Min	Max
Drainage Area (square miles)	7.61	1	1060
Mean Annual Precipitation (inches)	21.67	18	47

Maximum-Flows Basin Characteristics

100% Mountain Region Max Flow (7.61 mi2)

Parameter	Value	Regression Equation Valid Range	
		Min	Max
Drainage Area (square miles)	7.61	1	1060
Mean Annual Precipitation (inches)	21.67	18	47

Mean-Flows Basin Characteristics

100% Mountain Region Mean Flow (7.61 mi2)

Parameter	Value	Regression Equation Valid Range	
		Min	Max
Drainage Area (square miles)	7.61	1	1060
Mean Annual Precipitation (inches)	21.67	18	47

Peak-Flows Statistics						
Statistic	Value	Unit	Prediction Error (percent)	Equivalent years of record	90-Percent Prediction Interval	
					Min	Max
PK2	50.2	ft3/s	49			
PK5	76.4	ft3/s	44			
PK10	94.5	ft3/s	41			
PK25	119	ft3/s	40			
PK50	145	ft3/s	39			
PK100	165	ft3/s	36			
PK200	183	ft3/s	36			
PK500	220	ft3/s	33			

http://pubs.usgs.gov/sir/2009/5136/#http://pubs.usgs.gov/sir/2009/5136/#
(http://pubs.usgs.gov/sir/2009/5136/#http://pubs.usgs.gov/sir/2009/5136/#)
Capesius_ J.P._ and Stephens_ V. C._ 2009_ Regional Regression Equations for Estimation of Natural Streamflow Statistics in Colorado: U. S. Geological Survey Scientific Investigations Report 2009-5136_ 32 p.

Low-Flows Statistics						
Statistic	Value	Unit	Prediction Error (percent)	Equivalent years of record	90-Percent Prediction Interval	
					Min	Max
M7D2Y	0.31	ft3/s	89			
M7D10Y	0.12	ft3/s	150			
M7D50Y	0.15	ft3/s	130			

http://pubs.usgs.gov/sir/2009/5136/#http://pubs.usgs.gov/sir/2009/5136/#
(http://pubs.usgs.gov/sir/2009/5136/#http://pubs.usgs.gov/sir/2009/5136/#)
Capesius_ J.P._ and Stephens_ V. C._ 2009_ Regional Regression Equations for Estimation of Natural Streamflow Statistics in Colorado: U. S. Geological Survey Scientific Investigations Report 2009-5136_ 32 p.

Flow-Duration Statistics						
Statistic	Value	Unit	Prediction Error (percent)	Equivalent years of record	90-Percent Prediction Interval	
					Min	Max
D10	12.9	ft3/s	45			
D25	3.56	ft3/s	55			
D50	1.46	ft3/s	55			
D75	0.81	ft3/s	64			
D90	0.43	ft3/s	85			

http://pubs.usgs.gov/sir/2009/5136/#http://pubs.usgs.gov/sir/2009/5136/#
(http://pubs.usgs.gov/sir/2009/5136/#http://pubs.usgs.gov/sir/2009/5136/#)
Capesius_ J.P._ and Stephens_ V. C._ 2009_ Regional Regression Equations for Estimation of Natural Streamflow Statistics in Colorado: U. S. Geological Survey Scientific Investigations Report 2009-5136_ 32 p.

Maximum-Flows Statistics						
Statistic	Value	Unit	Prediction Error (percent)	Equivalent years of record	90-Percent Prediction Interval	
					Min	Max
V7D2Y	32.5	ft3/s	46			
V7D10Y	55.8	ft3/s	35			
V7D50Y	80.6	ft3/s	31			

http://pubs.usgs.gov/sir/2009/5136/#http://pubs.usgs.gov/sir/2009/5136/#
(http://pubs.usgs.gov/sir/2009/5136/#http://pubs.usgs.gov/sir/2009/5136/#)
Capesius_ J.P._ and Stephens_ V. C._ 2009_ Regional Regression Equations for Estimation of Natural Streamflow Statistics in Colorado: U. S. Geological Survey Scientific Investigations Report 2009-5136_ 32 p.

Mean-Flows Statistics

Statistic	Value	Unit	Prediction Error (percent)	Equivalent years of record	90-Percent Prediction Interval	
					Min	Max
Q1	0.9	ft3/s	50			
Q2	0.85	ft3/s	51			
Q3	0.91	ft3/s	49			
Q4	1.76	ft3/s	44			
Q5	14.2	ft3/s	46			
Q6	29.1	ft3/s	46			
Q7	8.3	ft3/s	76			
Q8	3.72	ft3/s	80			
Q9	2.18	ft3/s	59			
QA	5.62	ft3/s	33			
Q10	1.62	ft3/s	45			
Q11	1.26	ft3/s	46			
Q12	1.03	ft3/s	47			

http://pubs.usgs.gov/sir/2009/5136/#http://pubs.usgs.gov/sir/2009/5136/#
(http://pubs.usgs.gov/sir/2009/5136/#http://pubs.usgs.gov/sir/2009/5136/#)
Capesius_ J.P._ and Stephens_ V. C._ 2009_ Regional Regression Equations for Estimation of Natural Streamflow Statistics in Colorado: U. S. Geological Survey Scientific Investigations Report 2009-5136_ 32 p.

Legal Availability

Diversions are shown on the map below. There are no decreed active water rights within the proposed instream flow reach between the headwaters of Dutchman Creek and the confluence with Owens Creek. However, records for diversions below where the two creeks meet list Dutchman Creek as the water source for these rights. The USGS cites the same source as Owens Creek. The map and diversion information below clarifies the location of these ditches as diverting from Owens Creek.

Map of Dutchman Creek Area Diversions and R2CROSS Cross Section Location

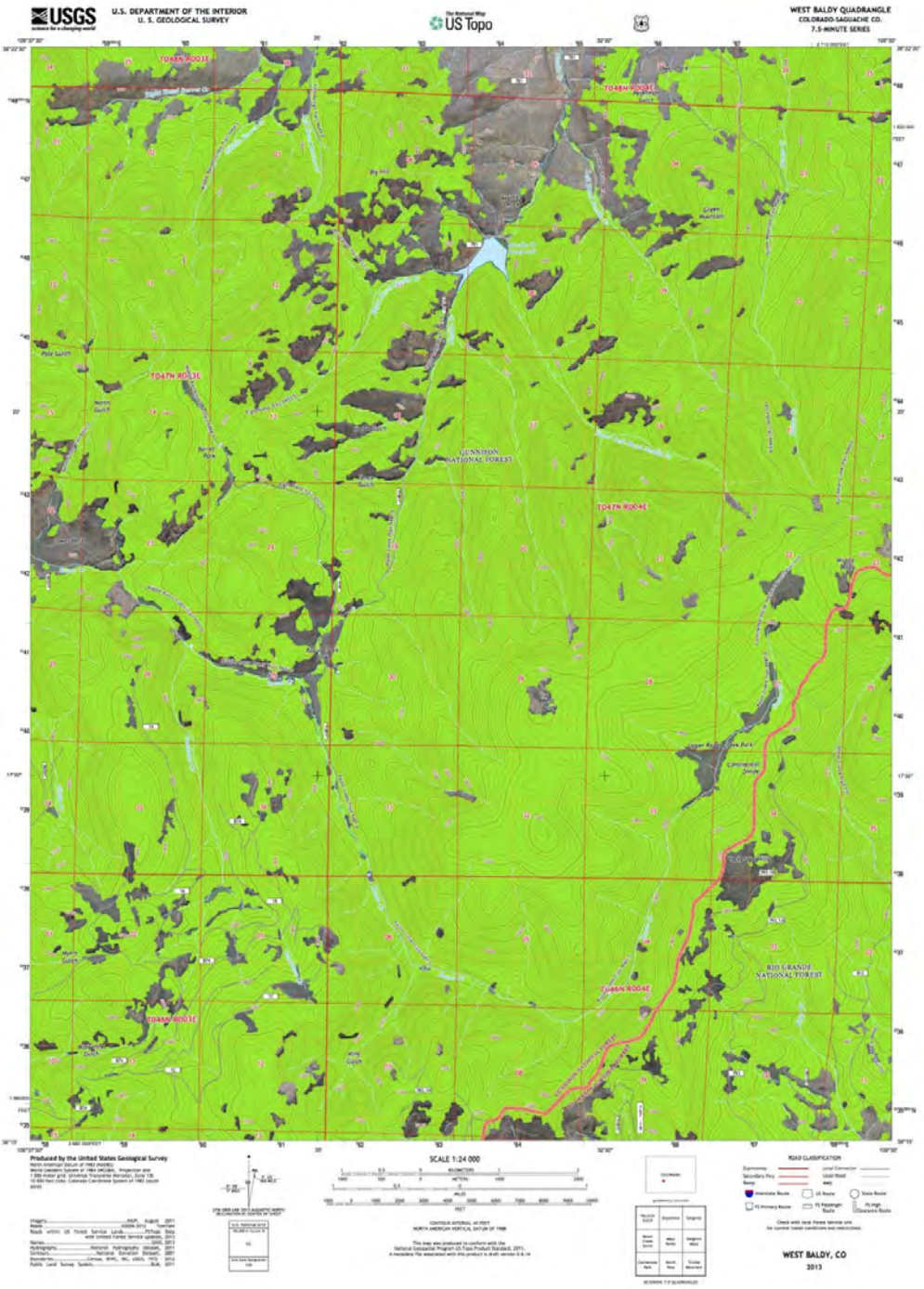
A copy of the water rights search on Dutchman Creek is included below (these ditches refer to Dutchman and Owens as a source but are located off of the proposed instream flow reach).

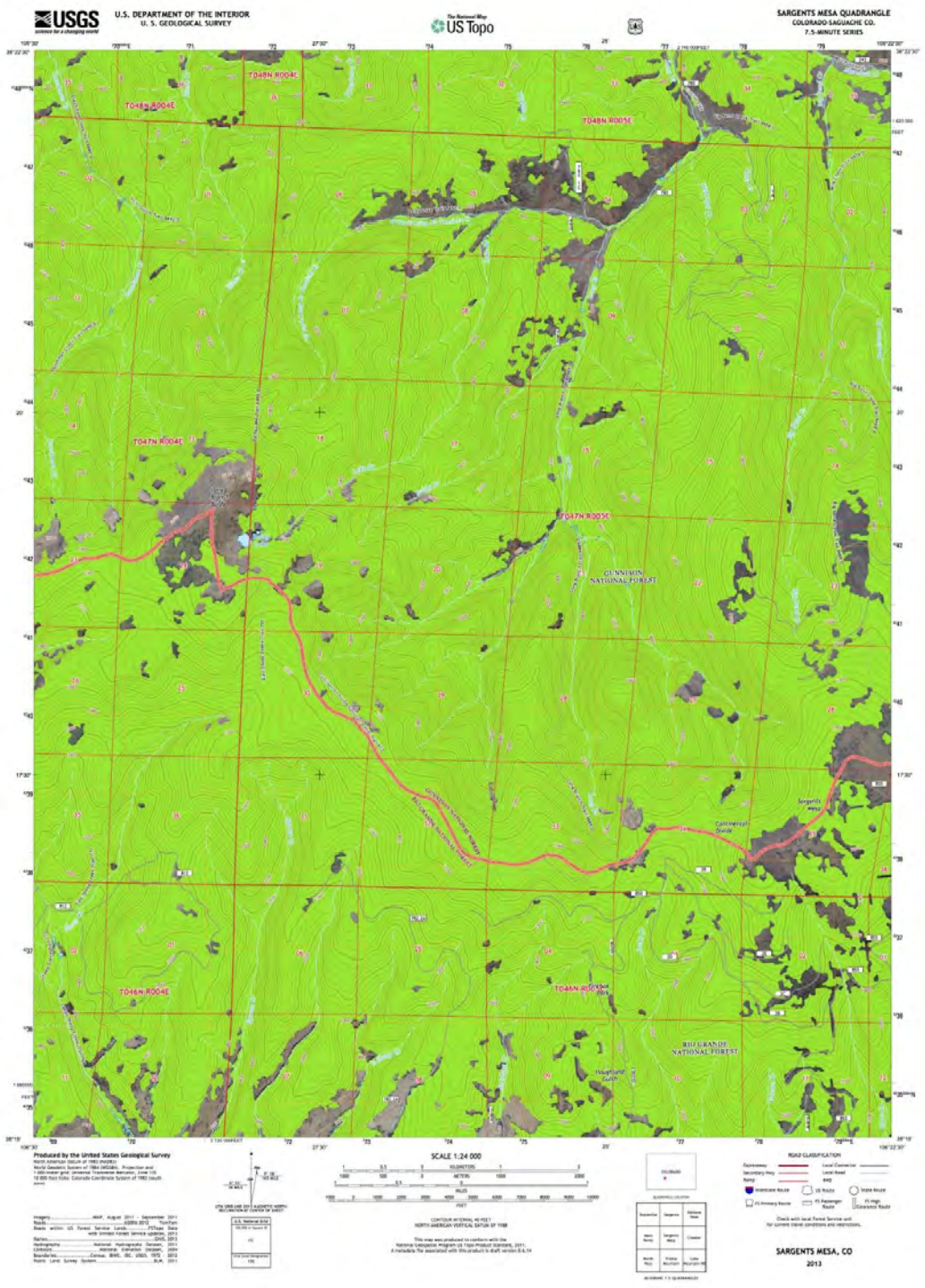
Div	WD	Struc. ID	Struc. Name	Water Source[1]	Stream Mile	Owner	Type	Use	Decreed Rate Abs (CFS)	Decreed Rate Total (CFS)	Lat.	Long.
4	28	712	WATTERS AND HICKS DITCH	DUTCHMAN CREEK	0		Ditch	I			38.397077	-106.514485
4	28	962	HELLMUTH D NOS 1&2	DUTCHMAN CREEK	227.38		Ditch	A	1.62	1.62	38.400930	-106.510029
4	28	706	TIE CREEK DITCH	DUTCHMAN CREEK	227.32		Ditch	H			38.400162	-106.510055
4	28	565	GILBERTSON NO 2 DITCH[2]	DUTCHMAN CREEK	0	IRBY RANCHES LLC. (IRBY, STAN)	Ditch	A	3	3	38.430490	-106.507059

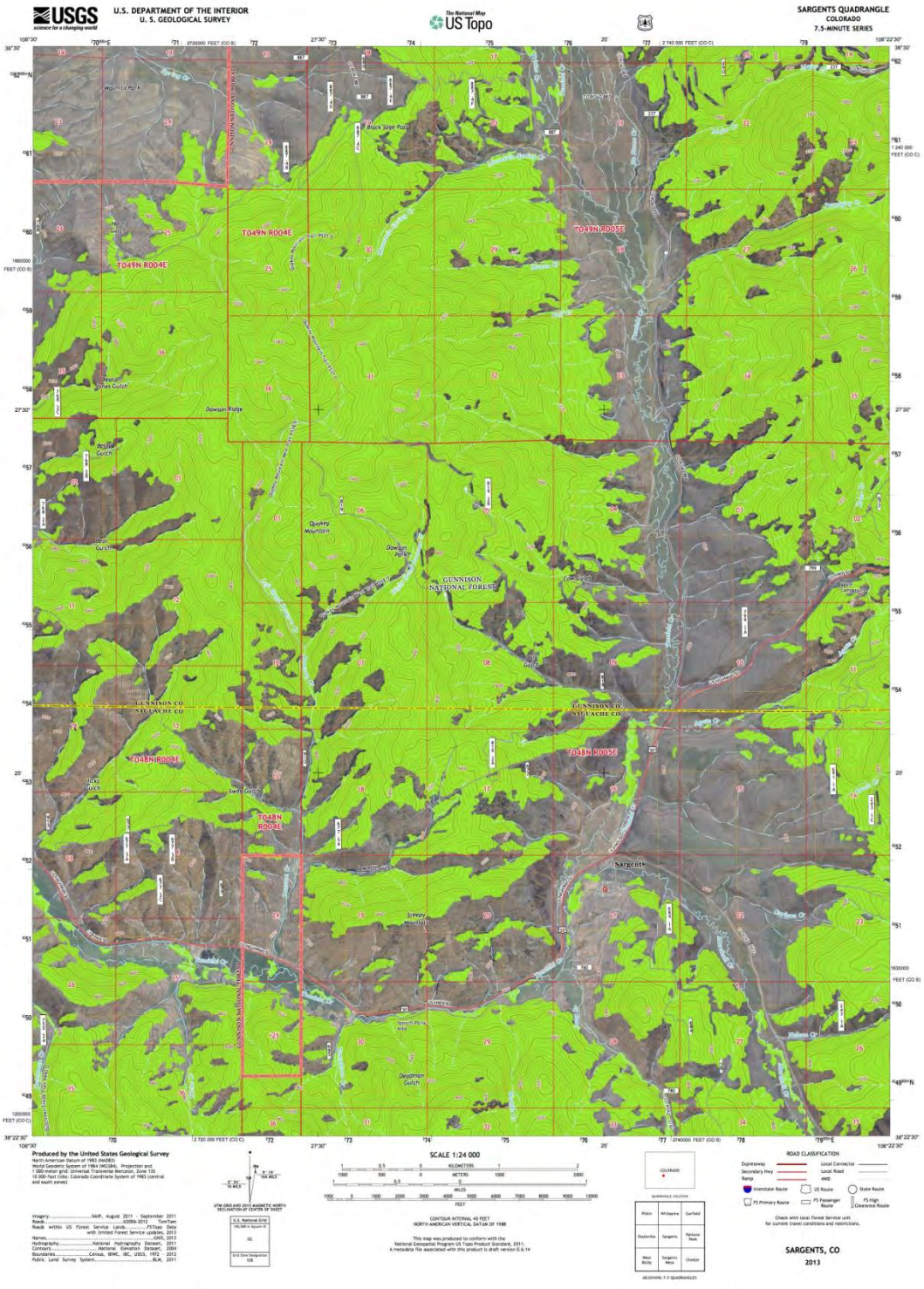
[1] Note that USGS calls the stream Owens Creek below the confluence of Owens Creek and Dutchman Creek. The Colorado Division of Water Resources (DWR) calls this same stretch of creek Dutchman Creek. All of the diversions above are either located on Owens Creek or below the confluence. This ISF flow proposal is for Dutchman Creek from the headwaters to the confluence with Owens Creek.

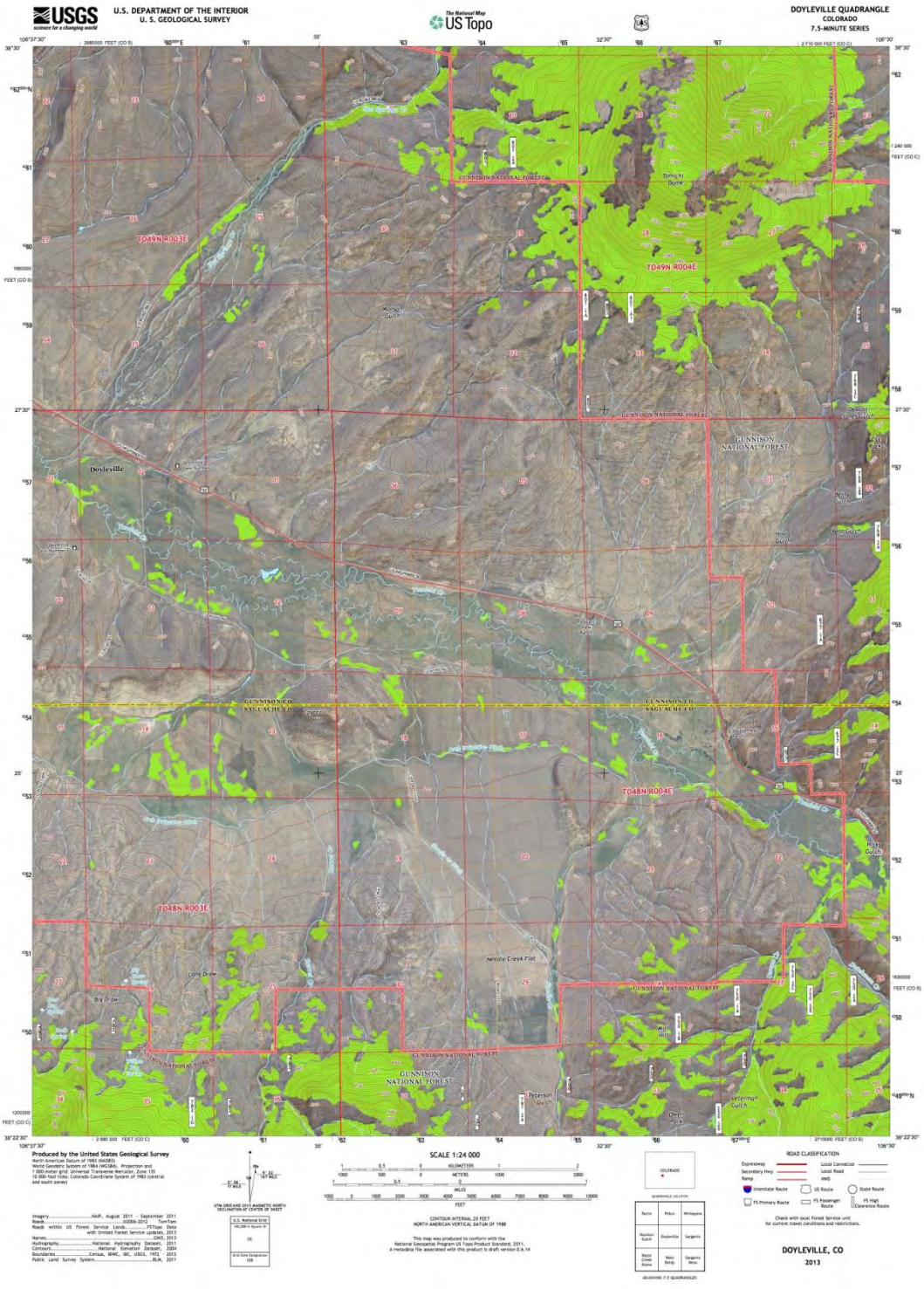
[2] The coordinates for Gilbertson No 2 Ditch in the DWR water rights database are incorrect as they place the ditch on the north side of Tomichi Creek, out of the Dutchman/Owens drainage. The correct coordinates, based upon input from Tom Rozman Water Commissioner, Division 4 District 59 are Latitude 38.404094 Longitude -106.506279.

Attachment E: USGS Topographic Quadrangle Maps




U.S. DEPARTMENT OF THE INTERIOR
U. S. GEOLOGICAL SURVEY
USGS
US Topo
SARGENTS MESA QUADRANGLE
COLORADO-SAGUACHE CO.
7.5-MINUTE SERIES
T048N R004E
T048N R005E
T047N R004E
T047N R005E
T046N R004E
T046N R005E
GUNNISON NATIONAL FOREST
RIO GRANDE NATIONAL FOREST
Sargents Mesa
Continental Divide
Produced by the United States Geological Survey
SCALE 1:24 000
ROAD CLASSIFICATION
SARGENTS MESA, CO
2013


U.S. DEPARTMENT OF THE INTERIOR
U. S. GEOLOGICAL SURVEY
USGS
science for a changing world
The National Map
US Topo
SARGENTS QUADRANGLE
COLORADO
7.5-MINUTE SERIES
T049N R004E
T049N R005E
T048N R004E
T048N R005E
T048N R003E
GUNNISON NATIONAL FOREST
GUNNISON CO
SAGUACHE CO
Sargents
Dawson Ridge
Quarry Mountain
Dawson Park
Sleepy Mountain
Deadman Gulch
Black Sage Park
Produced by the United States Geological Survey
North American Datum of 1983 (NAD83)
World Geodetic System of 1984 (WGS84). Projection and
1 000-meter grid: Universal Transverse Mercator, Zone 13S
10 000-foot ticks: Colorado Coordinate System of 1983 (central
and south zones)
SCALE 1:24 000
KILOMETERS
METERS
MILES
FEET
CONTOUR INTERVAL 40 FEET
NORTH AMERICAN VERTICAL DATUM OF 1988
This map was produced to conform with the
National Geospatial Program US Topo Product Standard, 2011.
A metadata file associated with this product is draft version 0.6.14
ROAD CLASSIFICATION
Expressway
Secondary Hwy
Ramp
Local Connector
Local Road
4WD
Interstate Route
US Route
State Route
FS Primary Route
FS Passenger Route
FS High Clearance Route
Check with local Forest Service unit
for current travel conditions and restrictions.
SARGENTS, CO
2013


U.S. DEPARTMENT OF THE INTERIOR
U. S. GEOLOGICAL SURVEY
USGS
science for a changing world
The National Map
US Topo
DOYLEVILLE QUADRANGLE
COLORADO
7.5-MINUTE SERIES
T049N R003E
T049N R004E
T048N R003E
T048N R004E
GUNNISON NATIONAL FOREST
Doyleville
GUNNISON CO.
SAGUACHE CO.
Produced by the United States Geological Survey
SCALE 1:24 000
CONTOUR INTERVAL 20 FEET
NORTH AMERICAN VERTICAL DATUM OF 1988
ROAD CLASSIFICATION
DOYLEVILLE, CO
2013