November 29, 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 during field reconnaissance and sampling in September 2016 and July 2017.

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.

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-F.

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 F.

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 Creek and Owens Creek.

Table 1. Land Status

Upper Terminus	Lower Terminus	Total Length (miles)	Land Ownership	
			Private (%)	Public (%)
Headwaters	Confluence with Owens Creek.	Approx. 7	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. Streamflow estimates from StreamStats were used to evaluate water availability. StreamStats is 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 to estimate stream flows at user-selected locations.

StreamStats predicted mean monthly flows that ranged from a high of 29.1 cfs in June to a low of 0.85 cfs in February for Dutchman Creek upstream of the confluence with Owens Creek. The average monthly flows resulting from the StreamStats calculation show sufficient flows to meet the winter instream flow recommendation of 0.84 cfs from 9/1 until 3/31 and the summer instream flow recommendation of 0.94 cfs from 4/1 until 8/31.

Legal Availability

Diversions on Owens Creek are 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 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 reconnaissance and sampling in 2016 and 2017 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 model and develop an instream flow recommendation that will protect Dutchman Creek's natural environment to a reasonable degree.

Alpine Environmental Consultants completed the R2CROSS field survey on July 14, 2017. R2CROSS analysis and interpretation were completed following fieldwork. These data were used to create winter and summer instream flow recommendations for Dutchman Creek (Table 2). R2CROSS analysis outputs are attached for review (Attachment C).

Based on analysis of R2CROSS results (Table 2; and Attachment C), 0.84 cfs is 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 and average depth) at the assessed cross section. The recommendation for summer flow is 0.94 cfs; which satisfies all three of the required hydrologic criteria.

Table 2. R2CROSS analysis summary and preliminary instream flow recommendations.

Date of Cross Section	Measured Discharge	Bankfull Top Width	Winter Flow Recommendation	Summer Flow Recommendation
7/14/17	1.15 cfs	4.38 ft	0.84 cfs	0.94 cfs
Proposed ISF Recommendation			0.84 cfs (9/1 until 3/31)	0.94 cfs (4/1 until 8/31)

Photographs

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

Rationale for Instream Flow Water Right

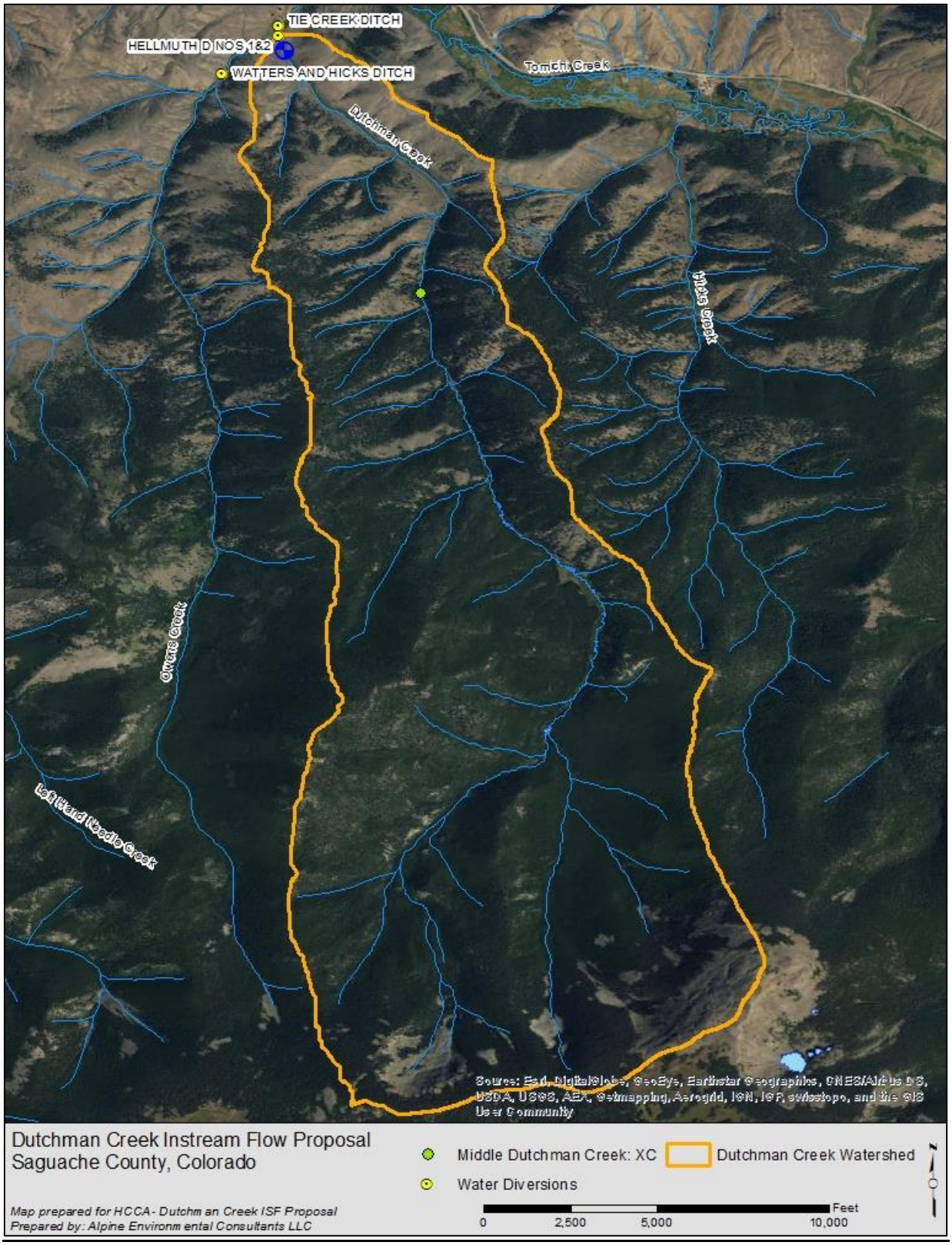
Dutchman Creek has no existing instream flow to protect the creek's natural environment.

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
C – R2CROSS Field Data Sheets
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 Field Data Sheets

Slope 1/2 1' 23.5 / 1/0 2' 32.5

FIELD DATA FOR INSTREAM FLOW DETERMINATIONS

COLORADO WATER CONSERVATION BOARD

COLORADO DIVISION OF WILDLIFE

LOCATION INFORMATION

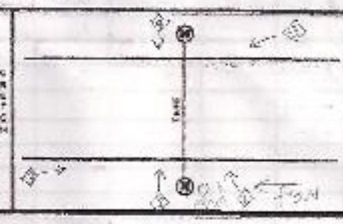
STREAM NAME: Dutchman Creek	CROSS-SECTION NO.:
CROSS-SECTION LOCATION: upper Dutchman creek	
NAD83 38.7515 -106.49802 elev. 9292	
DATE: 9/14/17	OBSERVERS: Bernhardt, Nave
LEGAL DESCRIPTION: ¼ SECTION: SECTION: TOWNSHIP: N/S RANGE: E/W PM:	
COUNTY: Saguache	WATERSHED: Tomichi
WATER DIVISION:	DOW WATER CODE:
MAP(S): USGS:	USFS:

SUPPLEMENTAL DATA

SAG TAPE SECTION SAME AS DISCHARGE SECTION: YES / NO	METER TYPE: Marsh McBirney
METER NUMBER: AEC	DATE RATED: CALIB/SPIN: ___ sec TAPE WEIGHT: ___ lbs/foot TAPE TENSION: ___ lbs
CHANNEL BED MATERIAL SIZE RANGE: gravel, cobble, sand	PHOTOGRAPHS TAKEN: YES/NO NUMBER OF PHOTOGRAPHS:

CHANNEL PROFILE DATA

STATION	DISTANCE FROM TAPE (ft)	ROD READING (ft)
Tape @ Stake LB	0.0	
Tape @ Stake RB	0.0	
① WS @ Tape LB/RB	0.0	5.0
② WS Upstream	10.0	9.8
③ WS Downstream	30	5.0
SLOPE	.94/15.0 = .0063	



AQUATIC SAMPLING SUMMARY

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 (FILL IN)	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

0.97 cfs discharge

We moved to 2016 Dutchman Creek location (~200' downstream of cabin). The channel form changed, the banks have become less stable, due in part to cattle activity in the riparian area. The channel edges are no longer uniform on the river left bank. Soil is caving into the creek. The channel is wider as a result. Velocity was measured at random, velocities ranged from 1.61 to 1.05 ft/s. So, the cross-section will not meet velocity criteria. We saw 3, 4-6" Trout at 2016 location.

D– R2CROSS Analysis

Dutchman Creek Cross Section

Left bank facing downstream at site

Left bank facing cross section

Left bank facing upstream to cross section

Right bank facing cross section

Right bank facing downstream towards assessment site

COLORADO WATER CONSERVATION BOARD
INSTREAM FLOW / NATURAL LAKE LEVEL PROGRAM
STREAM CROSS-SECTION AND FLOW ANALYSIS

LOCATION INFORMATION

STREAM NAME:	Dutchman Creek
XS LOCATION:	Middle Dutchman Creek
XS NUMBER:	#2
DATE:	14-Jul-17
OBSERVERS:	AJB, JN
1/4 SEC:	0
SECTION:	0
TWP:	0
RANGE:	0
PM:	0
COUNTY:	0
WATERSHED:	0
DIVISION:	0
DOW CODE:	0
USGS MAP:	0
USFS MAP:	0

SUPPLEMENTAL DATA

		*** NOTE ***
		Leave TAPE WT and TENSION at defaults for data collected with a survey level and rod
TAPE WT:	0.0106	
TENSION:	99999	

CHANNEL PROFILE DATA

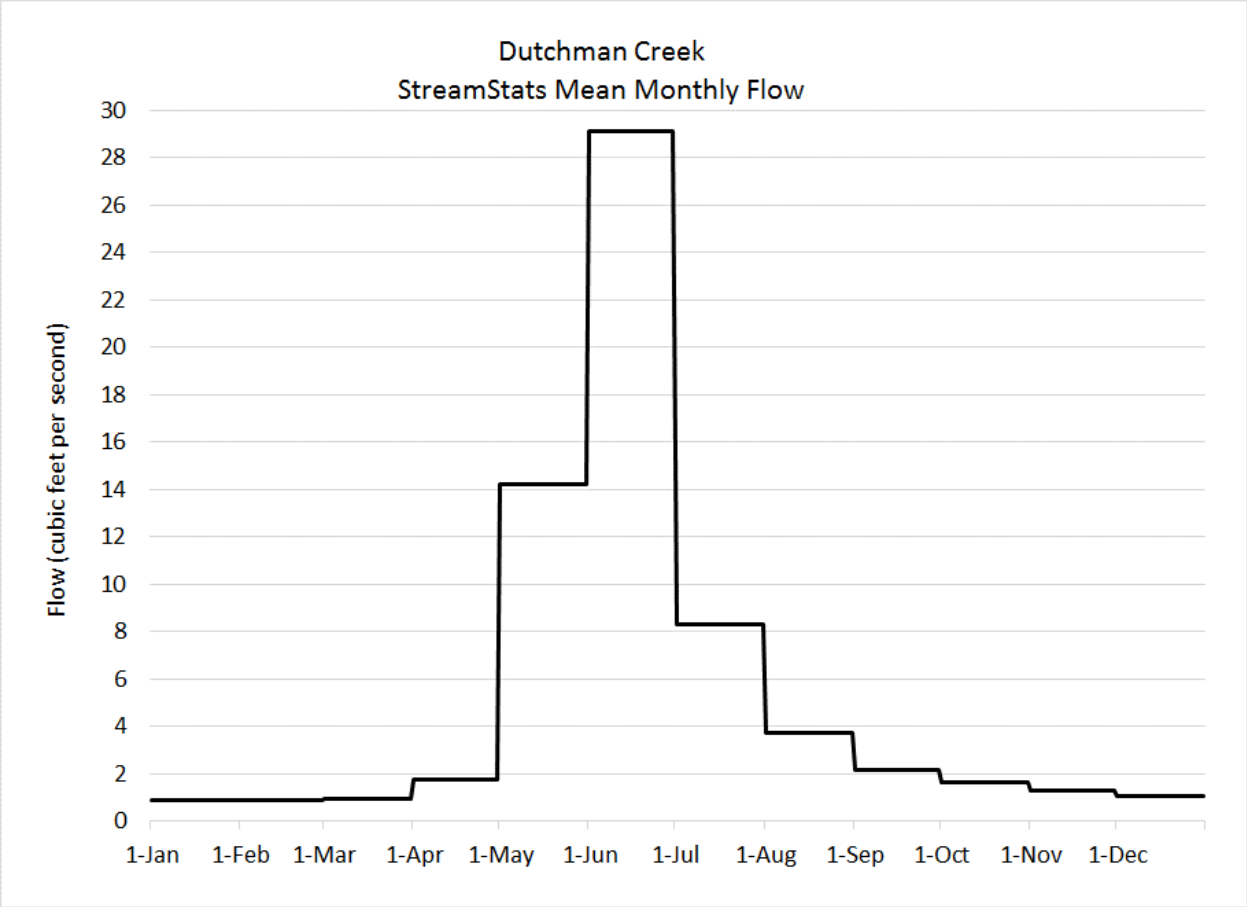
SLOPE:	0.006057

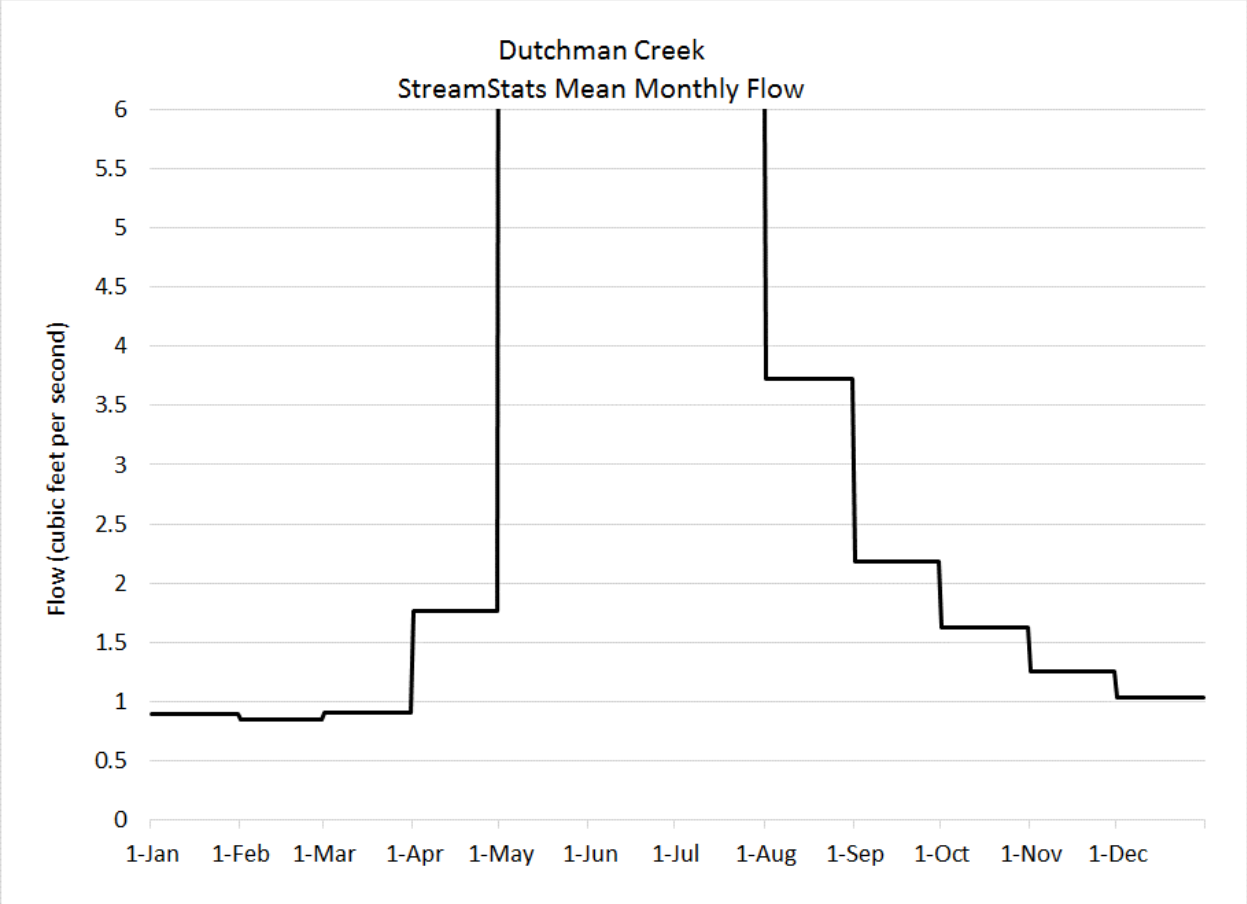
INPUT DATA CHECKED BY: .....DATE.....

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

Attachment D- Water Availability Analysis

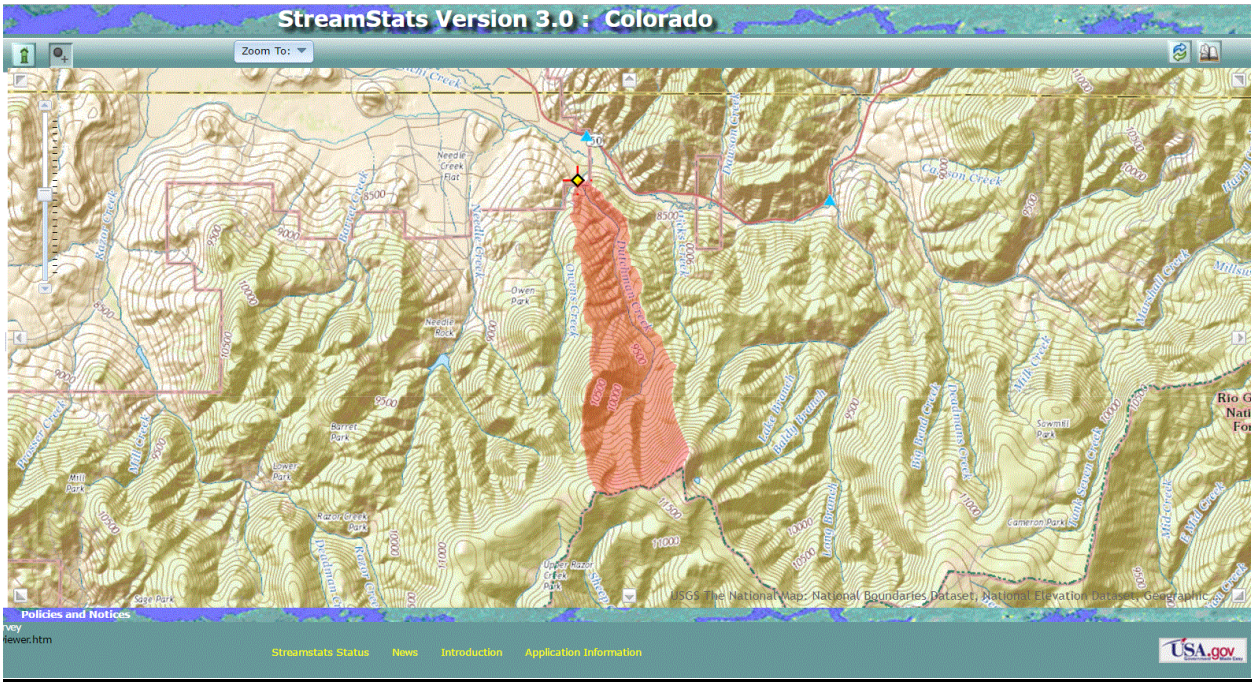
Physical Availability





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			

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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			

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(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			

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(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			

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(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.

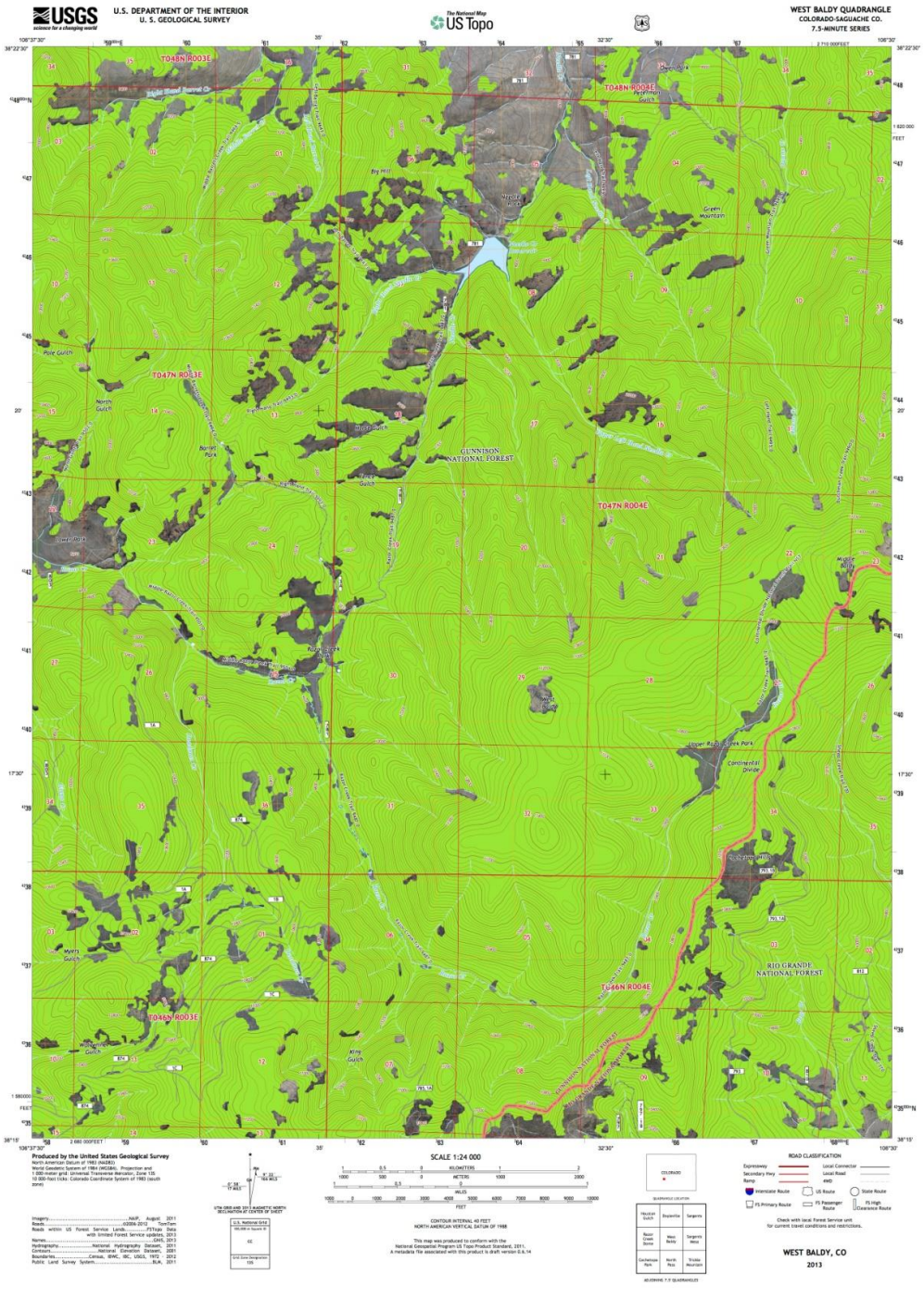
A copy of the water rights search on Dutchman Creek is included below (these ditches refer to Dutchman and Owens as a source but are located off of the proposed instream flow reach).

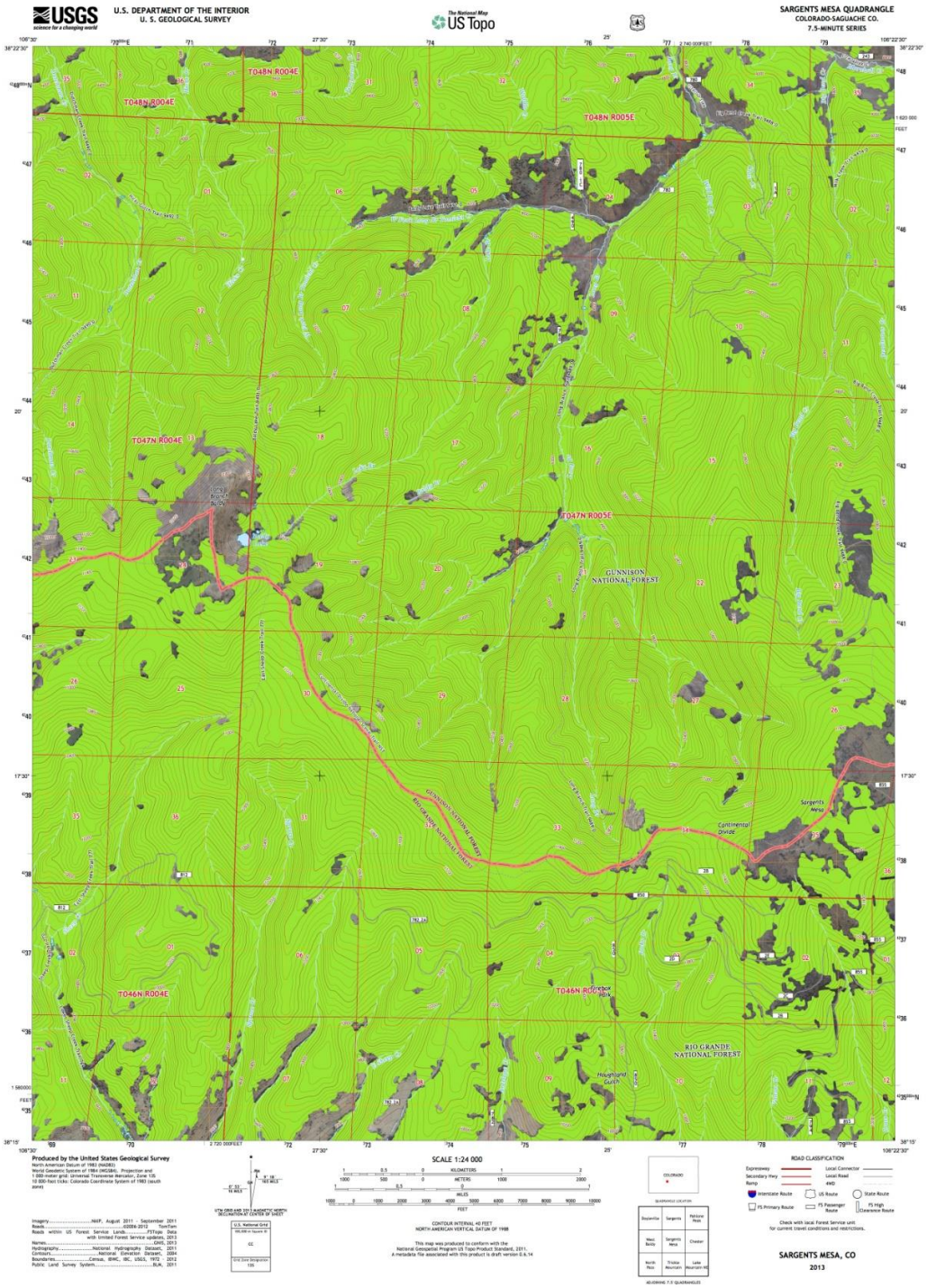
Div	WD	Struc. ID	Struc. Name	Water Source[1]	Stream Mile	Type	Use	Decreed Rate Abs (CFS)	Decreed Rate Total (CFS)	Lat.	Long.
4	28	712	WATTERS AND HICKS DITCH	DUTCHMAN CREEK	0	Ditch	I			38.397077	-106.51448
4	28	962	HELLMUTH D NOS 1&2	DUTCHMAN CREEK	227.38	Ditch	A	1.62	1.62	38.400930	-106.51002
4	28	706	TIE CREEK DITCH	DUTCHMAN CREEK	227.32	Ditch	H			38.400162	-106.51005
4	28	565	GILBERTSON NO 2 DITCH[2]	DUTCHMAN CREEK		Ditch	A		3	38.430490	-106.50705

[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.

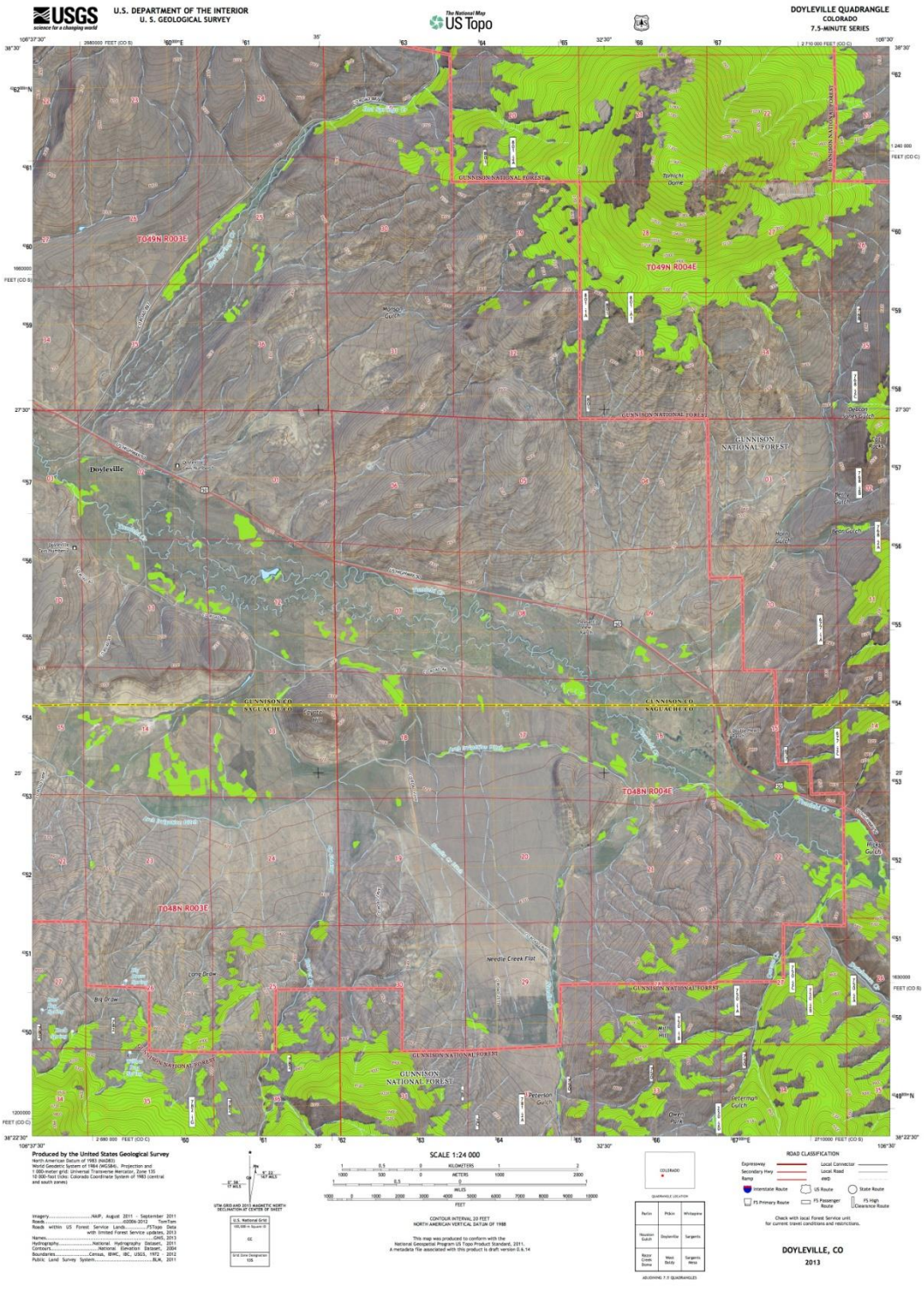
[2] The coordinates for Gilbertson No 2 Ditch in the DWR water rights database are incorrect as they place the ditch on the north side of Tomichi Creek, out of the Dutchman/Owens drainage. The correct coordinates, based upon input from Tom Rozman Water Commissioner, Division 4 District 59 are Latitude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

Attachment E: USGS Topographic Quadrangle Maps




U.S. DEPARTMENT OF THE INTERIOR
U. S. GEOLOGICAL SURVEY
USGS
science for a changing world
The National Map
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
Houghland Gulch
Produced by the United States Geological Survey
SCALE 1:24 000
CONTOUR INTERVAL 40 FEET
NORTH AMERICAN VERTICAL DATUM OF 1988
ROAD CLASSIFICATION
SARGENTS MESA, CO
2013

U.S. DEPARTMENT OF THE INTERIOR
U. S. GEOLOGICAL SURVEY
The National Map
US Topo
SARGENTS QUADRANGLE
COLORADO
7.5-MINUTE SERIES
T049N R004E
T049N R005E
T048N R004E
T048N R005E
Black Sage Pass
Dawson Ridge
Quakey Mountain
Dawson Park
GUNNISON NATIONAL FOREST
GUNNISON CO
SAGUACHE CO
Sargents
Sleepy Mountain
Deadman Gulch
Produced by the United States Geological Survey
SCALE 1:24 000
CONTOUR INTERVAL 40 FEET
NORTH AMERICAN VERTICAL DATUM OF 1988
ROAD CLASSIFICATION
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 R004E
T048N R003E
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

Dear Colorado Water Conservation Board Members,

As citizens of the Upper Gunnison River Basin we support High Country Conservation Advocates recommendation that the Colorado Water Conservation Board appropriate an instream flow on Dutchman Creek, Water Division 4, to preserve the natural environment of Dutchman Creek. The health of this creek is important to the overall well-being of our local ecology and recreation-based economy.

The proposed instream flow will protect a fishery and riparian area that currently does not have an instream flow protection. Colorado state policy states 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..." This instream flow would further this important policy, as our businesses, community, and livelihoods are reliant on a healthy Dutchman Creek.

Thank you for supporting healthy rivers and streams in the Gunnison Basin.

Sincerely,

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Page ___ of ___	State of Colorado	Meas. No: 1
YYYY: 2017	**Colorado Water Conservation Board**	Division: 4
MM-DD: 07-17	MMB Discharge Measurement Notes	District:

Station Name: DUTCHMAN

River, Creek, Canal, Ditch

At, Near, Above, Below Hellmuth 1 or 2

Latitude: UTM 4251378 Longitude: 368146

Party: JR, BL

Conditions

Weather: Partly cloudy

Wind Spd / Dir: light wind Water Temp:

X-Sec Desc: Below diversion, most flow on river right

Flow Conds:

Control Desc.: Run

Measurement Rate: Excelent (2%) / Good (5%) / Fair (8%) / Poor (>8%)

[based on the above conditions]

Gage Reading

Time	Outside	Inside	Encoder	Recorder	Other
Weighted MGH					
GH Corr.					
Correct MGH					

Discharge Measurement

Manufacturer: Marsh-McBirney Model: Flow-Mate S/N:

Firmware:

Equipment Test:

Meas Type: Wading / Boat / Bridge / Cableway Method:

ft. or mi / up or down stream of gage

Start Edge: 4.7	End Edge: 8.1	Total Width:	
Start Time:	End Time:	# Sections:	
Discharge: 0.79	Uncertainty:		
Mean v:	Width	Mean d:	
Max v:	Area:	Max d:	

Remarks: Sand, fines, small pea gravel

Meas. By: Jeff Baessler Notes By: Brandy Logan

Processed By: Brandy Logan Reviewed By:

Date: 7/17/2017 MMB Discharge Measurement Notes Meas. No.: 1

Station Name:

Dist from initial point	Width	Total depth of water	Depth of Obs.	Angle Coef.	Velocity at point	Velocity mean in vertical	Area	Discharge
4.7	WL Left	0	0					
4.9	4.9	0.2	0.2		0.07			
5.1	5.1	0.2			0.10			
5.3	5.3	0.3			0.11			
5.5	"	0.35			0.08			
5.7		0.2			0.15			
5.9		0.3			0.13			
6.1		0.5			0.46			
6.3		0.65			0.41			
6.5		0.6			0.44			
6.7		0.6			0.47			
6.9		0.55			0.83			
7.1		0.5			1.04			
7.3		0.45			1.04			
7.5		0.4			0.89			
7.7		0.5			0.89			
7.9		0.5			0.92			
8.1	WE	0.55			0.11			
WL	4.7							

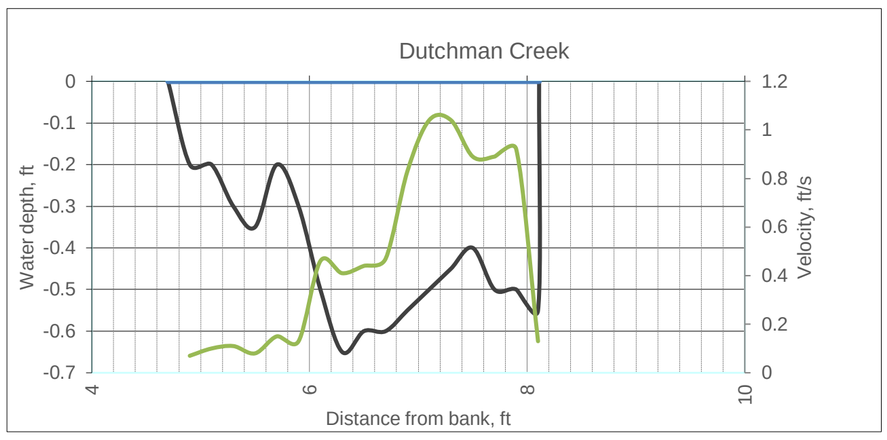
Total W	Sections		Mean V	Total A	Total Q

Remarks: consistent runoff
Start water 1st week of May, Stop irrigating mid-late July
At this location there is always water

Flow Measurement Calculations

Stream: **Dutchman Creek**
Date: 7/17/2017 **Time:** 1:44 PM
Observers: Jeff Baessler, Brandy Logan, Jack Brakawsi
County:
Water Division: 4
Latitude: UTM 367805
Longitude: 4251378
Location Description: Approximately 100 ft downstream from confluence, just below the lower Hellmuth 1 or 2 ditch (Jack did not know which was which)
Comments: warm, partly overcast
Other: Photos taken of stream, measurement location, substrate, headgates

Distance from bank	Width, ft	Depth, ft	Velocity, ft/s	Area, ft2	Discharge, cfs	%
4.7	water line	0				
4.9	0.2	0.2	0.07	0.04	0.0028	0.4%
5.1	0.2	0.2	0.1	0.04	0.004	0.5%
5.3	0.2	0.3	0.11	0.06	0.0066	0.8%
5.5	0.2	0.35	0.08	0.07	0.0056	0.7%
5.7	0.2	0.2	0.15	0.04	0.006	0.8%
5.9	0.2	0.3	0.13	0.06	0.0078	1.0%
6.1	0.2	0.5	0.46	0.1	0.046	5.8%
6.3	0.2	0.65	0.41	0.13	0.0533	6.8%
6.5	0.2	0.6	0.44	0.12	0.0528	6.7%
6.7	0.2	0.6	0.47	0.12	0.0564	7.1%
6.9	0.2	0.55	0.83	0.11	0.0913	11.6%
7.1	0.2	0.5	1.04	0.1	0.104	13.2%
7.3	0.2	0.45	1.04	0.09	0.0936	11.9%
7.5	0.2	0.4	0.89	0.08	0.0712	9.0%
7.7	0.2	0.5	0.89	0.1	0.089	11.3%
7.9	0.2	0.5	0.92	0.1	0.092	11.7%
8.1	0.1	0.55	0.13	0.055	0.00715	0.9%
8.11		0				
				FLOW =	**0.79**	



Graph Data

Bed elevation		Waterline	
4.7	0	4.7	0
4.9	-0.2	8.11	0
5.1	-0.2		
5.3	-0.3		
5.5	-0.35		
5.7	-0.2		
5.9	-0.3		
6.1	-0.5		
6.3	-0.65		
6.5	-0.6		
6.7	-0.6		
6.9	-0.55		
7.1	-0.5		
7.3	-0.45		
7.5	-0.4		
7.7	-0.5		
7.9	-0.5		
8.1	-0.55		
8.11	0		