Stream: North Fork Tabeguache

Executive Summary

Water Division: 4 Water District: 60
HUC 140300030601

Segment: Near Headwaters down to Confluence with Tabeguache Creek

Upper Terminus: Latitude: 38° 27' 32.4"N Longitude: 108° 28' 58.8"W
UTM 196036.839 Easting UTM 4262456.227 Northing
NAD 83 Zone 13N
NE1/4, NE1/4, Sec 2, T48N, R15W, NMPM

Lower Terminus: Latitude: 38° 22' 44.4"N Longitude: 108° 27' 43.2"W
UTM 197554.539 Easting UTM 4253517.811 Northing
NAD 83 Zone 13N
SE1/4, SE1/4, Sec 25, T48N, R15W, NMPM

Counties: Montrose Length: 6.7 miles

USGS Quad(s): Starvation Point

Forest Service Instream Flow Recommendation:

May 1 – September 30 = 2.3 cfs
Oct. 1 – April 30 = 1.7 cfs

Alternative Flow to meet water availability constraints

May 1 – June 30 = 2.3 cfs
July 1 – Aug 14 = 1.4 cfs
Aug 15 – Sept. 30 = .75 cfs
Oct 1 – March 31 = .75 cfs
April 1 – April 30 = 1.4 cfs

North Fork Tabeguache Creek
July 17, 2009
R2X Survey

Summary

The information contained in this report and the associated instream flow file folder forms the basis for staff's instream flow recommendation to be considered by the Board. It is staff's opinion that the information contained in this report is sufficient to support the findings required in Rule 5.40.

Colorado's Instream Flow Program was created in 1973 when the Colorado State Legislature recognized "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 CWCB with the exclusive authority to appropriate and acquire instream flow and natural lake level water rights. In order to encourage other entities to participate in Colorado's Instream Flow Program, the statute directs the CWCB to request instream flow recommendations from other state and federal agencies. The United States Forest Service (USFS) has been interested in protection of instream flows on the North Fork of Tabeguache since the early 1990's when the area was being considered for Wilderness designation. Formal Wilderness designation has not occurred, but the 1993 Colorado Wilderness Act specified that much of the Tabeguache basin was to be managed by the Forest Service to preserve its natural characteristics. The North Fork of Tabeguache Creek is being recommended for protection of instream flows because it has a natural environment that is dependent upon adequate streamflows to preserve both aquatic and riparian ecosystems and should be preserved to a reasonable degree. The USFS is very interested in protecting stream flows in North Fork Tabeguache Creek because it is a free flowing perennial stream which is supporting both aquatic and riparian values on public land. Forest Service investigations

conducted in 1993, 1994 and 2009 have suggested that this is a fully functioning aquatic system that is contributing towards the agency stewardship mission of protecting sustainable ecosystems. This stream provides occupied habitat for both native and non-native species. It provides important refuge during periods of drought and elevated water temperatures. There are currently no withdrawals of water from North Fork Tabeguache Creek. In 2010 an instream flow appropriation was considered by the Board for Tabeguache Creek, beginning at Forty-seven Creek and continuing downstream to the headgate of Templeton ditch. This appropriation has been contested by a landowner and water user located along the stream. The upper terminus of this reach is located 3.5 miles downstream from where the North Fork of Tabeguache Creek joins main Tabeguache.

North Fork of Tabeguache Creek is located entirely on Federal lands administered by the U.S. Forest Service. The drainage is located about midway along the Uncomphagre Plateau approximately 12 miles northeast of Nucla, Colorado. The upper terminus begins in the upper reaches of the basin, at an elevation of approximately 8,680 feet (see attachment 1 map). The stream flows for approximately 6.7 miles before it joins the mainstem of Tabeguache Creek. The total drainage area of the North Fork of Tabeguache Creek is 18.2 square miles.

Biological Flow Recommendation

The CWCB staff relied upon the biological expertise of the cooperating agencies to interpret output from the R2Cross data collected to develop the initial, biologic instream flow recommendation. This initial recommendation is designed to address the unique biologic requirements of each stream without regard to water availability. Three instream flow hydraulic parameters, average depth, percent wetted perimeter, and average velocity are used to develop biologic instream flow recommendations. The CWCB has determined that maintaining these three hydraulic parameters at adequate levels across riffle habitat types, aquatic habitat in pools and runs will also be maintained for most life stages of fish and aquatic invertebrates (Espegren 1996).

Considerable field work has been conducted within the Tabeguache watershed for the purpose of determining in-stream flow protection needs. Field work was first initiated in 1993. Field study sites have been located at key sites along both the mainstem of Tabeguache Creek and the North Fork of Tabeguache Creek. Based upon a recommendation by the Grand Mesa, Uncomphagre and Gunnison National Forest to the CWCB a notice to appropriate was issued in early 2009.

Using the R2Cross program to evaluate protection needs to determine winter and summer flow requirements the average level of protection for those solutions within the range of .4Q to 2.5Q were 1.7 cfs for winter flow and 2.3 cfs for summer flow.

Table 1: Stream flow data and R2Cross outputs from four cross sections located on North Fork Tabeguache Creek

Party	X-sec	Date	Measured Q	40%-250%	2 of 3 criteria	3 of 3 criteria
USFS & CDOW	#3	10/6/1993	.87 cfs	.5 - 3.0 cfs	2.2 cfs	Out of Range
USFS & BLM	#4	6/21/1994	1.2 cfs	.3 – 2.2 cfs	1.65 cfs	Out of Range
USFS	#1	7/17/2009	.95 cfs	.38 – 2.38 cfs	1.5 cfs	2.0 cfs
USFS	#2	7/17/2009	.96 cfs	.38 – 2.4 cfs	1.3 cfs	2.6 cfs

For this segment of stream, four data sets were collected with the results shown in Table 1 above. Table 1 shows who collected the data (Party), the date the data was collected (Date), the measured discharge at the time of the survey (Q), the accuracy range of the predicted flows based on Manning's Equation (250% and 40% of Q), the summer flow recommendation based on meeting 3 of 3 hydraulic criteria and the winter flow recommendation based upon 2 of 3 hydraulic criteria. However, updates to the R2Cross program have the ability to vary Manning's n over a range of flows allowing for more accurate staging tables to be used in the prediction of hydraulic parameters. These changes allow for more accurate hydraulic modeling in periods outside of the typical accuracy range of R2Cross. For this exercise the USFS generated the Thorne-Zevenbergen staging table by supplying a D84 for use in setting Mannings roughness coefficient and also selected the Bathhurst formula for calculation of velocity and discharge in streams with high relative roughness.

While it is unlikely that the Board would agree to a peak flow component for protection, our recommendation would be to have one that is based upon flows that meet or exceed 60% of bank full discharge for a period of at least 5 consecutive days during the period of April 15th thru June 15th. This rule of thumb comes from advice provided by Forest Service researchers who have conducted sediment transport studies in adjustable channels over the last 20 years. Stream systems need periodic high flows in order to accomplish scour and deposition of channel materials and floodplain inundation. This is an important function necessary to sustain the physical environment which in turns supports the biological values that we desire.

Land Status Review

Upper Terminus	Lower Terminus	Total Length (miles)	Land Ownership	
			% Private	% Public
Headwaters	Mainstem Tabeguache Creek	6.7 miles	0%	100%

Biological Data

Fisheries surveys conducted on the North Fork of Tabeguache in 2008 indicate that the stream environment supports self-sustaining populations of rainbow trout. (See Exhibit 3) Low flows are common in the late summer and fall, and may be a limiting factor for fish production and movement during this time. The stream channel provides good pool habitat during summer and winter low flows. Despite these natural flow limitations in the summer and winter seasons, the stream does support a full-functional riparian community, and suitable fish habitat to support the long-term persistence of cold water fish. The North Fork of Tabeguache has been selected as a potential Colorado River cutthroat trout reclamation stream by both the Colorado Division of Wildlife and the U.S. Forest Service. The presence of several large natural barriers makes this stream an ideal location to isolate cutthroat from other salmonids that pose threats of competition or hydridization.

Field Survey Data

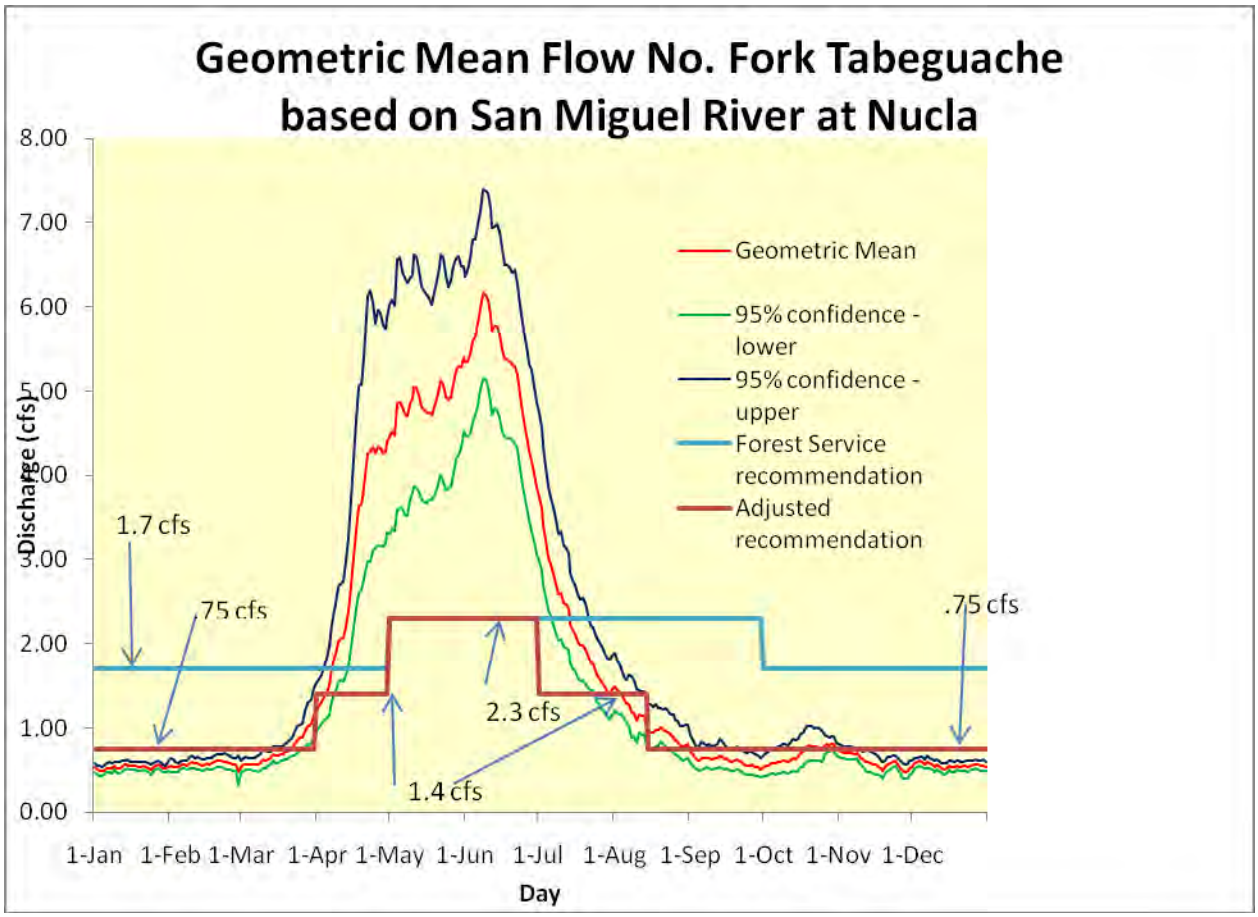
USFS staff used the R2Cross methodology to quantify the amount of water required to preserve the natural environment to a reasonable degree. Surveys were first performed in 1993 and again in 1994. Cross sections were again surveyed July 2009. All data that fell within range of acceptable solutions based upon measured discharge at the time of survey were utilized. A two person crew used a pygmy meter and current meter digitizer to measure cross section velocities in the stream. Channel widths and depths were surveyed with a

stadia rod, engineering level and fiberglass tape. Channel gradients were determined from rod, level and tape survey. The R2Cross method requires that stream discharge and channel profile data be collected in a riffle stream habitat type. Riffles are most easily visualized, as the stream habitat types that would dry up first should stream flow cease. This type of hydraulic data collection consists of surveying the stream channel geometry, determining channel roughness by collecting a representative sample of bed particles, and measuring the stream discharge. Two cross sections were established and surveyed on 7/17/2009. When run through the R2Cross model the 2009 data results were felt to be reasonable and representative of observed flows and channel morphological characteristics. Channel roughness was estimated by measuring 100 channel substrate particles and then calculating the D84 size particle. Mountain streams are difficult to get precise flow measurements, particularly during low flows, due to the highly variable velocity profiles that occur in streams with high roughness and channel complexity. Most likely measured flows under estimate the actual flows in the channel due to the volume of water moving through the channel bed materials.

Hydrologic Data

No stream gaging records exist for North Fork Tabeguache Creek. CWCB staff have developed a model which estimates mean daily flows at the lower terminus of the North Fork of Tabeguache Creek that were derived by extrapolating flow records for the San Miguel River at Nucla based upon a comparison of basin area. Mean daily flow for the North Fork were estimated to be 4.37% of the flow at the gaged site for that same date based upon basin tributary area. While this is a common and reasonable approach, USFS staff believe that it under represents the actual flows in the headwater streams particularly during the base flow period. Antidotal evidence by water resource specialists and managers would support the conclusion that the Uncompahre Plateau tends to be “flashy” with very high peaks and very low baseflows. However, elevation and position within the watershed is not well accounted for and tends to ameliorate these conditions. The streams draining the Plateau are losing systems. The source of water for streams, particularly the baseflow, is the headwaters above 8500 feet where snowpack accumulation occurs and water is stored in the soils beneath forested canopies and contributes to baseflows in the streams. Surface flows tend to diminish at lower elevations as groundwater aquifers are charged. The effect is often during the baseflow periods there is more surface water found in channels higher in the watershed than down lower, where the gaging stations were located. This assertion cannot be substantiated with site specific data and therefore the structure of Forest Service recommendation has been constrained by the physical water availability model provide by the State of Colorado.

The instream flow appropriation and dates were constrained by the physical water availability model. So winter flow recommendations of 1.7 cfs were reduced to .75 cfs. Summer flow recommendations of 2.3 were reduced for a period of time to 1.4 cfs.



Existing Water Right Information

Staff has analyzed the water rights tabulation and consulted with the Division Engineer's Office (DEO) to identify any potential water availability problems. Records indicate that there are no surface water diversions on the North Fork of Tabeguache Creek.

Relationship to Management Plans and Forest Service Policy

The Grand Mesa, Uncompahgre, and Gunnison National Forests (GMUG NF) Land and Resource Management Plan provide land management direction for FS lands located in the North Fork of Tabeguache. Forest Plan direction for Fisheries, Threatened, Endangered, and Sensitive species suggest that land managers should among other things, maintain viable populations of native fish species, improve fish habitat conditions, and cooperate with state agencies to meet minimum flow needs to support fish populations. Additionally, agencies of the Colorado Division of Natural Resources and the Forest Service have signed agreements to assist in the conservation and protection of Colorado River cutthroat trout (CRCT River Cutthroat Trout Task Force 2006), and to work together to solve water issues in Colorado (Colorado DNR/USDA Forest Service MOU on water, 2004).

The North Fork of Tabeguache is one of only a few perennial streams in the semi-arid landscape of the Uncompahgre Plateau. The stream is an important source of water for the lower reaches of Tabeguache Creek, since headwater diversions currently divert a significant source of the summer flows. Access into the North Fork of Tabeguache is very limited, so fishing pressure, and other land management uses are minimal. There is

no motorized use within the canyon feature. As previously mentioned the Forest Service has been directed by Congress to manage these lands to preserve their natural character.

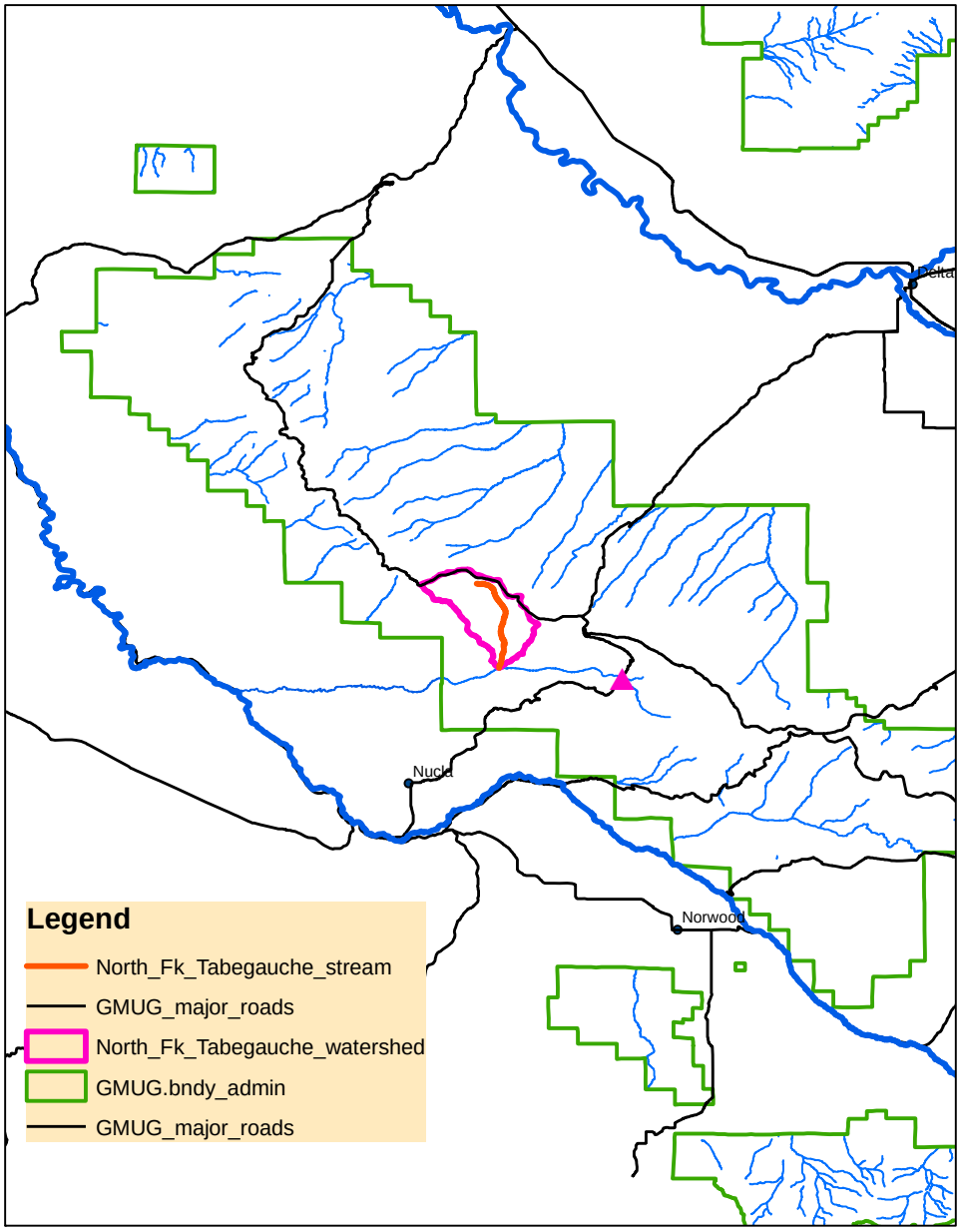
The FS requests that the Board recognize that this recommendation is based only upon the minimum flows necessary to support the cold-water fishery values. In the estimation of many Forest Service land managers and resource specialists the program as it currently exists does not provide sufficient flows throughout the year to insure that flow dependant resource values are sustained in the long term. The failure to incorporate at least a measure of periodic high flow into the protection strategy is a serious drawback. These fluvial systems require flows that are capable of transporting bedload, relocating course wood and providing periodic floodplain inundation. Given this shortcoming it is difficult to achieve a goal of "protecting the environment to a reasonable degree". However, the GMUG NF feels some minimal protection under Colorado water law does have a benefit to the resource and therefore operating within the constraints of the program is a acceptable reality. The agency has Congressional authority, in fact a responsibility under the Federal Land Management and Policy Act (FLPMA), to protect natural resources and the processes which sustain them. To the extent that those processes cannot be protected under state law and authority they must be address by the Federal Land management agency at a time when actions are proposed that might require a determination of effects and conditions imposed felt to be necessary to insure sustainability.

We thank both the Colorado Division of Wildlife and the Water Conservation Board for their cooperation in this effort.

If you have any questions regarding our instream flow recommendation, please contact Clay Speas, Fisheries Biologist, at (970) 874-6650 or Gary Shellhorn, Watershed Program Manager, at (970) 874-6666.

Exhibit 1 – Project Area Maps

Project Area Map



North Fork Tabeguache
ISF Reach

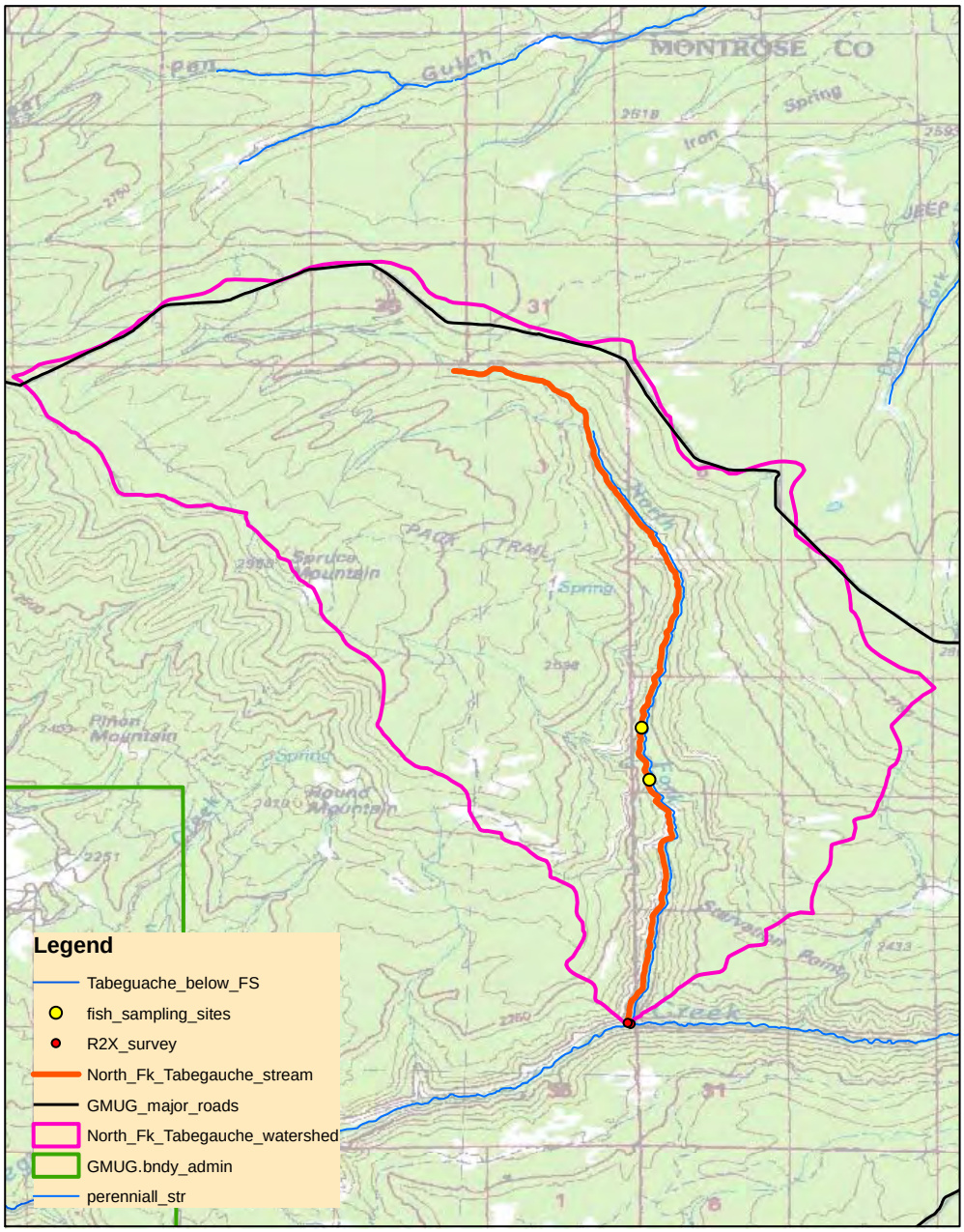


Exhibit 2 – Xsection Staging Tables

	STREAM NAME:		No. Fk Tabegauche										
	XS LOCATION:		45' upstream of confluence									**D84 Table**	
	XS NUMBER:		xs1_2009				Thorne-Zevenbergen D84 Correction Applied					1-HeyD84	0.56
								User Supplied D84 =	0.66			BathurstD84	0.71
			GL = lowest Grassline elevation corrected for sag									3-Best Est	0.71
	STAGING TABLE		*WL* = Waterline corrected for variations in field measured water surface elevations and sag									4-User	0.66
									Bathurst Formula Velocity				
	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)	Bath VELOCITY (FT/SEC)	Hey VELOCITY (FT/SEC)	
GL	3.90	12.02	0.54	1.18	6.52	12.70	100.0%	0.51	15.58	2.39	2.3903236	2.0257428	
	3.92	11.79	0.53	1.16	6.31	12.46	98.1%	0.51	14.77	2.34	2.3421728	1.9867613	
	3.97	11.13	0.52	1.11	5.73	11.79	92.9%	0.49	12.67	2.21	2.2095444	1.8773499	
	4.02	10.47	0.50	1.06	5.19	11.13	87.6%	0.47	10.82	2.08	2.0826067	1.7695689	
	4.07	9.97	0.47	1.01	4.68	10.62	83.6%	0.44	8.93	1.91	1.9058795	1.6329086	
	4.12	9.43	0.45	0.96	4.20	10.06	79.2%	0.42	7.34	1.75	1.7490184	1.5033251	
	4.17	8.59	0.44	0.91	3.75	9.19	72.4%	0.41	6.36	1.70	1.698286	1.4358614	
	4.22	7.75	0.43	0.86	3.34	8.32	65.5%	0.40	5.57	1.67	1.667847	1.3806445	
	4.27	6.92	0.43	0.81	2.97	7.45	58.6%	0.40	4.95	1.67	1.6664759	1.3419853	
	4.32	6.51	0.41	0.76	2.64	7.01	55.2%	0.38	3.99	1.51	1.5116556	1.2135865	
	4.37	6.24	0.37	0.71	2.32	6.72	52.9%	0.35	3.04	1.31	1.3086514	1.0476518	
	4.42	5.76	0.35	0.66	2.02	6.21	48.9%	0.33	2.39	1.18	1.1844905	0.9275492	
	4.47	5.27	0.33	0.61	1.74	5.70	44.9%	0.31	1.87	1.07	1.0711438	0.8117365	
	4.52	4.77	0.31	0.56	1.49	5.18	40.8%	0.29	1.44	0.97	0.965882	0.698737	
WL	4.57	4.47	0.28	0.51	1.26	4.85	38.2%	0.26	1.03	0.82	0.8179045	0.5424394	
	4.62	3.75	0.28	0.46	1.05	4.10	32.3%	0.26	0.83	0.78	0.7843867	0.4875838	
	4.67	3.61	0.24	0.41	0.87	3.93	30.9%	0.22	0.54	0.62	0.6178021	0.2952864	
	4.72	3.48	0.20	0.36	0.69	3.76	29.6%	0.18	0.33	0.47	0.4701991	0.0957169	
	4.77	3.36	0.16	0.31	0.52	3.60	28.4%	0.15	0.18	0.34	0.3426274	-0.110453	
	4.82	3.00	0.12	0.26	0.36	3.19	25.1%	0.11	0.09	0.25	0.2516279	-0.278591	
	4.87	2.14	0.11	0.21	0.24	2.26	17.8%	0.10	0.05	0.20	0.196545	-0.36516	
	4.92	1.67	0.08	0.16	0.14	1.73	13.6%	0.08	0.02	0.13	0.1317766	-0.502707	
	4.97	1.15	0.06	0.11	0.07	1.18	9.3%	0.06	0.01	0.08	0.079026	-0.623232	
	5.02	0.68	0.04	0.06	0.03	0.70	5.5%	0.04	0.00	0.04	0.0359375	-0.731727	
	5.07	0.24	0.01	0.01	0.00	0.24	1.9%	0.01	0.00	0.01	0.0070329	-0.628403	

	STREAM NAME:		No. Fk Tabegauche										
	XS LOCATION:		77' upstream of confluence									D84 Table	
	XS NUMBER:		xs2_2009				Thorne-Zevenbergen D84 Correction Applied					1-HeyD84	0.94
								User Supplied D84 =		0.66		BathurstD84	1.69
			GL = lowest Grassline elevation corrected for sag									3-Best Est	1.69
	STAGING TABLE		*WL* = Waterline corrected for variations in field measured water surface elevations and sag									4-User	0.66
									Bathurst Formula Velocity				
	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)	Bath VELOCITY (FT/SEC)	Hey VELOCITY (FT/SEC)	
GL	4.50	11.72	0.77	1.34	9.00	12.62	100.0%	0.71	42.55	4.73	4.727636	3.1095302	
	4.54	11.61	0.74	1.30	8.58	12.47	98.9%	0.69	37.86	4.41	4.410473	2.9832604	
	4.59	11.45	0.70	1.25	8.01	12.27	97.3%	0.65	31.91	3.99	3.9854219	2.8034196	
	4.64	11.30	0.66	1.20	7.44	12.07	95.7%	0.62	26.64	3.58	3.5818041	2.6194476	
	4.69	11.14	0.62	1.15	6.88	11.87	94.1%	0.58	22.01	3.20	3.1998265	2.4310977	
	4.74	10.99	0.58	1.10	6.32	11.67	92.5%	0.54	17.96	2.84	2.8396856	2.2381033	
	4.79	10.84	0.53	1.05	5.78	11.47	90.9%	0.50	14.46	2.50	2.5015657	2.0401767	
	4.84	10.68	0.49	1.00	5.24	11.27	89.3%	0.47	11.45	2.19	2.1856376	1.8370091	
	4.89	10.53	0.45	0.95	4.71	11.06	87.7%	0.43	8.91	1.89	1.8920585	1.6282716	
	4.94	10.12	0.41	0.90	4.19	10.63	84.3%	0.39	7.05	1.68	1.681255	1.4545089	
	4.99	9.60	0.39	0.85	3.70	10.11	80.1%	0.37	5.56	1.50	1.5039663	1.2942626	
	5.04	9.09	0.36	0.80	3.23	9.58	75.9%	0.34	4.31	1.33	1.3328949	1.1306647	
	5.09	8.57	0.33	0.75	2.79	9.05	71.7%	0.31	3.26	1.17	1.1683791	0.9633787	
WL	5.14	7.19	0.33	0.70	2.39	7.66	60.7%	0.31	2.83	1.18	1.1824271	0.9503253	
	5.19	5.88	0.35	0.65	2.07	6.35	50.3%	0.33	2.60	1.26	1.2589108	0.9797258	
	5.24	4.91	0.37	0.60	1.80	5.37	42.5%	0.34	2.40	1.33	1.3279036	0.9911394	
	5.29	4.55	0.34	0.55	1.57	4.98	39.5%	0.31	1.86	1.18	1.1834973	0.8546311	
	5.34	4.28	0.32	0.50	1.35	4.67	37.0%	0.29	1.37	1.02	1.0178077	0.6944048	
	5.39	4.00	0.29	0.45	1.14	4.36	34.6%	0.26	0.98	0.86	0.8617578	0.5297536	
	5.44	3.76	0.25	0.40	0.95	4.09	32.4%	0.23	0.67	0.71	0.707174	0.3510883	
	5.49	3.60	0.21	0.35	0.76	3.89	30.8%	0.20	0.42	0.55	0.5496799	0.1463713	
	5.54	3.44	0.17	0.30	0.59	3.68	29.2%	0.16	0.24	0.41	0.4114228	-0.064502	
	5.59	3.28	0.13	0.25	0.42	3.48	27.6%	0.12	0.12	0.29	0.2938026	-0.278297	
	5.64	2.77	0.09	0.20	0.26	2.93	23.3%	0.09	0.05	0.20	0.2030683	-0.451988	
	5.69	2.25	0.06	0.15	0.14	2.38	18.9%	0.06	0.02	0.13	0.1326698	-0.598683	
	5.74	1.53	0.03	0.10	0.04	1.62	12.8%	0.02	0.00	0.07	0.0707384	-0.678984	
	5.79	0.19	0.03	0.05	0.01	0.23	1.8%	0.02	0.00	0.01	0.005541	-0.751036	
	5.84	0.01	0.00	0.00	0.00	0.02	0.1%	0.00	0.00	0.00	3.226E-05	-0.483014	

	STREAM NAME:		North Fk Tabeguache							
	XS LOCATION:		Just above confluence with Tabegauche							
	XS NUMBER:		xs3_1993				Thorne-Zevenbergen D84 Correction Applied			
								User Supplied D84 =		0.66
			GL = lowest Grassline elevation corrected for sag							
	STAGING TABLE		*WL* = Waterline corrected for variations in field measured water surface elevations and sag							
									Bathurst Formula Velocity	
	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	3.40	16.50	1.54	2.80	25.42	18.11	100.0%	1.40	80.07	3.15
	3.99	13.79	1.20	2.21	16.48	15.14	83.6%	1.09	31.34	1.90
	4.04	13.56	1.16	2.16	15.79	14.89	82.2%	1.06	28.56	1.81
	4.09	13.33	1.13	2.11	15.12	14.64	80.8%	1.03	25.95	1.72
	4.14	13.10	1.10	2.06	14.46	14.39	79.5%	1.00	23.52	1.63
	4.19	12.87	1.07	2.01	13.81	14.14	78.1%	0.98	21.25	1.54
	4.24	12.64	1.04	1.96	13.17	13.89	76.7%	0.95	19.14	1.45
	4.29	12.41	1.01	1.91	12.55	13.63	75.3%	0.92	17.17	1.37
	4.34	12.21	0.98	1.86	11.93	13.41	74.1%	0.89	15.26	1.28
	4.39	12.02	0.94	1.81	11.33	13.20	72.9%	0.86	13.48	1.19
	4.44	11.83	0.91	1.76	10.73	12.98	71.7%	0.83	11.85	1.10
	4.49	11.64	0.87	1.71	10.14	12.77	70.5%	0.79	10.37	1.02
	4.54	11.12	0.86	1.66	9.57	12.23	67.5%	0.78	9.65	1.01
	4.59	10.52	0.86	1.61	9.03	11.61	64.1%	0.78	9.17	1.01
	4.64	10.28	0.83	1.56	8.51	11.35	62.7%	0.75	8.07	0.95
	4.69	10.13	0.79	1.51	8.00	11.17	61.7%	0.72	6.92	0.87
	4.74	9.98	0.75	1.46	7.50	10.98	60.6%	0.68	5.90	0.79
	4.79	9.83	0.71	1.41	7.01	10.80	59.6%	0.65	4.98	0.71
	4.84	9.68	0.67	1.36	6.52	10.62	58.6%	0.61	4.17	0.64
	4.89	9.53	0.63	1.31	6.04	10.44	57.6%	0.58	3.45	0.57
	4.94	9.38	0.59	1.26	5.57	10.25	56.6%	0.54	2.83	0.51
WL	4.99	9.23	0.55	1.21	5.10	10.07	55.6%	0.51	2.28	0.45
	5.04	8.31	0.56	1.16	4.66	9.14	50.5%	0.51	2.15	0.46
	5.09	7.21	0.59	1.11	4.27	8.04	44.4%	0.53	2.20	0.51
	5.14	6.77	0.58	1.06	3.92	7.57	41.8%	0.52	1.95	0.50
	5.19	6.47	0.55	1.01	3.59	7.25	40.0%	0.50	1.65	0.46
	5.24	6.18	0.53	0.96	3.28	6.93	38.2%	0.47	1.38	0.42
	5.29	5.89	0.50	0.91	2.97	6.61	36.5%	0.45	1.15	0.39
	5.34	5.70	0.47	0.86	2.68	6.38	35.2%	0.42	0.91	0.34
	5.39	5.53	0.43	0.81	2.40	6.18	34.1%	0.39	0.71	0.29
	5.44	5.37	0.40	0.76	2.13	5.98	33.0%	0.36	0.54	0.25
	5.49	5.20	0.36	0.71	1.87	5.78	31.9%	0.32	0.40	0.21
	5.54	4.43	0.37	0.66	1.63	4.99	27.5%	0.33	0.36	0.22
	5.59	4.14	0.34	0.61	1.42	4.67	25.8%	0.30	0.27	0.19
	5.64	3.98	0.31	0.56	1.22	4.47	24.7%	0.27	0.19	0.16
	5.69	3.86	0.26	0.51	1.02	4.31	23.8%	0.24	0.13	0.13
	5.74	3.57	0.23	0.46	0.83	4.00	22.1%	0.21	0.09	0.10
	5.79	3.23	0.21	0.41	0.66	3.64	20.1%	0.18	0.05	0.08
	5.84	2.90	0.18	0.36	0.51	3.26	18.0%	0.16	0.03	0.06
	5.89	2.57	0.15	0.31	0.37	2.87	15.9%	0.13	0.02	0.05
	5.94	2.23	0.11	0.26	0.25	2.48	13.7%	0.10	0.01	0.03
	5.99	1.90	0.08	0.21	0.15	2.10	11.6%	0.07	0.00	0.02
	6.04	1.26	0.06	0.16	0.07	1.39	7.7%	0.05	0.00	0.01
	6.09	0.56	0.05	0.11	0.03	0.62	3.4%	0.04	0.00	0.01
	6.14	0.25	0.03	0.06	0.01	0.28	1.5%	0.03	0.00	0.00
	6.19	0.04	0.00	0.01	0.00	0.05	0.3%	0.00	0.00	0.00

	STREAM NAME:		No. Fk Tabegauche							
	XS LOCATION:		Indian Trail Crossing 2 miles above confluence							
	XS NUMBER:		xs4_1994				Thorne-Zevenbergen D84 Correction Applied			
								User Supplied D84 =		0.66
			GL = lowest Grassline elevation corrected for sag							
	STAGING TABLE		*WL* = Waterline corrected for variations in field measured water surface elevations and sag							
								Velocity based on test of R/D84>1		
	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	2.25	27.22	1.64	2.35	44.71	29.16	100.0%	1.53	208.21	4.66
	3.01	22.87	1.12	1.59	25.69	24.54	84.2%	1.05	81.03	3.15
	3.06	22.60	1.09	1.54	24.91	24.25	83.2%	1.01	74.72	3.04
	[illegible]	[illegible].33	1.05	1.49	24.19	23.97	82.2%	0.98	68.67	2.93
	[illegible]	[illegible].06	1.01	1.44	22.32	23.68	81.2%	0.94	62.87	2.82
	3.21	21.79	0.97	1.39	21.23	23.39	80.2%	0.91	57.32	2.70
	3.26	21.52	0.94	1.34	20.14	23.10	79.2%	0.87	52.03	2.58
	3.31	21.25	0.90	1.29	19.08	22.82	78.2%	0.84	46.98	2.46
	3.36	20.99	0.86	1.24	18.02	22.53	77.3%	0.80	42.19	2.34
	3.41	20.72	0.82	1.19	16.98	22.25	76.3%	0.76	37.65	2.22
	3.46	20.47	0.78	1.14	15.95	21.97	75.4%	0.73	33.34	2.09
	3.51	20.21	0.74	1.09	14.93	21.70	74.4%	0.69	29.28	1.96
	3.56	19.96	0.70	1.04	13.93	21.43	73.5%	0.65	32.31	2.32
	3.61	19.71	0.66	0.99	12.93	21.16	72.6%	0.61	27.18	2.10
	3.66	19.47	0.61	0.94	11.96	20.89	71.7%	0.57	22.61	1.89
	3.71	19.28	0.57	0.89	10.99	20.68	70.9%	0.53	18.52	1.69
	3.76	19.09	0.53	0.84	10.03	20.46	70.2%	0.49	14.98	1.49
	3.81	18.90	0.48	0.79	9.08	20.24	69.4%	0.45	11.94	1.32
	3.86	18.71	0.43	0.74	8.14	20.02	68.7%	0.41	9.36	1.15
	3.91	18.52	0.39	0.69	7.21	19.81	67.9%	0.36	7.19	1.00
	3.96	18.24	0.34	0.64	6.29	19.48	66.8%	0.32	5.44	0.87
WL	4.01	17.54	0.31	0.59	5.39	18.69	64.1%	0.29	4.11	0.76
	4.06	16.56	0.27	0.54	4.54	17.60	60.4%	0.26	3.06	0.68
	4.11	15.12	0.25	0.49	3.74	16.04	55.0%	0.23	2.27	0.61
	4.16	13.69	0.22	0.44	3.02	14.49	49.7%	0.21	1.62	0.54
	4.21	12.27	0.19	0.39	2.37	12.96	44.4%	0.18	1.11	0.47
	4.26	10.85	0.17	0.34	1.80	11.42	39.2%	0.16	0.72	0.40
	4.31	9.38	0.14	0.29	1.29	9.83	33.7%	0.13	0.43	0.34
	4.36	7.82	0.11	0.24	0.86	8.16	28.0%	0.11	0.23	0.27
	4.41	5.99	0.09	0.19	0.51	6.21	21.3%	0.08	0.11	0.21
	4.46	2.64	0.10	0.14	0.27	2.77	9.5%	0.10	0.04	0.15
	4.51	2.38	0.06	0.09	0.15	2.46	8.4%	0.06	0.01	0.10
	4.56	1.81	0.02	0.04	0.04	1.84	6.3%	0.02	0.00	0.06

Staging Table Options

Home

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Exhibit 3 – Fish Survey Data

North Fork Tabeguache Creek

Date: July 29/30, 2008
County: Montrose
State: Colorado
Forest: GMUG NF, Norwood Ranger District
Drainage: North Fork Tabeguache Creek/Tabeguache Creek/San Miguel River/Dolores River.

Reach 1:
Location: One pool downstream of Indian Trail (FST 500) crossing.
Time: 1000 hours
Water Temperature: 13c
Air Temperature: 22c

This reach of the drainage is low to intermediate gradient with some degree of sinuosity. The riparian vegetation is dominated by willows and to a lesser degree cottonwoods and spruce/fir. The vegetation in the canyon shifts from spruce/fir and aspen close to the stream to oak scrub and pine up higher. There was little to no sign of cattle grazing.

There are sections of lower gradient composed of riffles that transition to long pools. Some of the deeper pools occur at slight bends with undercut bank/overhanging willow cover. There are also short step pool sections that provide fish habitat. There was a little cover and pool habitat provided by coarse woody debris. Substrate is mainly comprised of boulders and cobbles. There was also gravel through the reach with some of appropriate size for spawning as well as some finer substrate. There is a short stretch in the reach with a slumping bank that has deposited a large amount of sand and gravel over the streambed.

RBT were the only fish species in the sample. There is no evidence from observation of individual fish that there is any CRN hybridization so no fin clips were taken. There were adult fish across multiple age classes. No YOY were represented in the sample but such fish were observed in the reach.

Reach 1:
Location: Approximately ½ mile upstream from Indian Trail (FST 500) crossing.
Time: 1300 hours
Water Temperature: 17c
Air Temperature: 29c

This reach is higher gradient than downstream and is dominated by step pools with low sinuosity overall. The willows along the stream are denser than downstream. The upland vegetation is largely comprised of spruce/fir.

The streambed is dominated by bedrock and boulder substrate throughout this reach forming large step pool complexes. The density and quality of pools in this reach was higher than downstream. Some of the deeper pools had depths of 3-5 ft that created challenges to electro fishing. There are large downed trees in the channel at several places that contribute to pool formation or enhance cover of existing pools. There is finer substrate of sands and silts in some of the larger pools. There seemed to be less gravel throughout this reach than downstream.

Again RBT were the only species captured in the reach and there was no evidence of hybridization with CRN. All fish captured were adults over a variety of age classes. There was very few YOY size fish observed while sampling.

Water: North Fork Tabeguache
Date: 7/30/2008
Location: Indian Trail (FST#500) Crossing, 1 pool downstream of trail crossing
Drainage: San Miguel
Water
Code:43492
UTM Zone: 12S
UTM X:
0721820
UTM Y:
4254208
Station Length = 201.5 ft
Station Width = 11.36 ft
Crew: Adams, Much, Olson
Notes: Water Temperature: 13c; Air Temperature: 22c; Pass 1 Effort: 938sec; Pass 2 Effort: 836sec; No hybridization with CRN a

Species	Count	Length (mm)	Weight (g)	Status	Mark	TagID
RBT	1	147	31	1		
RBT	1	111	14	1		
RBT	1	109	14	1		
RBT	1	80	5	1		
RBT	1	103	11	1		
RBT	1	197	90	1		
RBT	1	110	13	1		
RBT	1	109	9	1		
RBT	1	116	15	1		
RBT	1	170	48	1		
RBT	1	141	29	1		
RBT	1	178	52	1		
RBT	1	153	35	1		
RBT	1	138	30	1		
RBT	1	129	24	1		
RBT	1	111	14	1		
RBT	1	110	14	1		
RBT	1	90	8	1		
RBT	1	106	11	1		
RBT	1	207	86	1		
RBT	1	222	100	1		
RBT	1	215	83	1		
RBT	1	111	15	1		
RBT	1	118	19	1		
RBT	1	207	75	1		
RBT	1	163	47	1		
RBT	1	144	31	1		
RBT	1	223	116	1		
RBT	1	152	35	1		
RBT	1	168	42	1		
RBT	1	224	84	1		
RBT	1	151	33	1		

RBT	1	177	53	1
RBT	1	82	6	1
RBT	1	146	35	1
RBT	1	205	80	1
RBT	1	156	41	1
RBT	1	135	35	1
RBT	1	198	69	1
RBT	1	147	33	1
RBT	1	134	26	1
RBT	1	149	34	1
RBT	1	97	10	1
RBT	1	200	82	1
RBT	1	131	24	1
RBT	1	79	6	1
RBT	1	145	31	1
RBT	1	126	23	1
RBT	1	95	10	1
RBT	1	109	14	1
RBT	1	112	14	1
RBT	1	140	27	1
RBT	1	96	10	1
RBT	1	108	14	1
RBT	1	107	11	1
RBT	1	203	95	2
RBT	1	181	73	2
RBT	1	191	70	2
RBT	1	108	16	2
RBT	1	105	14	2
RBT	1	89	8	2
RBT	1	100	11	2

COLORADO WATER CONSERVATION BOARD

FIELD DATA FOR INSTREAM FLOW DETERMINATIONS

COLORADO DIVISION OF WILDLIFE

LOCATION INFORMATION

STREAM NAME: North Fork Tabeguache Ck					CROSS-SECTION NO.: #1
CROSS-SECTION LOCATION: 15 ft above confluence w/ Main Stem Tabeguache					
DATE: 7/17/09	OBSERVERS: King, Spear, Shatto				
LEGAL DESCRIPTION	¼ SECTION:	SECTION	TOWNSHIP: N/S	RANGE: E/W	PM:
COUNTY:	WATERSHED	WATER DIVISION:	DOW WATER CODE:		
MAP(S) USGS:					
USFS:					

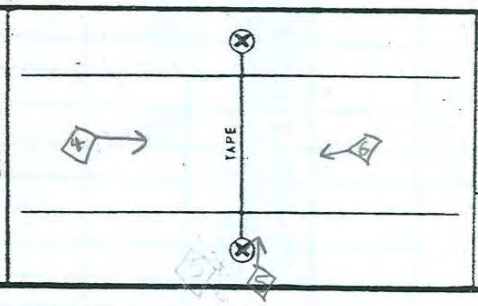
SUPPLEMENTAL DATA

SAG TAPE SECTION SAME AS DISCHARGE SECTION: YES / NO	METER TYPE: Pygmy			
METER NUMBER.	DATE RATED.	CALIB/SPIN _____ sec	TAPE WEIGHT _____ lbs/1001	TAPE TENSION _____ lbs
CHANNEL BED MATERIAL SIZE RANGE		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	
② WS Upstream	87'	2.20
③ WS Downstream	36'	6.02
SLOPE	.123	

SKETCH



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

Water 59° F @ 1140

Speckled dace but no RBT observed. Macroinvertebrates include caddis, mayflies, stoneflies and plecoptera (stone flies). Mayfly's less abundant than in Main Tabeguache Creek. Adequate spawning gravels which are probably used during Spring Spawning.

FORM #ISF FD 1-85

DISCHARGE/CROSS SECTION NOTES

STREAM NAME	CROSS-SECTION NO	DATE	SHEET ___ OF ___
N. Fk Tahoganch	#1	7/17/09	

BEGINNING OF MEASUREMENT	EDGE OF WATER LOOKING DOWNSTREAM (0.0 AT STAKE)	LEFT / RIGHT	Gage Reading. ___ ft	TIME 1115 – 11:45

Features: Stake (S) Grassline (G) Waterline (W) Rock (R)	Distance From Initial Point (ft)	Width (ft)	Total Vertical Depth From Tape/Inst (ft)	Water Depth (ft)	Depth of Observation (ft)	Revolutions	Time (sec)	Velocity (ft/sec) At Point	Velocity (ft/sec) Mean in Vertical	Area (ft^2)	Discharge (cfs)
LS	-1		2.97								
	0.5		3.43								
LBF	2.0		3.89								
	3.0		4.02	[illegible]					[illegible]		
	4.5		4.37								
LEW	6.0		4.54								
	6.3		4.70	0.22					1.005		
	6.6		4.90	0.3					0.79		
	7.0		4.94	0.32					0.767		
	7.3		5.06	0.45					1.033		
	7.6		5.08	0.45					0.669		
	8.0		4.99	0.4					0.887		
	8.3		4.96	0.38					0.940		
	8.6		4.77	0.2					0.698		0.68
	8.9		4.86	0.3					0.696		
	9.3		4.82	0.3					0.241		
	9.6		4.94	0.4					0.217		
	9.9		4.91	0.1					0		
REW	10.5		4.59								
	11.0		4.11								
	12.0		4.04								
	13.0		4.28								
RBF	14.1		3.9								
	15		2.79								
	18		2.57								
TOTALS											

End of Measurement	Time:	Gage Reading None ft	CALCULATIONS PERFORMED BY:	CALCULATIONS CHECKED BY:

6.02 2.20

COLORADO WATER CONSERVATION BOARD

FIELD DATA FOR INSTREAM FLOW DETERMINATIONS

COLORADO DIVISION OF WILDLIFE

LOCATION INFORMATION

STREAM NAME: N. Fk Taheguach					CROSS-SECTION NO.: #2
CROSS-SECTION LOCATION: 32 ft above upstream XS1 (77' above confluence w/ main Taheguach)					
DATE: 7/17/05	OBSERVERS: Alway, Spears, Stanton				
LEGAL DESCRIPTION	¼ SECTION:	SECTION	TOWNSHIP N/S	RANGE: E/W	PM:
COUNTY:	WATERSHED	WATER DIVISION:	DOW WATER CODE:		
MAP(S) USGS:					
USFS:					

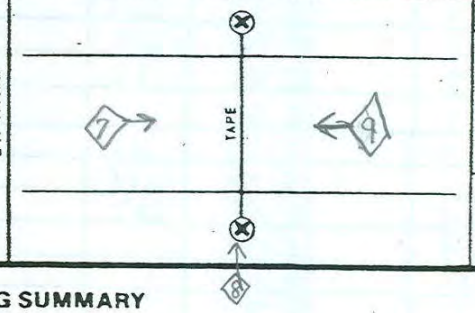
SUPPLEMENTAL DATA

SAG TAPE SECTION SAME AS DISCHARGE SECTION: YES / NO	METER TYPE: Pygmy			
METER NUMBER:	DATE RATED:	CALIB/SPIN _____ sec	TAPE WEIGHT _____ lbs/1001	TAPE TENSION _____ lbs
CHANNEL BED MATERIAL SIZE RANGE: Large ground 20%; Cobble 40%, Lg. boulder 40% – Substrate w/ more large cobble/less boulder than on 7/6 surveys	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	
② WS Upstream	87'	2.20
③ WS Downstream	36'	6.82
SLOPE		

SKETCH



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

Water Temp – 59°F

FORM #ISF FD 1-85

DISCHARGE/CROSS SECTION NOTES

STREAM NAME	CROSS-SECTION NO	DATE	SHEET ___ OF ___
No. Tahquamenon Creek		7/17/09	

BEGINNING OF MEASUREMENT	EDGE OF WATER LOOKING DOWNSTREAM (0.0 AT STAKE)	LEFT / RIGHT	Gage Reading. ____ ft	TIME 11:55

Features: Stake (S) Grassline (G) Waterline (W) Rock (R)	Distance From Initial Point (ft)	Width (ft)	Total Vertical Depth From Tape/Inst (ft)	Water Depth (ft)	Depth of Observation (ft)	Revolutions	Time (sec)	Velocity (ft/sec) At Point	Velocity (ft/sec) Mean in Vertical	Area (ft^2)	Discharge (cfs)
LG	-0.5		3.60								
G	0.3		3.84								
	1.2		4.47								
	2.5		4.93								
LEW	3.0		5.10								
	4.0		5.16	.03				Ø			
	4.6		5.28	.17				Ø			
	5.3		5.42	.3				Ø.246			
	5.6		5.53	.38				Ø.207			
	5.9		5.64	.40				Ø.256			
	6.2		5.63	.45				Ø.316			
	6.5		5.64	.42				Ø.305			
	6.8		5.54	.50				Ø.601			
	7.1		5.72	.58				Ø.652			
	7.4		5.73	.50				Ø.344			
	7.7		5.62	.62				Ø.367			
	8.0		5.75	.65				Ø.396			
	8.3		5.76	.65				Ø.260			
	8.6		5.74	.62				Ø.530			
	8.9		5.84	.65				Ø.487			
	9.2		5.80	.15				Ø.966			
	9.5		5.64	.10				Ø.459			
	9.8		5.76	.10				0.30			
	10.1		5.19	.09				Ø			
	10.9		5.18								
REW	11.5		5.09								
	12.9		4.9								
G	13.0		4.5								
RG	14.0		3.76								
TOTALS											

End of Measurement	Time:	Gage Reading ____ ft	CALCULATIONS PERFORMED BY:	CALCULATIONS CHECKED BY:

Draft February 24, 2009

Ms. Linda Bassi
Colorado Water Conservation Board
1313 Sherman Street, Room 721
Denver, Colorado 80203

Dear Ms. Bassi:

The USDA Forest Service (FS) is writing this letter to formally communicate its instream flow recommendation for North Fork (NF) Tabeguache Creek, located in Water Division 4.

Location and Land Status. The FS is recommending stream flow protection under the CWCB Stream and Lake Protection program for 9 miles of NF Tabeguache Creek starting at the headwaters and terminating at the confluence with Tabeguache Creek. NF Tabeguache Creek is a tributary to Tabeguache Creek, located approximately 15 miles northeast of Nucla, in Montrose County. The stream reach covered by the surveys encompasses the entire NF Tabeguache Creek watershed. The proposed reach is entirely located on NFS lands.

Biological Summary. Fisheries surveys in the watershed indicate that the stream environment supports self-sustaining populations of rainbow trout. Population estimates for rainbow trout were 701 fish/mile in August 2007. NF Tabeguache Creek has been selected as a potential Colorado River cutthroat trout (CRCT) reclamation stream by the CDOW and FS.

Low flows create later summer and winter fish habitat constraints, and may be a limiting factor for fish production and movement during this time. The stream channel provides good pool habitat during summer and winter low flows. Low flows also limit aquatic insect production during this low period as well. Despite these natural flow limitations in the late summer and winter seasons, the stream does support a full-functional riparian community, and suitable fish habitat to support the long-term persistence of rainbow trout.

R2Cross Analysis. Two cross sections were collected on NF Tabeguache Creek in October 1993 and used to quantify instream flow protection using R2Cross procedures outlined by the Colorado Water Conservation Board (CWCB 1996). However, R2Cross failed to provide suitable staging tables from any of the cross sections. Therefore, summer flow recommendations could not be derived using the R2Cross staging tables. One cross section was used to derive a winter flow recommendation for NF Tabeguache Creek. Based FS professional knowledge of the site, the summer flow recommendation was based on the use of Tennant method (1976). The FS chose a narrative flow category of "fair or degrading" as described by Tennant (1976). The FS believes that in the case of NF Tabeguache Creek, that the use of Tennant provides a more accurate instream flow recommendation than R2Cross. Therefore, based on the combination of Tennant method and R2Cross, the data indicates that the following flows are needed to preserve the fishery and natural environment to a reasonable degree.

- A minimum flow of 3.3 cubic feet per second (cfs) is recommended from April 1st to July 31st. 3.3 cfs was derived using the Tennant method (1976) for the category of "fair or degrading" as describe by Tennant. This category protects 30% of the mean annual flow during spring and summer flow regimes. Instream flow protection during

the receding period of the hydrograph during the months of June and July are important for the protection and maintenance of flows during the spawning and incubation periods for rainbow trout, and potentially a future population of CRCT. The FS believes that this level of protection is needed in order to "preserve the native fishery and natural environment to a reasonable degree."

- A minimum flow of 1.0 cfs is recommended from August 1st to March 31st. 1.0 cfs is based on R2Cross outputs required to maintain the two of the three principal hydraulic criteria of average depth, average velocity and percent wetted perimeter. Based on the FS observations of this stream during base flow periods, the protection of flows below 1.0 cfs is needed to protect existing fish habitat, fish migration, and juvenile rearing periods for rainbow and future cutthroat trout. Water use and development during low flow periods would have severe detrimental effects on adult recruitment, summer and fall distribution and migration patterns, and aquatic food abundance in a stream system where these fisheries habitat and food requirements are already strained by naturally occurring low flows.

Water Availability

In the absence of gage data from NF Tabeguache Creek, a hydrograph was constructed using a natural flow estimation model developed by Kircher et al (1985). The southwest regional equation was used to predict annual water yield and mean annual discharge for the basin area of the NF Tabeguache Creek watershed. A review of USGS Tabeguache Creek gage (1946-53) was used to develop monthly streamflow characteristics for NF Tabeguache Creek. Monthly water yield estimates were eventually converted to mean monthly discharge numbers to construct an annual hydrograph (Table 1). Annual yield was estimated at 8,048 acre-feet, with 93% of the annual yield occurring in April-June.

Relationship to Management Plans. The Grand Mesa, Uncompahgre, and Gunnison National Forests (GMUG NF) Land and Resource Management Plan provide land management direction for FS lands located in the NF Tabeguache Creek watershed. Forest Plan direction for Fisheries, Threatened, Endangered, and Sensitive species suggest that land managers should among other things, maintain viable populations of native fish species, improve fish habitat conditions, and cooperate with state agencies to meet minimum flow needs to support fish populations. Additionally, agencies of the Colorado Division of Natural Resources and the Forest Service have signed agreements to assist in the conservation and protection of Colorado River cutthroat trout (CRCT River Cutthroat Trout Task Force 2006), and to work together to solve water issues in Colorado (Colorado DNR/USDA Forest Service MOU on water, 2004).

The NF Tabeguache Creek stream segment is important to the FS because has been identified as a potential CRCT reclamation site. Currently the stream provides important spawning and rearing habitat for a self-sustaining rainbow trout fishery. NF Tabeguache Creek is one of only a few perennial streams in the semi-arid landscape of the Uncompahgre Plateau. The stream is an important source of water for the lower reaches of the San Miguel River, where diversions currently divert a significant source of the summer flows for irrigation and small domestic use. Access into NF Tabeguache Creek is very limited, so fishing pressure, and other land management uses are is minimal, so stream level protection would be an important tool in

maintaining aquatic values in this area of the Uncompahgre Plateau.

The FS requests that the Board recognize that this recommendation is based only upon the minimum flows necessary to support the cold-water fishery values. FS may wish to work with the Board and/or through the Colorado water rights system to appropriate flows to optimally protect fish values and to protect other water-dependent values specified in FS resource management plans.

Table 1. Mean monthly hydrograph for NF Tabeguache Creek developed using southwest regional equations developed by Kircher et al (1985) and intermittent gage from Tabeguache Creek.

Drainage Area (square miles):	17.9
Mean Basin Elevation (ft):	8500
Mean Basin Elev. -5000 ft/1000 ft:	3.5
Mean Annual Flow (cfs):	11.1169
Mean Annual Yield in Acre-Feet (AF):	8048.266

Month	%of flow	AF/Month	AF/Day	Mean Monthly flow (cfs)
January	0.01	55.16	1.78	0.90
February	0.01	76.72	2.65	1.34
March	0.01	114.13	3.68	1.86
April	0.31	2479.22	82.64	41.74
May	0.51	4079.07	131.58	66.46
June	0.11	881.04	29.37	14.83
July	0.01	66.43	2.14	1.08
August	0.01	62.19	2.01	1.01
September	0.01	61.19	2.04	1.03
October	0.01	57.70	1.86	0.94
November	0.01	66.58	2.22	1.12
December	0.01	48.82	1.57	0.80

Data sheets, R2Cross output, fishery survey information, hydrology and water yield techniques, and photographs of the cross section are enclosed to support this recommendation. We thank both the Colorado Division of Wildlife and the Water Conservation Board for their cooperation in this effort.

If you have any questions regarding our instream flow recommendation, please contact Christopher James, Fisheries Biologist, at (970) 240-5421 or John Almy, Forest Hydrologist, at (970) 874-6656.

4 Enclosures

cc: Pauline Adams, GMUG NF, Water Rights Coordinator
Polly Hayes, Regional Office, Water Program Manager
Scott Ludwig, Regional Office, Water Rights Coordinator

Literature Cited

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Tabeguache and Red Canyon 6th Level HUC's