

MC1 Stream Reach Summary

Study Reach: MC1, Muddy Creek - U.S. Highway 40 downstream to Wolford Mountain Reservoir.

Reach Description: Approximate channel length: 2.75 miles with an approximate channel slope of 0.2%.

This is the first reach of Muddy Creek above Wolford Reservoir. The creek meanders through easily eroded shale that gives the stream its muddy appearance. The adjacent land use is primarily dominated by agriculture and in private ownership. The streamflows are affected by diversions, agriculture and grazing-related impacts to channel and overbank.



Muddy Creek above Wolford Reservoir

Flow Recommendations:

Environmental Flow Methodology: A study site has not been established within this reach and CWCB instream flows have not been set.

Water Users:

- Irrigators, municipalities and industry flow-related issues: none reported
- Recreation: none reported

Summary of Flows:

Environmental, recommended flow target range

- none

CWCB flows

- none

Water Users

- Water rights diversions for local water users have not been reviewed for this reach
- Recreation: none reported

Stream Assessments: No assessments were conducted in MC1.

Spawning Observations: No trout spawning survey was conducted in this reach.

Hydrologic Records: USGS Gage Station 09041000 was in operation 17 miles northwest of Kremmling (about 10 miles upstream of Wolford Mountain Reservoir) for 28 years during the period 1938 to 1999. Streamflow exceedence plots and IHA analysis indicate median monthly flows ranged from a low of 4.5 cfs in September up to 290 cfs in May. The median daily high flow of about 340 cfs occurred in mid-May, while the flood flow with a 2-year return period was 551 cfs. A second gage within reach MC1, USGS Station 09041090, is located immediately upstream of Wolford Mountain Reservoir and has been in operation since 1991. Streamflow exceedence plots and IHA analysis for this station indicate median monthly flows have ranged from 6.0 cfs in September up to 297 cfs in May, with a median daily high flow of about 480 cfs in late May.

Water Temperature: MC1 is a Tier I stream reach as designated by CDPHE with a chronic temperature standard of 17°C MWAT and an acute temperature standard of 21.2°C DM. No temperature data are reviewed above Wolford Mountain Reservoir.

Water Quality: No water quality data were available for this reach.

Water Supply Issues (UPCO): No water supply issues are reported for this reach.

Summary of Results and Additional Remarks:

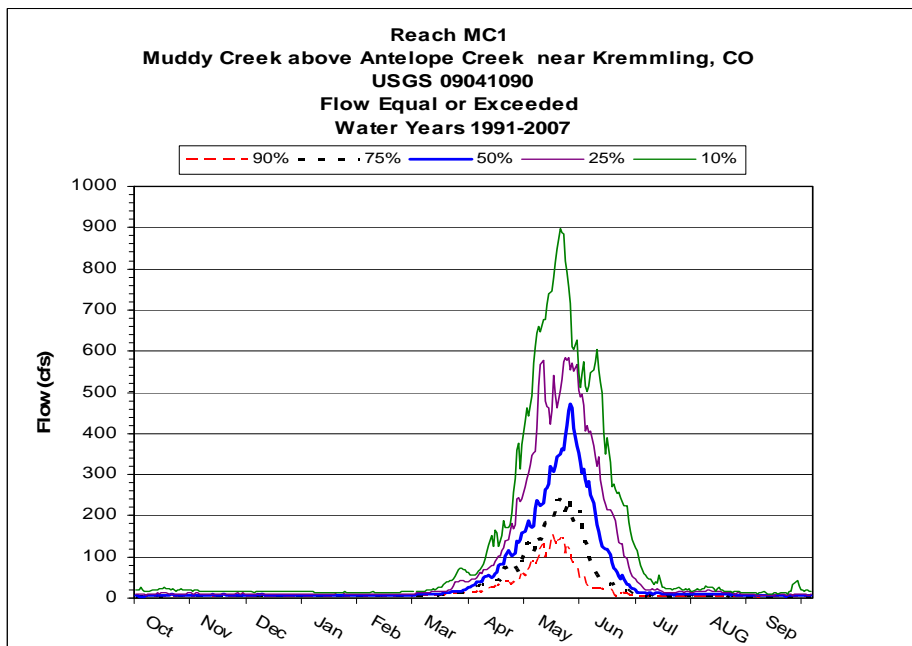
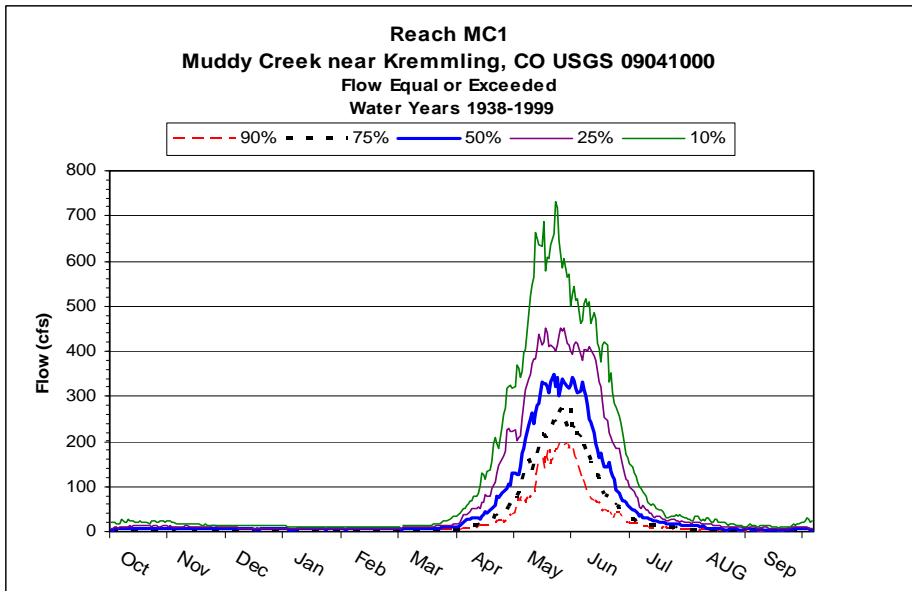
1. This reach of Muddy Creek lies above Wolford Reservoir, and is subject to anthropogenic influences, primarily from agricultural land uses and backwater effects from the reservoir. Future recommendations for this reach may include a biological and geomorphic analysis and restoration recommendations for improvements in and along the riparian corridor.
2. There does not appear to be a compelling reason to establish a study site within reach MC1 at this time. Should environmental flows be needed in the interim, the IHA analyses can provide useful guidance. Should future work entail channel surveys for habitat restoration purposes, this reach should be included in that effort.

Restoration Opportunities: No recommendations are made at this time.

Monitoring: No recommendations are made at this time.

Support Data

Hydrographs and Exceedance Plots and Tables:



Return Period T (year)	Probability P (percent)	Flood Discharge Q (ft³/sec)
1.05	95.2	384
1.11	90.1	410
1.25	80	448
2	50	551
5	20	714
10	10	836
25	4	1006

Flood frequency analysis for USGS 09041000 Muddy Creek nr Kremmling, CO, for 28 years of record (Water years 1936-1999).

IHA Results

Reach MC1

Non-Parametric IHA Scorecard

Muddy Creek nr Kremmling, CO USGS 09041000 (above Wolford Reservoir)

Period of Analysis: 1938-1999 (28 years)

Mean annual flow (cfs)	55.9
Mean flow/area (dimensionless)	55.9
Annual C. V.	2.06
Flow predictability (%)	0.49
Constancy/predictability	0.42
% of floods in 60d period	0.49
Flood-free season (days)	127

	Medians	Coeff. of Disp.
Parameter Group #1		
October (cfs)	5.85	1.167
November (cfs)	6.15	0.752
December (cfs)	5.25	0.7095
January (cfs)	5.3	0.7311
February (cfs)	5.25	0.8048
March (cfs)	8	0.6156
April (cfs)	50	1.195
May (cfs)	290	0.3905
June (cfs)	137	1.16
July (cfs)	21	0.7381
August (cfs)	5.55	1.432
September (cfs)	4.475	1.196
Parameter Group #2		
1-day minimum (cfs)	2.15	1.023
3-day minimum (cfs)	2.2	0.9318
7-day minimum (cfs)	2.529	0.822
30-day minimum (cfs)	3.533	0.3965
90-day minimum (cfs)	4.649	0.8037
1-day maximum (cfs)	481.5	0.3567
3-day maximum (cfs)	463	0.3659
7-day maximum (cfs)	441.4	0.3284
30-day maximum (cfs)	346.3	0.4612
90-day maximum (cfs)	192	0.4187
Number of zero days (count)	0	0
Base flow index (7day minimum in cfs/median in cfs)	0.05211	0.9384
Parameter Group #3		
Date of minimum (Julian day)	251.5	0.1154
Date of maximum (Julian day)	138.5	0.03689
Parameter Group #4		
Low pulse count (#)	5.5	1
Low pulse duration (days)	5.5	1.455
High pulse count (#)	2	1.375
High pulse duration (days)	38.25	1.748
The low pulse threshold is (cfs)	4.8	
The high pulse threshold is (cfs)	30	
Parameter Group #5		
Rise rate (cfs difference between consecutive days)	1	1.525
Fall rate (cfs difference between consecutive days)	-1.6	-0.6484
Number of reversals	80.5	0.323

Reach MC1
IHA Percentile Data
Muddy Creek nr Kremmling, CO USGS 09041000 (above Wolford Reservoir)

	Period of Analysis: 1938-1999 (28 years)		Period of Analysis			(75-25)/50
	10%	25%	50%	75%	90%	
Parameter Group #1						
October (cfs)	3.47	3.925	5.85	10.75	20.8	1.167
November (cfs)	4.09	4.85	6.15	9.475	15.95	0.752
December (cfs)	3.49	4.275	5.25	8	13.1	0.7095
January (cfs)	3	3.7	5.3	7.575	9.2	0.7311
February (cfs)	3	3.65	5.25	7.875	10	0.8048
March (cfs)	3.97	5.075	8	10	15.2	0.6156
April (cfs)	14.75	27.63	50	87.38	145.8	1.195
May (cfs)	183.7	242.3	290	355.5	490.1	0.3905
June (cfs)	44.95	77.88	137	236.8	353.9	1.16
July (cfs)	5.94	11.25	21	26.75	41.3	0.7381
August (cfs)	1.76	3.8	5.55	11.75	16.3	1.432
September (cfs)	1.81	2.75	4.475	8.1	10.42	1.196
Parameter Group #2						
1-day minimum (cfs)	0.48	1.275	2.15	3.475	5.11	1.023
3-day minimum (cfs)	0.4867	1.517	2.2	3.567	5.217	0.9318
7-day minimum (cfs)	0.5929	1.639	2.529	3.718	5.536	0.822
30-day minimum (cfs)	1.283	2.83	3.533	4.231	6.742	0.3965
90-day minimum (cfs)	2.912	3.634	4.649	7.371	9.816	0.8037
1-day maximum (cfs)	384.4	424	481.5	595.8	753.3	0.3567
3-day maximum (cfs)	363.7	409.8	463	579.3	736	0.3659
7-day maximum (cfs)	334.3	367.1	441.4	512	697.7	0.3284
30-day maximum (cfs)	245.8	267.9	346.3	427.6	522.4	0.4612
90-day maximum (cfs)	131.7	143.9	192	224.3	317.2	0.4187
Number of zero days (count)	0	0	0	0	0	0
Base flow index (7day minimum in cfs/median in cfs)	0.01663	0.0249	0.05211	0.0738	0.08409	0.9384
Parameter Group #3						
Date of minimum (Julian day)	190.9	233.5	251.5	275.8	323	0.1154
Date of maximum (Julian day)	128.7	133.3	138.5	146.8	151.4	0.03689
Parameter Group #4						
Low pulse count (#)	0	2.25	5.5	7.75	11.5	1
Low pulse duration (days)	2	3	5.5	11	50.9	1.455
High pulse count (#)	1	1	2	3.75	5	1.375
High pulse duration (days)	1.9	3.875	38.25	70.75	86.7	1.748
Parameter Group #5						
Rise rate (cfs difference between consecutive days)	0.68	1	1	2.525	4.55	1.525
Fall rate (cfs difference between consecutive days)	-3.1	-2.038	-1.6	-1	-0.795	-0.6484
Number of reversals	60	71.25	80.5	97.25	113.2	0.323
EFC Monthly Low Flows						
October Low Flow (cfs)	3.8	4.25	5.9	10	18.5	0.9746
November Low Flow (cfs)	4.135	5.013	6.125	9.475	15.3	0.7286
December Low Flow (cfs)	3.9	4.8	5.4	8	13.2	0.5926
January Low Flow (cfs)	3.56	4	6.2	7.8	9.8	0.6129
February Low Flow (cfs)	3.56	4.125	6	7.95	10	0.6375
March Low Flow (cfs)	3.88	5	8	10	15	0.625
April Low Flow (cfs)	5.15	9.313	16	26.13	27.25	1.051
May Low Flow (cfs)						
June Low Flow (cfs)	15	17.5	20.5	25.75	29	0.4024
July Low Flow (cfs)	7.08	10	16	20.5	25.6	0.6563
August Low Flow (cfs)	3.58	4.7	5.9	10	14	0.8983
September Low Flow (cfs)	3.44	4.3	5.05	7	8.84	0.5347
EFC Parameters						
Extreme low peak (cfs)	1.855	2.113	2.475	2.775	3	0.2677
Extreme low duration (days)	1.55	2	3.75	7.375	12.85	1.433
Extreme low timing (Julian date)	67.5	232.3	247.8	265	319.6	0.08948
Extreme low freq. (#/year)	0	0	2.5	4.75	6	1.9
High flow peak (cfs)	14.5	16.38	21.5	29.38	38.95	0.6047
High flow duration (days)	2.5	3	3.75	5.125	7.65	0.5667
High flow timing (Julian date)	188	211	231.8	253.3	285.1	0.1154
High flow frequency (#/year)	1.8	3	5	6	8	0.6
High flow rise rate (cfs difference between consecutive days)	2.975	3.978	5.413	6.945	8.289	0.5482
High flow fall rate (cfs difference between consecutive days)	-5.968	-4.154	-3.058	-2.194	-1.493	-0.641
Small Flood peak (cfs)	482	498.3	549.5	703.5	744.2	0.3735
Small Flood duration (days)	77.5	86.75	98	117	126.9	0.3087
Small Flood timing (Julian date)	124.6	130.8	139.5	145.8	155.9	0.04098
Small Flood freq. (#/year)	0	0	0	1	1	0
Small Flood riserate (cfs difference between consecutive days)	7.624	7.762	12.73	15.09	29.12	0.5758
Small Flood fallrate (cfs difference between consecutive days)	-15.01	-12.92	-10.24	-8.149	-7.364	-0.4656
Large flood peak (cfs)	819	819	891.5	964	964	0.1626
Large flood duration (days)	92	92	99	106	106	0.1414
Large flood timing (Julian date)	138	138	138.5	139	139	0.002732
Large flood freq. (#/year)	0	0	0	0	0.1	0
Large flood riserate (cfs difference between consecutive days)	16.12	16.12	19.18	22.24	22.24	0.3189
Large flood fallrate (cfs difference between consecutive days)	-18.35	-18.35	-16.04	-13.72	-13.72	-0.2886

Reach MC1**Non-Parametric IHA Scorecard****MC1 Muddy Creek above Antelope Creek, nr Kremmling, CO USGS 09041090****Period of Analysis: 1991-2007 (17 years)**

Mean annual flow (cfs)	56.91
Mean flow/area (dimensionless)	56.91
Annual C. V.	2.22
Flow predictability (%)	0.5
Constancy/predictability	0.45
% of floods in 60d period	0.58
Flood-free season (days)	128

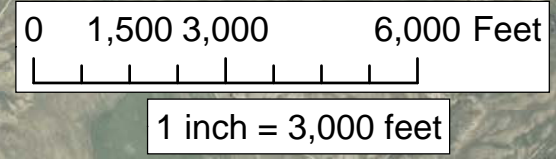
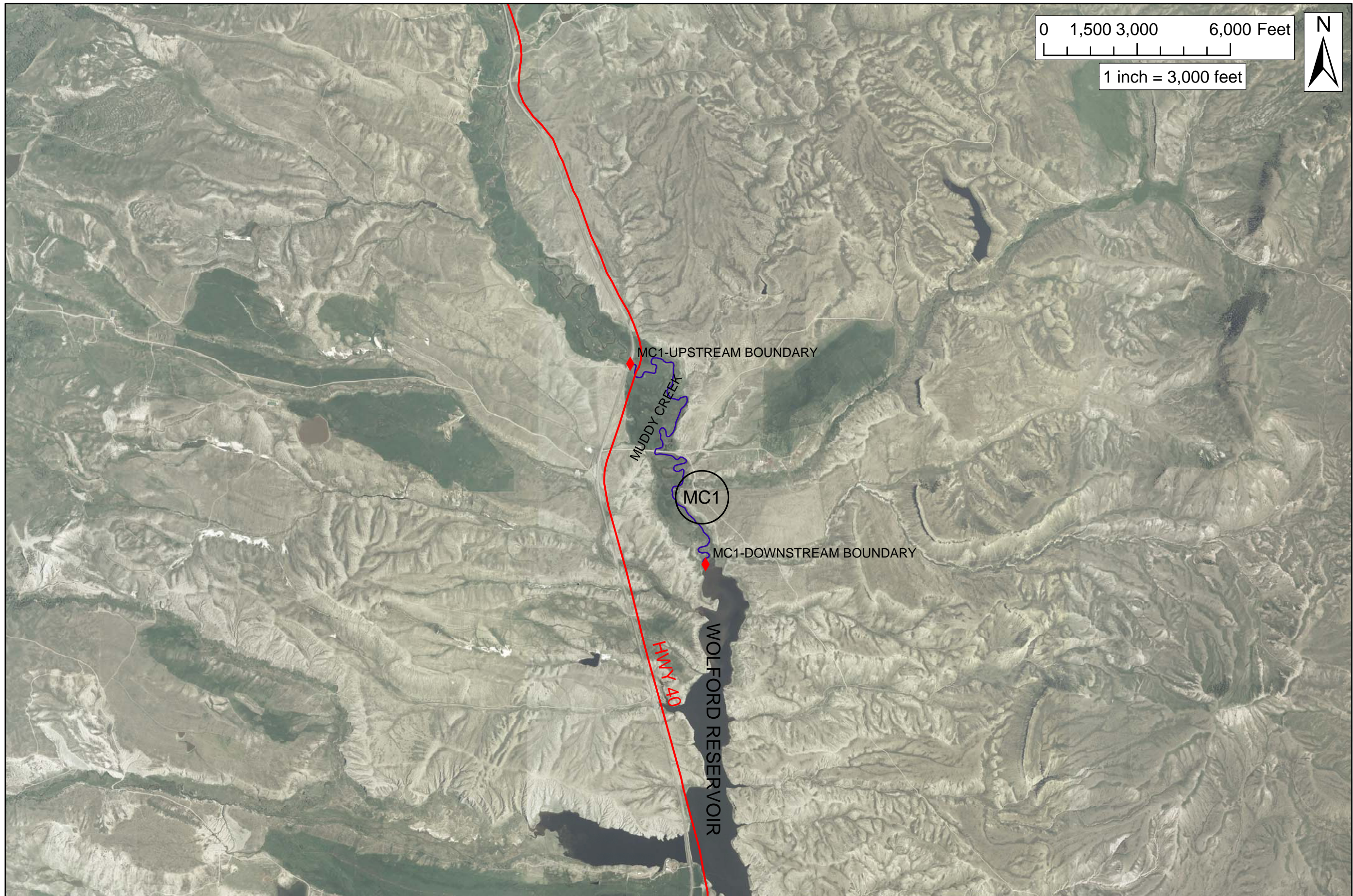
	Medians	Coeff. of Disp.
Parameter Group #1		
October (cfs)	6.5	0.7923
November (cfs)	7	0.5821
December (cfs)	8	0.5
January (cfs)	7.4	0.7432
February (cfs)	7.3	0.524
March (cfs)	12	0.7833
April (cfs)	68	0.9301
May (cfs)	297	0.9024
June (cfs)	80.5	2.18
July (cfs)	9.9	1.126
August (cfs)	8.7	0.8793
September (cfs)	6.05	0.7727
Parameter Group #2		
1-day minimum (cfs)	2.4	1.333
3-day minimum (cfs)	2.767	1.181
7-day minimum (cfs)	3.157	1.079
30-day minimum (cfs)	3.96	0.8024
90-day minimum (cfs)	5.584	0.7381
1-day maximum (cfs)	572	0.5253
3-day maximum (cfs)	550	0.4606
7-day maximum (cfs)	526.9	0.4273
30-day maximum (cfs)	373	0.5957
90-day maximum (cfs)	193.9	0.5777
Number of zero days (count)	0	0
Base flow index (7day minimum in cfs/median in cfs)	0.05937	0.5965
Parameter Group #3		
Date of minimum (Julian day)	260	0.1489
Date of maximum (Julian day)	139	0.04508
Parameter Group #4		
Low pulse count (#)	5	1.1
Low pulse duration (days)	5.25	1.214
High pulse count (#)	2	1
High pulse duration (days)	44	1.318
The low pulse threshold is (cfs)	6.3	
The high pulse threshold is (cfs)	27	
Parameter Group #5		
Rise rate (cfs difference between consecutive days)	1	0.9
Fall rate (cfs difference between consecutive days)	-1	-0.95
Number of reversals	87	0.2126

Reach MC1

IHA Percentile Data

MC1 Muddy Creek above Antelope Creek, nr Kremmling, CO USGS 09041090

Parameter Group #1	Period of Analysis: 1991-2007 (17 years)					
	10%	25%	50%	75%	90%	(75-25)/50
October (cfs)	4.26	4.75	6.5	9.9	20.2	0.7923
November (cfs)	4.64	5.925	7	10	15.6	0.5821
December (cfs)	2.94	5.6	8	9.6	15.4	0.5
January (cfs)	2.58	5	7.4	10.5	13.6	0.7432
February (cfs)	3.64	5.5	7.3	9.325	13.8	0.524
March (cfs)	7.94	9.1	12	18.5	35.6	0.7833
April (cfs)	37.5	45.5	68	108.8	153	0.9301
May (cfs)	135.6	228	297	496	673.8	0.9024
June (cfs)	17.78	27.5	80.5	203	273.2	2.18
July (cfs)	2.44	4.35	9.9	15.5	25.2	1.126
August (cfs)	2.5	5.35	8.7	13	16.2	0.8793
September (cfs)	2.91	3.4	6.05	8.075	10.8	0.7727
Parameter Group #2						
1-day minimum (cfs)	0.928	1.5	2.4	4.7	7	1.333
3-day minimum (cfs)	1.066	1.717	2.767	4.983	7.08	1.181
7-day minimum (cfs)	1.169	1.814	3.157	5.221	7.411	1.079
30-day minimum (cfs)	1.926	2.673	3.96	5.85	8.611	0.8024
90-day minimum (cfs)	2.735	3.505	5.584	7.627	11.23	0.7381
1-day maximum (cfs)	252.2	400	572	700.5	899.2	0.5253
3-day maximum (cfs)	245.3	394.8	550	648.2	890.3	0.4606
7-day maximum (cfs)	230.6	376.6	526.9	601.8	867.6	0.4273
30-day maximum (cfs)	155.1	270.5	373	492.7	670.6	0.5957
90-day maximum (cfs)	82.93	139.4	193.9	251.5	358.3	0.5777
Number of zero days (count)	0	0	0	0	0	0
Base flow index (7day minimum in cfs/median in cfs)	0.0335	0.04392	0.05937	0.07934	0.1054	0.5965
Parameter Group #3						
Date of minimum (Julian day)	153.6	224	260	278.5	296.4	0.1489
Date of maximum (Julian day)	122.8	128.5	139	145	149.2	0.04508
Parameter Group #4						
Low pulse count (#)	0	2	5	7.5	11	1.1
Low pulse duration (days)	3.25	4	5.25	10.38	48.25	1.214
High pulse count (#)	1	1	2	3	2	3.8
High pulse duration (days)	2.8	19.5	44	77.5	97.2	1.318
Parameter Group #5						
Rise rate (cfs difference between consecutive days)	0.48	0.85	1	1.75	3.2	0.9
Fall rate (cfs difference between consecutive days)	-3	-1.85	-1	-0.9	-0.62	-0.95
Number of reversals	62.4	75.5	87	94	100.2	0.2126
EFC Monthly Low Flows						
October Low Flow (cfs)	4.3	4.625	6.625	8.325	11.8	0.5585
November Low Flow (cfs)	5	6.4	7.3	10	15.6	0.4932
December Low Flow (cfs)	3.5	5.6	8	9.1	15.4	0.4375
January Low Flow (cfs)	4.16	6	7.6	11	15.2	0.6579
February Low Flow (cfs)	3.97	6.425	7.65	9.663	14.45	0.4232
March Low Flow (cfs)	6.72	7.875	11	16	18.3	0.7386
April Low Flow (cfs)	11.5	12.25	23	25.5	26	0.5761
May Low Flow (cfs)			21			
June Low Flow (cfs)	7.47	9.7	11	20.5	23.4	0.9818
July Low Flow (cfs)	4.06	5	9	13.75	18.3	0.9722
August Low Flow (cfs)	4.21	5.3	8.5	12.5	13.8	0.8471
September Low Flow (cfs)	3.68	4.75	6.05	7.25	9.84	0.4132
EFC Parameters						
Extreme low peak (cfs)	1.62	2	2.5	2.8	2.98	0.32
Extreme low duration (days)	2.2	3	5	13	54.2	2
Extreme low timing (Julian date)	54.1	207	246	279	320	0.1967
Extreme low freq. (#/year)	0	0	1	4	5.8	4
High flow peak (cfs)	15.4	16	18	22.25	87.4	0.3472
High flow duration (days)	2	2	4	5.75	17	0.9375
High flow timing (Julian date)	126.2	187.3	219	237.8	277	0.138
High flow frequency (#/year)	1.8	3	4	5	6.4	0.5
High flow rise rate (cfs difference between consecutive days)	3.468	4.217	5.65	7.1	9.478	0.5103
High flow fall rate (cfs difference between consecutive days)	-7.149	-5.125	-2.7	-1.935	-1.691	-1.181
Small Flood peak (cfs)	572	639.8	678	767.5	897	0.1884
Small Flood duration (days)	86	89.25	95.5	105.5	108	0.1702
Small Flood timing (Julian date)	128	139	143.5	146.8	158	0.02117
Small Flood freq. (#/year)	0	0	0	1	1	0
Small Flood riserate (cfs difference between consecutive days)	9.738	10.42	11.87	13.12	17.44	0.2279
Small Flood fallrate (cfs difference between consecutive days)	-29.39	-19.42	-17.07	-13.44	-11.22	-0.3509
Large flood peak (cfs)			908			
Large flood duration (days)			96			
Large flood timing (Julian date)			139			
Large flood freq. (#/year)	0	0	0	0	0.2	0
Large flood riserate (cfs difference between consecutive days)			18.42			
Large flood fallrate (cfs difference between consecutive days)			-18.02			



GRAND COUNTY
STREAM MANAGEMENT PLAN
REACHES

- Legend**
- ◆ REACH BOUNDARY
 - ★ PHABSIM SITES
 - DIVERSIONS

REACH: MC1
SHEET # :
1 OF 1

