# **Stream**: Clear Fork East Muddy Creek

## Executive Summary

Water Division: 4
Water District: 40
CDOW#: 41753
CWCB ID: 09/4/A-001

**Segment:** Headwaters to the Forest Service Boundary above the Confluence with Little Muddy Creek

**Upper Terminus**: HEADWATERS IN THE VICINITY OF
(Latitude 39° 15’ 11.7”N) (Longitude 107° 25’ 36.9”W)

**Lower Terminus**: FOREST SERVICE BOUNDARY ABOVE THE CONLFUENCE WITH LITTLE MUDDY CREEK
(Latitude 39° 8’ 45.1”N) (Longitude 107° 26’ 10.4”W)

**Watershed:** North Fork Gunnison (HUC#: 14020004)
**Counties**: Gunnison
**Length**: 8.7 miles
**USGS Quad(s)**: Elk Knob, Quaker Mesa
**Flow Recommendation:** 13.0 cfs (April 1 to August 15)
5.0 cfs (August 16 to March 31)

# Staff Analysis and Recommendation

## 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 Colorado Division of Wildlife (CDOW) and Trout Unlimited (TU) recommended this segment of Clear Fork East Muddy Creek to the CWCB for inclusion into the Instream Flow Program. Clear Fork East Muddy Creek is being considered for inclusion into the Instream Flow Program because it has a natural environment that can be preserved to a reasonable degree with an instream flow water right.

The Clear Fork East Muddy Creek originates at the top of Clear Fork Park near the divide between Gunnison and Mesa Counties at an elevation of just under 9,600 feet. The stream flows generally southward 9.1 miles through the Gunnison National Forest to its confluence with Little Muddy Creek at an elevation of 7,450 feet. All of the land on the 8.7 mile segment addressed by this report is publicly owned. Clear Fork East Muddy Creek is located within Gunnison County. The total drainage area of the creek is approximately 38 square miles.

The subject of this report is a segment of Clear Fork East Muddy Creek beginning at the headwaters and extending downstream to a lower terminus approximately 0.4 miles above its confluence with Little Muddy Creek, just above a streambed road crossing and above the private land where Little Muddy and the Clear Fork come together. The proposed segment is located approximately 21 miles northeast of Paonia. The staff has received one joint recommendation for this segment, from the CDOW and TU. The recommendation for this segment is discussed below.

## Instream Flow Recommendation(s)

The CDOW and TU recommended, 13.0 cfs (April 1 to August 15), 5.0 cfs (August 16 to March 31), based on its July 26, 2007 data collection efforts. The modeling results from this survey effort are within the confidence interval produced by the R2Cross model.

## Land Status Review

| Upper Terminus | Lower Terminus | Total Length (miles) | Land Ownership | |
|---|---|---|---|---|
| | | | % Private | % Public |
| Headwaters | USFS Boundary | 8.7 | 0% | 100% |

100% of the public lands are owned by the USFS.

## Biological Data

In July of 2007, CDOW and TU collected stream cross sectional data, natural environment data, and other data needed to quantify instream flow needs. Previous survey data collected by CDOW indicated the stream supports healthy populations of Colorado River cutthroat trout, Brook trout and molted sculpin.

## Field Survey Data

CDOW and TU staff used the R2Cross methodology to quantify the amount of water required to preserve the natural environment to a reasonable degree. 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 streamflow cease. This type of hydraulic data collection consists of setting up a transect, surveying the stream channel geometry, and measuring the stream discharge. Appendix B contains copies of field data collected for this proposed segment.

## 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 CDOW 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 (Nehring 1979; Espegren 1996).

For this segment of stream, one data set was collected with the results shown in Table 1 below. 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 (240% 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.

Table 1: Data

| Party | Date | Q | 250%-40% | Summer (3/3) | Winter (2/3) |
|---|---|---|---|---|---|
| DOW/TU | 7/26/2007 | 9.8 | 24.4 – 3.9 | 13.0 | 10.4 |

DOW = Division of Wildlife TU=Trout Unlimited
(1) Predicted flow outside of the accuracy range of Manning's Equation. ? = Criteria never met in R2CROSS Staging Table.

The summer flow recommendation, which meets 3 of 3 criteria and is within the accuracy range of the R2CROSS model is 13.0 cfs. The winter flow recommendation, which is based on water availability limitations, is 5.0 cfs. It is our belief that recommendations that fall outside of the accuracy range of the model, over 250% of the measured discharge or under 40% of the measured discharge may not give an accurate estimate of the necessary instream flow required.

## Hydrologic Data and Analysis

After receiving the cooperating agency's biologic recommendation, the CWCB staff conducted an evaluation of the stream hydrology to determine if water was physically available for an instream flow appropriation. This evaluation was done through a computation that is, in essence, a "water balance". In concept a "water balance" computation can be viewed as an accounting exercise. When done in its most rigorous form, the water balance parses precipitation into all the avenues water pursues after it is deposited as rain, snow, or ice. In other words, given a specified amount of water deposition (input), the balance tries to account for all water depletions (losses) until a selected end point is reached. Water losses include depletions due to evaporation and transpiration, deliveries into ground water storage, temporary surface storage, incorporations into plant and animal tissue and so forth. These losses are individually or collectively subtracted from the input to reveal the net amount of stream runoff as represented by the discharge measured by stream gages. Of course, the measured stream flow need not be the end point of interest; indeed, when looking at issues of water use to extinction stream flow measurements may only describe intermediate steps in the complex accounting process that is a water balance carried out to a net value of zero.

In its analysis, CWCB staff has attempted to use this idea of balancing inputs and losses to determine if water is available for the recommended Instream Flow Appropriation. Of course, this analysis must be a practical exercise rather than a lengthy, and costly, scientific investigation. As a result, staff has simplified the process by lumping together some variables and employing certain rational and scientifically supportable assumptions. The process may be described through the following description of the steps used to complete the evaluation for this particular stream.

The first step required in determining water availability is a determination of the hydrologic regime at the Lower Terminus (LT) of the recommended ISF reach. In the best case this means looking at the data from a gage at the LT. Further, this data, in the best case, has been collected for a long period of time (the longer the better) including wet and dry periods. In the case of **Clear Fork East Muddy Creek** there is a USGS gage record of discharge on the creek. However, the gage station is downstream from the LT. The USGS gage is CLEAR FORK NEAR RAGGED MOUNTAIN, CO. (USGS 09129800); it has a period of record (POR) of 8 years collected between 1965 and 1973. The gage is at an elevation of 7,450 ft above mean sea level (amsl) and has a drainage area of 38.5 $mi^2$. The hydrograph (plot of discharge over time) produced from this gage includes the consumptive uses of a couple of diversions including one that is a transbasin structure. However, the existence of these diversions is not a major limitation upon the use of the data from the gage. To make the measured data transferable to Clear Fork East Muddy Creek above the LT, the consumptive portions of these diversions were added back to the measured hydrograph; transbasin diversions were regarded as 100% consumptive. The resulting "adjusted" hydrograph could then be used on Clear Fork East Muddy Creek above the LT by multiplying the "adjusted" gage discharge values by an area ratio; specifically, the area of Clear Fork East Muddy Creek above the LT (38.05 $mi^2$) to Clear Fork Near Ragged Mountain, CO (38.5 $mi^2$). Next, the resulting proportioned "adjusted" hydrograph was itself "adjusted" (decreased) to reflect the existing depletions on Clear Fork East Muddy Creek above the LT resulting from upstream consumptive irrigation uses and transbasin diversions. The final hydrograph thus represents a distribution of flow over time that has been reduced to reflect existing human uses.

{The Following discussion is based upon the US Geological Survey's *Techniques of Water-Resources Investigations* Series, *Book 4: Hydrologic Analysis and Interpretation, Chapter A3: Statistical Methods in Water Resources* (Chapter 3: Describing Uncertainty) by D.R. Helsel and R. M. Hirsch. This technical reference provides the scientific background and guidance important to the systematic interpretation of hydrologic data. The document is available online and is a valuable aid to understanding and interpreting the analyses described here.}

The next step in producing a representation of the discharge at Clear Fork East Muddy Creek is to compute the Geometric Mean of the area-prorated "adjusted data values from the Clear Fork Near Ragged Mountain, CO hydrograph. This step is of value because of the inherent statistical weaknesses found in any collection of data intended to measure natural stream discharge. Without getting into the details of statistical theory, it is worth noting that a set of discharge measurements is inherently inaccurate, no matter how well collected, due to the difficulties attendant to data collection, especially hydrologic data. In this particular case, the short period of record lends even greater merit to the use of this statistical tool. To give deference to this fact and to increase the value of the hydrograph product of this analysis, the Geometric Means of the data were computed and plotted along with the 95% Confidence Intervals about the data. The resultant hydrograph, including recommended Instream Flow values, is displayed in figure 1 with an enlargement displayed in figure 2. The data displayed by this hydrograph follow in Table 1.

**Fig. 1. Geometric Mean Daily Discharge Clear Fork E. Muddy Cr abv LT (prop on Clear Fork E Muddy Cr nr Ragged Mntn, CO adj for irr and OoB) & ISFs**

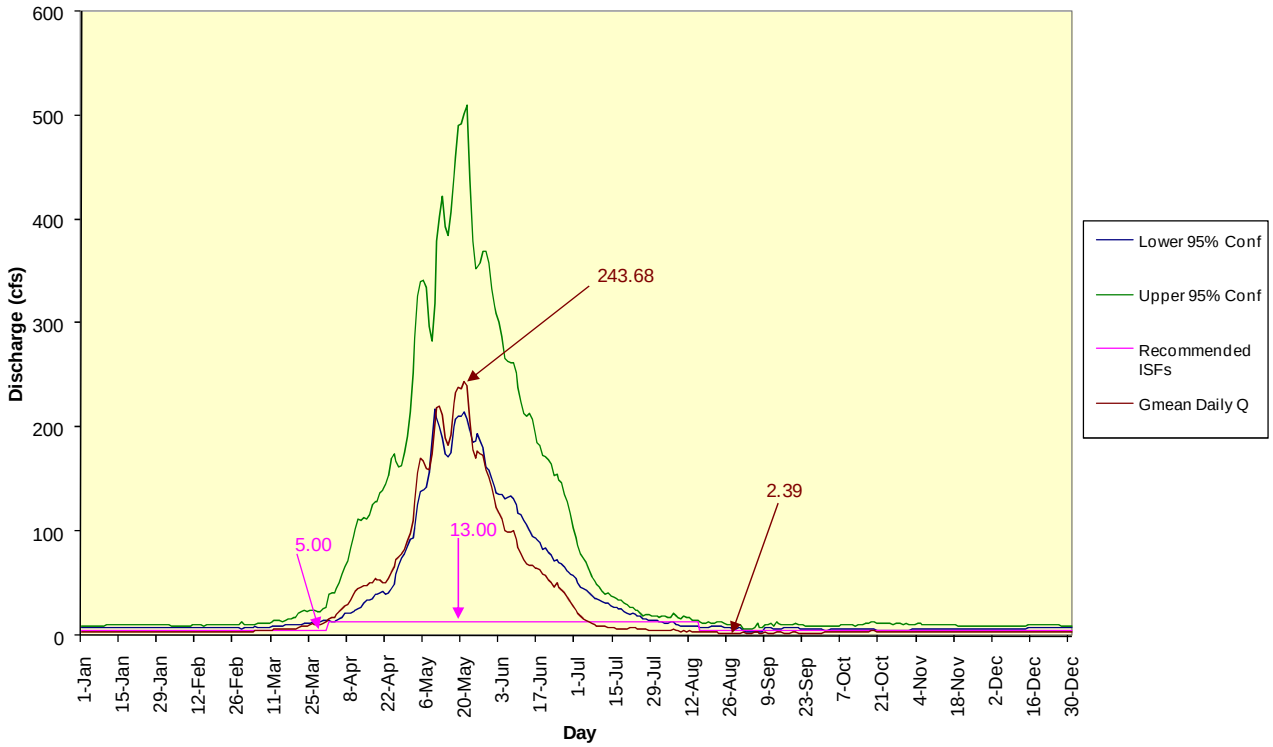
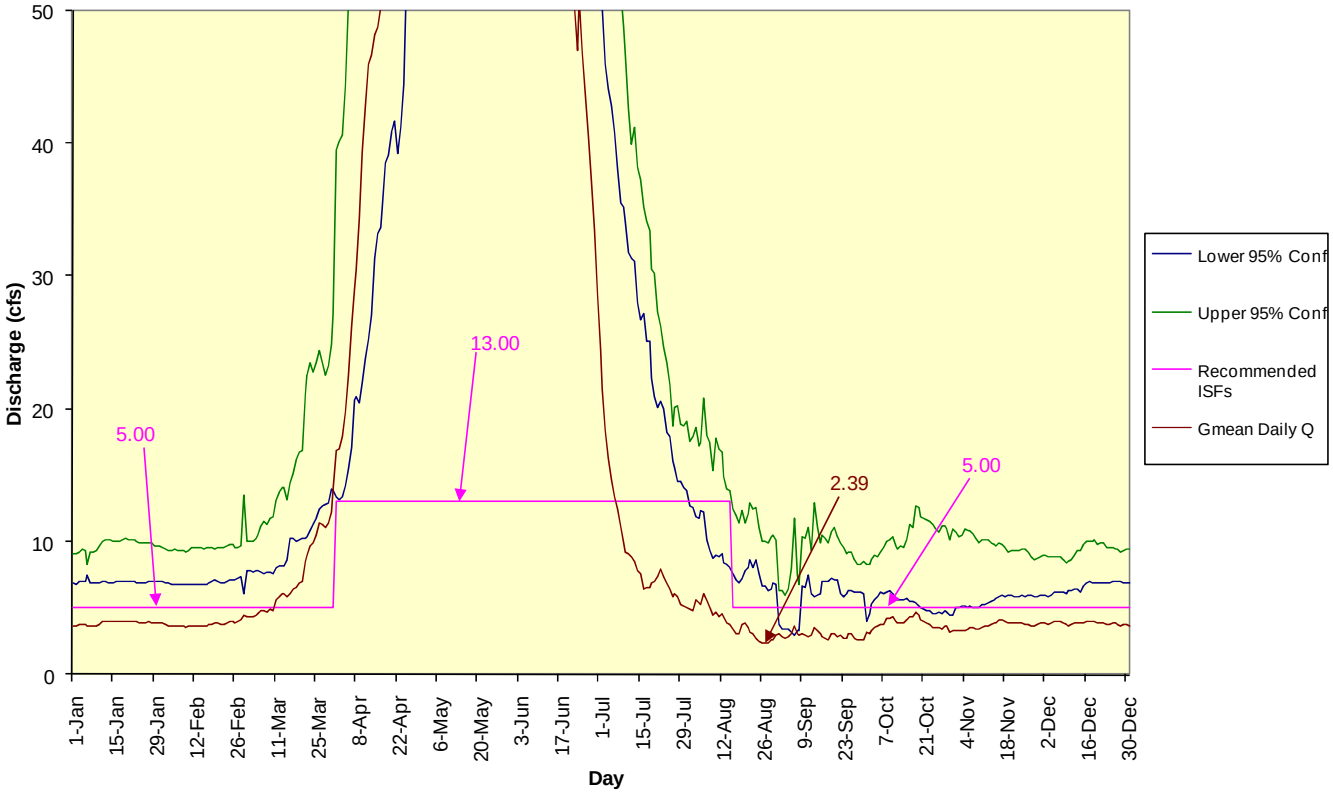


**Fig. 2. Geometric Mean Daily Discharge Clear Fork E. Muddy Cr abv LT (prop on Clear Fork E Muddy Cr nr Ragged Mntn, CO adj for irr and OoB) & ISFs**




| Table 1. Geometric Mean Discharge and Recommended Instream Flows | | |
|---|---|---|
| Date | Recommended ISF | Proportioned Adjusted GM (abv gage) Adj (-) for Irr & OoB in Clear Fk E Muddy Cr abv LT |
| 1-Jan | 5.0 | 3.656756941 |
| 2-Jan | 5.0 | 3.6921771 |
| 3-Jan | 5.0 | 3.773739269 |
| 4-Jan | 5.0 | 3.787167022 |
| 5-Jan | 5.0 | 3.738526995 |
| 6-Jan | 5.0 | 3.659026188 |
| 7-Jan | 5.0 | 3.627610329 |
| 8-Jan | 5.0 | 3.621947008 |
| 9-Jan | 5.0 | 3.663057278 |
| 10-Jan | 5.0 | 3.805108516 |
| 11-Jan | 5.0 | 3.971408416 |
| 12-Jan | 5.0 | 4.023529745 |
| 13-Jan | 5.0 | 4.032296047 |
| 14-Jan | 5.0 | 4.032296047 |
| 15-Jan | 5.0 | 3.966898004 |

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| 16-Jan | 5.0 | 3.973717709 |
| 17-Jan | 5.0 | 4.034812396 |
| 18-Jan | 5.0 | 4.054931989 |
| 19-Jan | 5.0 | 4.065567385 |
| 20-Jan | 5.0 | 4.069607764 |
| 21-Jan | 5.0 | 4.053794079 |
| 22-Jan | 5.0 | 4.056671055 |
| 23-Jan | 5.0 | 3.966752504 |
| 24-Jan | 5.0 | 3.892241152 |
| 25-Jan | 5.0 | 3.908914002 |
| 26-Jan | 5.0 | 3.925217214 |
| 27-Jan | 5.0 | 3.961156753 |
| 28-Jan | 5.0 | 3.95038938 |
| 29-Jan | 5.0 | 3.893128951 |
| 30-Jan | 5.0 | 3.922234416 |
| 31-Jan | 5.0 | 3.886588439 |
| 1-Feb | 5.0 | 3.84471691 |
| 2-Feb | 5.0 | 3.782360191 |
| 3-Feb | 5.0 | 3.702068346 |
| 4-Feb | 5.0 | 3.629750793 |
| 5-Feb | 5.0 | 3.658155712 |
| 6-Feb | 5.0 | 3.653172578 |
| 7-Feb | 5.0 | 3.633416648 |
| 8-Feb | 5.0 | 3.658815917 |
| 9-Feb | 5.0 | 3.578815824 |
| 10-Feb | 5.0 | 3.635528279 |
| 11-Feb | 5.0 | 3.668848464 |
| 12-Feb | 5.0 | 3.692779392 |
| 13-Feb | 5.0 | 3.704238128 |
| 14-Feb | 5.0 | 3.664237796 |
| 15-Feb | 5.0 | 3.686996896 |
| 16-Feb | 5.0 | 3.724082941 |
| 17-Feb | 5.0 | 3.739581726 |
| 18-Feb | 5.0 | 3.830822046 |
| 19-Feb | 5.0 | 3.862553753 |
| 20-Feb | 5.0 | 3.845131583 |
| 21-Feb | 5.0 | 3.751884742 |
| 22-Feb | 5.0 | 3.775076472 |
| 23-Feb | 5.0 | 3.854443577 |
| 24-Feb | 5.0 | 3.973606697 |
| 25-Feb | 5.0 | 4.036088046 |
| 26-Feb | 5.0 | 3.951101914 |
| 27-Feb | 5.0 | 3.976361947 |
| 28-Feb | 5.0 | 4.121068039 |
| 29-Feb | 5.0 | 4.429808323 |
| 1-Mar | 5.0 | 4.35977621 |
| 2-Mar | 5.0 | 4.372545275 |
| 3-Mar | 5.0 | 4.346455696 |
| 4-Mar | 5.0 | 4.433786356 |
| 5-Mar | 5.0 | 4.588817585 |
| 6-Mar | 5.0 | 4.781045918 |

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| 7-Mar | 5.0 | 4.793706859 |
| 8-Mar | 5.0 | 4.761862319 |
| 9-Mar | 5.0 | 4.905104418 |
| 10-Mar | 5.0 | 4.885958896 |
| 11-Mar | 5.0 | 5.65232413 |
| 12-Mar | 5.0 | 5.893557936 |
| 13-Mar | 5.0 | 6.054414286 |
| 14-Mar | 5.0 | 6.066775204 |
| 15-Mar | 5.0 | 5.917183462 |
| 16-Mar | 5.0 | 6.146581621 |
| 17-Mar | 5.0 | 6.413661123 |
| 18-Mar | 5.0 | 6.581296012 |
| 19-Mar | 5.0 | 6.904297823 |
| 20-Mar | 5.0 | 7.068088692 |
| 21-Mar | 5.0 | 8.557932008 |
| 22-Mar | 5.0 | 9.044707792 |
| 23-Mar | 5.0 | 9.668914036 |
| 24-Mar | 5.0 | 9.89842269 |
| 25-Mar | 5.0 | 10.54439772 |
| 26-Mar | 5.0 | 11.4241014 |
| 27-Mar | 5.0 | 11.31534851 |
| 28-Mar | 5.0 | 11.11955125 |
| 29-Mar | 5.0 | 11.38347081 |
| 30-Mar | 5.0 | 12.24118361 |
| 31-Mar | 5.0 | 13.9677053 |
| 1-Apr | 13.0 | 16.90562689 |
| 2-Apr | 13.0 | 17.03851199 |
| 3-Apr | 13.0 | 17.97223917 |
| 4-Apr | 13.0 | 19.73933632 |
| 5-Apr | 13.0 | 22.6172093 |
| 6-Apr | 13.0 | 26.29632282 |
| 7-Apr | 13.0 | 29.02592016 |
| 8-Apr | 13.0 | 30.46235103 |
| 9-Apr | 13.0 | 34.37050082 |
| 10-Apr | 13.0 | 39.39733574 |
| 11-Apr | 13.0 | 42.87086631 |
| 12-Apr | 13.0 | 46.03718162 |
| 13-Apr | 13.0 | 46.75944665 |
| 14-Apr | 13.0 | 48.24655096 |
| 15-Apr | 13.0 | 48.81772164 |
| 16-Apr | 13.0 | 50.35519972 |
| 17-Apr | 13.0 | 51.4167281 |
| 18-Apr | 13.0 | 54.78522304 |
| 19-Apr | 13.0 | 53.32640987 |
| 20-Apr | 13.0 | 54.06406644 |
| 21-Apr | 13.0 | 51.58986548 |
| 22-Apr | 13.0 | 51.15038736 |
| 23-Apr | 13.0 | 55.14846658 |
| 24-Apr | 13.0 | 61.00540792 |
| 25-Apr | 13.0 | 66.76413606 |
| 26-Apr | 13.0 | 72.48744467 |

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| 27-Apr | 13.0 | 76.49916797 |
| 28-Apr | 13.0 | 78.05992307 |
| 29-Apr | 13.0 | 83.30099267 |
| 30-Apr | 13.0 | 91.15503179 |
| 1-May | 13.0 | 98.65628837 |
| 2-May | 13.0 | 110.7793283 |
| 3-May | 13.0 | 128.4827752 |
| 4-May | 13.0 | 156.6833558 |
| 5-May | 13.0 | 169.9254432 |
| 6-May | 13.0 | 167.0099337 |
| 7-May | 13.0 | 161.1375686 |
| 8-May | 13.0 | 159.3236759 |
| 9-May | 13.0 | 174.4084865 |
| 10-May | 13.0 | 204.0034013 |
| 11-May | 13.0 | 218.0588304 |
| 12-May | 13.0 | 220.3969528 |
| 13-May | 13.0 | 212.1297245 |
| 14-May | 13.0 | 189.3694642 |
| 15-May | 13.0 | 182.7453012 |
| 16-May | 13.0 | 192.4691842 |
| 17-May | 13.0 | 222.7460469 |
| 18-May | 13.0 | 232.9836644 |
| 19-May | 13.0 | 238.4445731 |
| 20-May | 13.0 | 236.8581489 |
| 21-May | 13.0 | 243.6815043 |
| 22-May | 13.0 | 239.9712124 |
| 23-May | 13.0 | 206.5079261 |
| 24-May | 13.0 | 178.0940991 |
| 25-May | 13.0 | 170.4106866 |
| 26-May | 13.0 | 176.4978265 |
| 27-May | 13.0 | 174.1343314 |
| 28-May | 13.0 | 173.0643647 |
| 29-May | 13.0 | 158.7926761 |
| 30-May | 13.0 | 152.4165059 |
| 31-May | 13.0 | 142.520587 |
| 1-Jun | 13.0 | 130.6287625 |
| 2-Jun | 13.0 | 122.6315465 |
| 3-Jun | 13.0 | 117.7788994 |
| 4-Jun | 13.0 | 112.3562775 |
| 5-Jun | 13.0 | 101.0710762 |
| 6-Jun | 13.0 | 99.39391075 |
| 7-Jun | 13.0 | 99.23614487 |
| 8-Jun | 13.0 | 101.060713 |
| 9-Jun | 13.0 | 92.22952806 |
| 10-Jun | 13.0 | 84.29966831 |
| 11-Jun | 13.0 | 78.46577779 |
| 12-Jun | 13.0 | 73.1986156 |
| 13-Jun | 13.0 | 69.16570198 |
| 14-Jun | 13.0 | 67.92123331 |
| 15-Jun | 13.0 | 68.00260827 |
| 16-Jun | 13.0 | 64.51334128 |

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| 17-Jun | 13.0 | 64.13853528 |
| 18-Jun | 13.0 | 62.97197509 |
| 19-Jun | 13.0 | 59.41942883 |
| 20-Jun | 13.0 | 57.88674146 |
| 21-Jun | 13.0 | 53.72970907 |
| 22-Jun | 13.0 | 50.3296622 |
| 23-Jun | 13.0 | 47.09676533 |
| 24-Jun | 13.0 | 50.94670762 |
| 25-Jun | 13.0 | 46.9682776 |
| 26-Jun | 13.0 | 43.84041371 |
| 27-Jun | 13.0 | 40.54226471 |
| 28-Jun | 13.0 | 37.35082238 |
| 29-Jun | 13.0 | 33.47898651 |
| 30-Jun | 13.0 | 28.56036279 |
| 1-Jul | 13.0 | 24.49297145 |
| 2-Jul | 13.0 | 21.4889431 |
| 3-Jul | 13.0 | 18.45410683 |
| 4-Jul | 13.0 | 16.35323745 |
| 5-Jul | 13.0 | 14.73303272 |
| 6-Jul | 13.0 | 13.40929945 |
| 7-Jul | 13.0 | 12.50075052 |
| 8-Jul | 13.0 | 11.22831412 |
| 9-Jul | 13.0 | 9.922132693 |
| 10-Jul | 13.0 | 9.253948739 |
| 11-Jul | 13.0 | 9.116535714 |
| 12-Jul | 13.0 | 8.892096219 |
| 13-Jul | 13.0 | 8.563959468 |
| 14-Jul | 13.0 | 7.894549871 |
| 15-Jul | 13.0 | 7.634514466 |
| 16-Jul | 13.0 | 6.456649046 |
| 17-Jul | 13.0 | 6.624980996 |
| 18-Jul | 13.0 | 6.605476325 |
| 19-Jul | 13.0 | 6.87216799 |
| 20-Jul | 13.0 | 7.080534942 |
| 21-Jul | 13.0 | 7.395655601 |
| 22-Jul | 13.0 | 7.905057235 |
| 23-Jul | 13.0 | 7.363534622 |
| 24-Jul | 13.0 | 6.95704869 |
| 25-Jul | 13.0 | 6.443934295 |
| 26-Jul | 13.0 | 5.888708126 |
| 27-Jul | 13.0 | 6.094041878 |
| 28-Jul | 13.0 | 5.840318296 |
| 29-Jul | 13.0 | 5.255570414 |
| 30-Jul | 13.0 | 5.211007972 |
| 31-Jul | 13.0 | 5.103022532 |
| 1-Aug | 13.0 | 4.893136655 |
| 2-Aug | 13.0 | 4.804759429 |
| 3-Aug | 13.0 | 5.645138552 |
| 4-Aug | 13.0 | 5.354670001 |
| 5-Aug | 13.0 | 5.298552191 |
| 6-Aug | 13.0 | 6.085774799 |

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| 7-Aug | 13.0 | 5.59912875 |
| 8-Aug | 13.0 | 5.016892643 |
| 9-Aug | 13.0 | 4.438854157 |
| 10-Aug | 13.0 | 4.725735509 |
| 11-Aug | 13.0 | 4.397335227 |
| 12-Aug | 13.0 | 4.588504502 |
| 13-Aug | 13.0 | 4.383017134 |
| 14-Aug | 13.0 | 3.900199372 |
| 15-Aug | 13.0 | 3.792324471 |
| 16-Aug | 5.0 | 3.459640904 |
| 17-Aug | 5.0 | 3.090486885 |
| 18-Aug | 5.0 | 3.129292409 |
| 19-Aug | 5.0 | 3.733814584 |
| 20-Aug | 5.0 | 3.934774138 |
| 21-Aug | 5.0 | 3.599112234 |
| 22-Aug | 5.0 | 3.241959368 |
| 23-Aug | 5.0 | 3.052231362 |
| 24-Aug | 5.0 | 2.690418354 |
| 25-Aug | 5.0 | 2.483737133 |
| 26-Aug | 5.0 | 2.40767409 |
| 27-Aug | 5.0 | 2.394196299 |
| 28-Aug | 5.0 | 2.393008983 |
| 29-Aug | 5.0 | 2.598586078 |
| 30-Aug | 5.0 | 2.649934444 |
| 31-Aug | 5.0 | 2.928895756 |
| 1-Sep | 5.0 | 3.145677721 |
| 2-Sep | 5.0 | 2.863442219 |
| 3-Sep | 5.0 | 2.778669213 |
| 4-Sep | 5.0 | 2.87939661 |
| 5-Sep | 5.0 | 3.112771801 |
| 6-Sep | 5.0 | 3.683322373 |
| 7-Sep | 5.0 | 3.081863435 |
| 8-Sep | 5.0 | 2.929082851 |
| 9-Sep | 5.0 | 3.115851728 |
| 10-Sep | 5.0 | 2.992902878 |
| 11-Sep | 5.0 | 2.881903758 |
| 12-Sep | 5.0 | 2.942046196 |
| 13-Sep | 5.0 | 3.532440303 |
| 14-Sep | 5.0 | 3.276200706 |
| 15-Sep | 5.0 | 3.092612385 |
| 16-Sep | 5.0 | 2.871338132 |
| 17-Sep | 5.0 | 2.788570732 |
| 18-Sep | 5.0 | 2.675982049 |
| 19-Sep | 5.0 | 3.119852024 |
| 20-Sep | 5.0 | 3.101231337 |
| 21-Sep | 5.0 | 2.854024028 |
| 22-Sep | 5.0 | 3.020852229 |
| 23-Sep | 5.0 | 2.781440195 |
| 24-Sep | 5.0 | 2.795742907 |
| 25-Sep | 5.0 | 3.051405984 |
| 26-Sep | 5.0 | 3.033016489 |

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| 27-Sep | 5.0 | 2.797913472 |
| 28-Sep | 5.0 | 2.651610744 |
| 29-Sep | 5.0 | 2.626852905 |
| 30-Sep | 5.0 | 2.664282196 |
| 1-Oct | 5.0 | 3.220338583 |
| 2-Oct | 5.0 | 3.098846395 |
| 3-Oct | 5.0 | 3.32746156 |
| 4-Oct | 5.0 | 3.580051974 |
| 5-Oct | 5.0 | 3.714342086 |
| 6-Oct | 5.0 | 3.736843002 |
| 7-Oct | 5.0 | 3.806263807 |
| 8-Oct | 5.0 | 4.193701216 |
| 9-Oct | 5.0 | 4.279851314 |
| 10-Oct | 5.0 | 4.324592093 |
| 11-Oct | 5.0 | 3.993974891 |
| 12-Oct | 5.0 | 3.869338016 |
| 13-Oct | 5.0 | 3.928128602 |
| 14-Oct | 5.0 | 3.909902988 |
| 15-Oct | 5.0 | 4.117202758 |
| 16-Oct | 5.0 | 4.330173909 |
| 17-Oct | 5.0 | 4.418245664 |
| 18-Oct | 5.0 | 4.725187226 |
| 19-Oct | 5.0 | 4.485533248 |
| 20-Oct | 5.0 | 4.149146043 |
| 21-Oct | 5.0 | 4.039304637 |
| 22-Oct | 5.0 | 3.873029409 |
| 23-Oct | 5.0 | 3.805598859 |
| 24-Oct | 5.0 | 3.552046305 |
| 25-Oct | 5.0 | 3.515517775 |
| 26-Oct | 5.0 | 3.534088193 |
| 27-Oct | 5.0 | 3.489908548 |
| 28-Oct | 5.0 | 3.711010855 |
| 29-Oct | 5.0 | 3.63473248 |
| 30-Oct | 5.0 | 3.215491637 |
| 31-Oct | 5.0 | 3.350877158 |
| 1-Nov | 5.0 | 3.278512483 |
| 2-Nov | 5.0 | 3.295118195 |
| 3-Nov | 5.0 | 3.358970769 |
| 4-Nov | 5.0 | 3.341858919 |
| 5-Nov | 5.0 | 3.474165749 |
| 6-Nov | 5.0 | 3.562398153 |
| 7-Nov | 5.0 | 3.562212124 |
| 8-Nov | 5.0 | 3.47393347 |
| 9-Nov | 5.0 | 3.399663972 |
| 10-Nov | 5.0 | 3.554749749 |
| 11-Nov | 5.0 | 3.620302083 |
| 12-Nov | 5.0 | 3.699329927 |
| 13-Nov | 5.0 | 3.78327008 |
| 14-Nov | 5.0 | 3.861468245 |
| 15-Nov | 5.0 | 3.919050876 |
| 16-Nov | 5.0 | 4.090583594 |

| | | |
|---|---|---|
| 17-Nov | 5.0 | 4.100655574 |
| 18-Nov | 5.0 | 3.959698429 |
| 19-Nov | 5.0 | 3.94786176 |
| 20-Nov | 5.0 | 3.931962913 |
| 21-Nov | 5.0 | 3.867060578 |
| 22-Nov | 5.0 | 3.844457679 |
| 23-Nov | 5.0 | 3.864392479 |
| 24-Nov | 5.0 | 3.852929357 |
| 25-Nov | 5.0 | 3.827840716 |
| 26-Nov | 5.0 | 3.794782825 |
| 27-Nov | 5.0 | 3.701452183 |
| 28-Nov | 5.0 | 3.645318408 |
| 29-Nov | 5.0 | 3.773739464 |
| 30-Nov | 5.0 | 3.858263953 |
| 1-Dec | 5.0 | 3.867383387 |
| 2-Dec | 5.0 | 3.90600869 |
| 3-Dec | 5.0 | 3.771549733 |
| 4-Dec | 5.0 | 3.862085062 |
| 5-Dec | 5.0 | 4.012143108 |
| 6-Dec | 5.0 | 4.006958657 |
| 7-Dec | 5.0 | 4.023830683 |
| 8-Dec | 5.0 | 3.9349966 |
| 9-Dec | 5.0 | 3.750107937 |
| 10-Dec | 5.0 | 3.697820055 |
| 11-Dec | 5.0 | 3.78859196 |
| 12-Dec | 5.0 | 3.866594989 |
| 13-Dec | 5.0 | 3.940489784 |
| 14-Dec | 5.0 | 3.880700649 |
| 15-Dec | 5.0 | 3.91564994 |
| 16-Dec | 5.0 | 3.981810482 |
| 17-Dec | 5.0 | 4.016177861 |
| 18-Dec | 5.0 | 3.965660082 |
| 19-Dec | 5.0 | 4.009543067 |
| 20-Dec | 5.0 | 3.897484846 |
| 21-Dec | 5.0 | 3.866746313 |
| 22-Dec | 5.0 | 3.852958088 |
| 23-Dec | 5.0 | 3.743649512 |
| 24-Dec | 5.0 | 3.810720448 |
| 25-Dec | 5.0 | 3.858285214 |
| 26-Dec | 5.0 | 3.858955797 |
| 27-Dec | 5.0 | 3.829101196 |
| 28-Dec | 5.0 | 3.726675451 |
| 29-Dec | 5.0 | 3.742789866 |
| 30-Dec | 5.0 | 3.73815924 |
| 31-Dec | 5.0 | 3.704278841 |

## Existing Water Right Information

Staff has analyzed the water rights tabulation and contacted the Division Engineer Office (DEO) to identify any potential water availability problems. There is one decreed surface diversion within this reach of stream, the Elks Beaver Ditch (7 cfs, 1954 appropriation date). Staff has determined that water is available for appropriation on Buzzard Creek, from the headwaters to the Forest Service boundary above the confluence with Little Muddy Creek, to preserve the natural environment to a reasonable degree without limiting or foreclosing the exercise of valid existing water rights.

CWCB Staff's Instream Flow Recommendation

Staff recommends the Board form its intent to appropriate on the following stream reach:

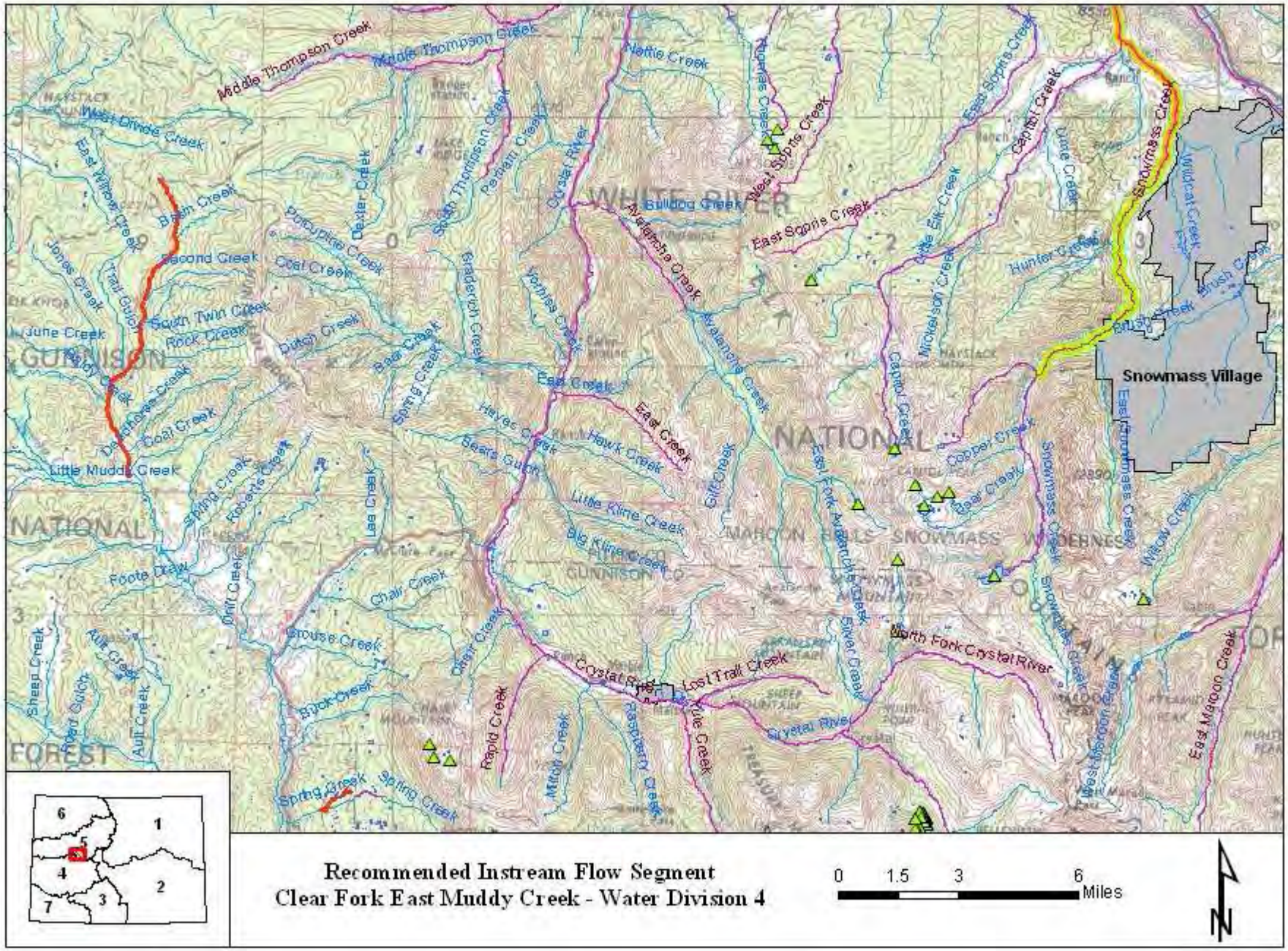
### **Segment:** Headwaters to the Forest Service Boundary above the Confluence with Little Muddy Creek

**Upper Terminus**: HEADWATERS IN THE VICINITY OF
(Latitude 39° 15' 11.7"N) (Longitude 107° 25' 36.9"W)
UTM = 4347686.9 N UTM = 290586.8 E
S22 T9S R90W 6PM
1789' East of the West Section Line; 798' North of the South Section Line

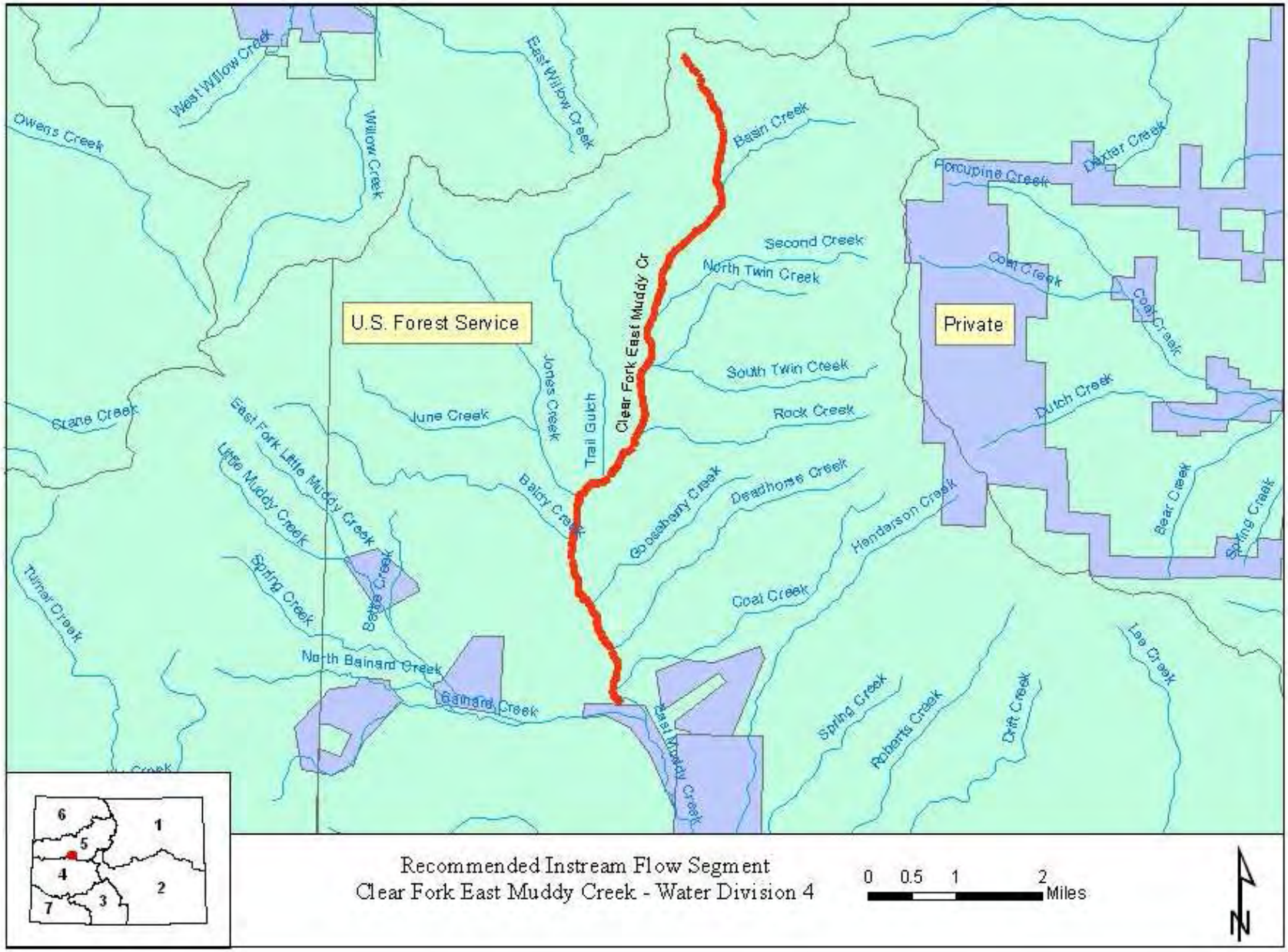
**Lower Terminus**: FOREST SERVICE BOUNDARY ABOVE THE CONLFUENCE WITH LITTLE MUDDY CREEK
(Latitude 39° 8' 45.1"N) (Longitude 107° 26' 10.4"W)
UTM = 4335791 N UTM = 289463.5 E
S34 T10S R90W 6PM
685' West of the East Section Line; 2170' North of the South Section Line

**Watershed:** North Fork Gunnison (HUC#: 14020004)
**Counties**: Gunnison
**Length**: 8.7 miles
**USGS Quad(s)**: Elk Knob, Quaker Mesa
**Flow Recommendation:** 13.0 cfs (April 1 to August 15)
5.0 cfs (August 16 to March 31)

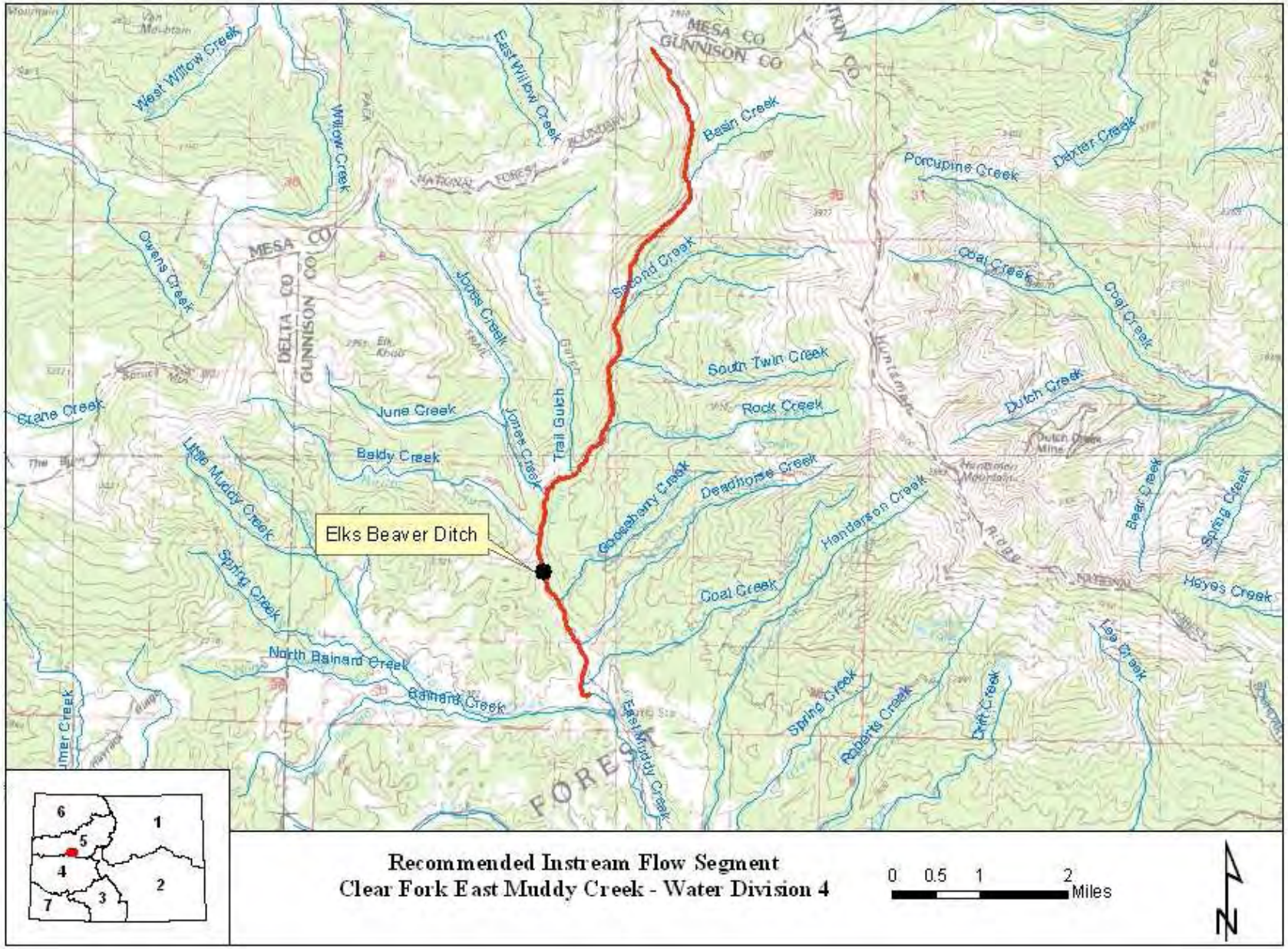
# Vicinity Map



# Land Use Map


U.S. Forest Service
Private
Clear Fork East Muddy Cr
West Willow Creek
East Willow Creek
Willow Creek
Owens Creek
Basin Creek
Porcupine Creek
Dexter Creek
Second Creek
North Twin Creek
Coal Creek
South Twin Creek
Rock Creek
Dutch Creek
Jones Creek
Trail Gulch
June Creek
Crane Creek
East Fork Little Muddy Creek
Little Muddy Creek
Barry Creek
Gooseberry Creek
Deadhorse Creek
Henderson Creek
Bear Creek
Spring Creek
Turner Creek
Spring Creek
Bette Creek
North Bainard Creek
Bainard Creek
East Muddy Creek
Spring Creek
Roberts Creek
Drift Creek
Lee Creek
6
1
5
4
2
7
3
Recommended Instream Flow Segment
Clear Fork East Muddy Creek - Water Division 4
0 0.5 1 2
Miles
N

# Topographic & Water Rights Map



***Greg Espegren***
*Aquatics Specialist*
*Colorado Water Project*
1320 Pearl Street, Suite 320
Boulder, CO 80302
303.440.2937

January 5, 2009

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

Dear Ms. Bassi and Mr. Baessler,

Trout Unlimited in conjunction with the Colorado Division of Wildlife (CDOW) is formally submitting this instream flow recommendation for the Clear Fork of East Muddy Creek, located in Gunnison County, Water Division 4.

**Location and Land Status.** The Clear Fork of Muddy Creek originates at the top of Clear Fork Park near the divide between Gunnison and Mesa Counties at an elevation of just under 9,600 feet. The stream flows generally southward 9.1 miles through the Gunnison National Forest to its confluence with little Muddy Creek at an elevation of 7,450 feet. The proposed ISF reach is from the headwaters to a lower terminus approximately 0.4 miles above its confluence with Little Muddy Creek, just above a streambed road crossing and above the private land where Little Muddy and the Clear Fork come together. The proposed reach is entirely on Forest Service Land. There are, however, small portions of two parcels of private land that are within the reach's drainage basin (Fig. 1).

**Biological Summary and R2CROSS Analysis.** In July of 2007 TU and CDOW collected stream cross sectional data, natural environment data, and other data needed to quantify instream flow needs. Previous survey data collected by CDOW indicated the stream supports healthy populations of Colorado River cutthroat trout, brook trout, and mottled sculpin.

Stream cross sectional data were analyzed using the R2CROSS program, and the output was evaluated using the methods described in Nehring (1979) and Espegren (1996). The R2CROSS models how average depth, percent wetted perimeter and average velocity vary with discharge. According to the criteria established by Nehring (1979), for a stream like the Clear Fork of East Muddy Creek with a bankfull width of 38.9 feet, the relevant minimum requirements are an average depth of 0.39 feet, a wetted perimeter of 50%, and an average velocity of 1.0 ft/sec. Protecting salmonids during the summer season is accomplished by insuring all three criteria are

met while during the winter protection can be accomplished by protecting 2 of three criteria. Thus, the fishery of the Clear Fork of East Muddy Creek can be protected with minimum summer flows of 13.0 cfs and minimum winter flows of 10.4 cfs. However, because spring and late summer water availability is often insufficient for meeting this requirement, we recommend adjusting the ISF requirement to reflect water availability.

Therefore, based on the best available scientific data, TU and CDOW recommend that the CWCB appropriate the following flow amounts to preserve the natural environment of Clear Fork of East Muddy Creek to a reasonable degree:

- From **April 1 through August 15** a flow appropriation of **13.0 cfs** is recommended to maintain the three principal criteria of average depth, average velocity, and percent wetted perimeter;

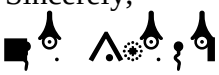
- From **August 16 to March 31** a flow appropriation of **5.0 cfs** is recommended based on water availability limitations.

Attached in Appendix A, please find copies of the field data sheets, the R2CROSS modeling runs, and stream photographs. The modeling results from this survey effort are within the confidence interval produced by the R2CROSS model. If you have any questions regarding the attached information or the instream flow recommendations, please feel free to contact me at (303) 440-2937.

**Relationship to Existing State Policy.** TU and the CDOW are forwarding this stream flow recommendation to the CWCB to meet 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). Further, the CDOW Strategic Plan states "Healthy aquatic environments are essential to maintain healthy and viable fisheries, and critical for self-sustaining populations. The Division desires to protect and enhance the quality and quantity of aquatic habitats." TU and CDOW recommend that Clear Fork East Muddy Creek be considered for inclusion in the Instream Flow Program because doing so would help meet these stated policies. Specifically, establishing minimum flows through this reach would preserve the natural environment of the stream to a reasonable degree.

TU believes that the information provided to the Board is the best scientific data available and that it forms the basis for the Board to make its statutory findings pursuant to C.R.S. 37-92-102(3)(c). Therefore, we recommend that the CWCB make the required findings and appropriate the above-referenced instream flow amounts on Clear Fork of East Muddy Creek. TU thanks the CDOW and CWCB staffs for their support in preparing this recommendation.

Sincerely,



Greg Espegren
Trout Unlimited
Aquatic Specialist

Cc: Jay Skinner, CDOW Water Unit Program Manager – w/o attachments
Mark Uppendahl, CDOW Instream Flow Program Coordinator

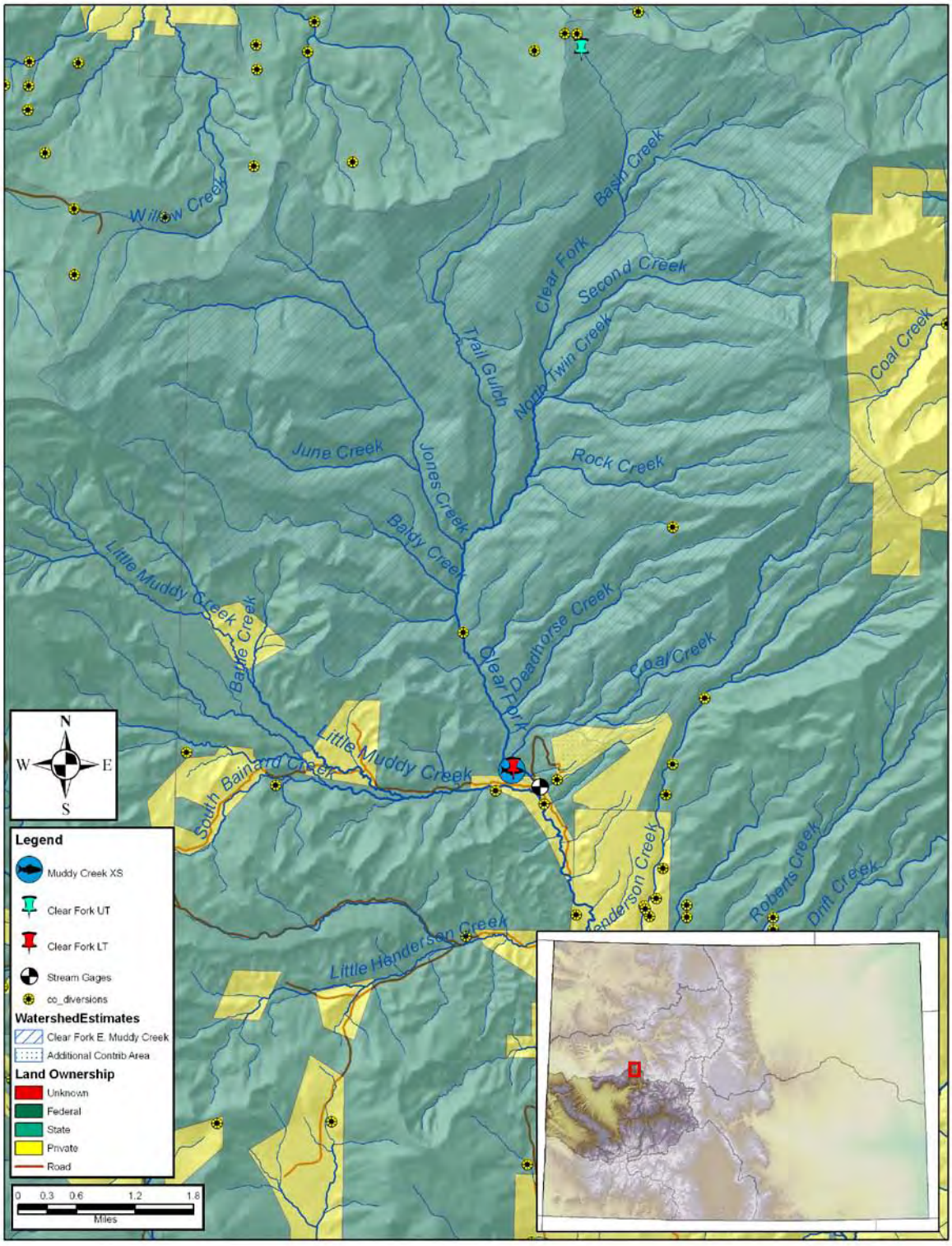



Fig. 1. Map of Clear Fork East Muddy Creek watershed. Positions of upper and lower termini of the proposed instream flow reach are noted as is the location of the R2CROSS cross section. Additionally, locations known diversion structures and stream gages are plotted. This includes USGS gage 09129800, located near the confluence of Little Muddy Creek and the Clear Fork, which was used in the water availability analysis. The watershed's location within Division 4 is indicated by the red box on the inset map of Colorado

***John Roach, Ph.D.***
*Aquatics Specialist*
*Colorado Water Project*
1320 Pearl Street, Suite 320
Boulder, CO 80302
303.440.2937

February 13, 2008

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

Dear Ms. Bassi and Mr. Baessler,

Trout Unlimited in conjunction with the Colorado Division of Wildlife (CDOW) is formally submitting this instream flow recommendation for the Clear Fork of East Muddy Creek, located in Gunnison County, District 4.

**Location and Land Status.** The Clear Fork of Muddy Creek originates at the top of Clear Fork Park near the divide between Gunnison and Mesa Counties at an elevation of just under 9,600 feet. The stream flows generally southward 9.1 miles through the Gunnison National Forest to its confluence with little Muddy Creek at an elevation of 7,450 feet. The proposed ISF reach is from the headwaters to a lower terminus approximately 0.4 miles above its confluence with Little Muddy Creek, just above a streambed road crossing and above the private land where Little Muddy and the Clear Fork come together. The proposed reach is entirely on Forest Service Land. There are, however, small portions of two parcels of private land that are within the reach's drainage basin (Fig. 1).

**Biological Summary and R2CROSS Analysis.** In July of 2007 TU and CDOW collected stream cross sectional data, natural environment data, and other data needed to quantify instream flow needs. Previous survey data collected by CDOW indicated the stream supports healthy populations of Colorado River cutthroat trout, brook trout, and mottled sculpin.

Stream cross sectional data were analyzed using the R2CROSS program, and the output was evaluated using the methods described in Nehring (1979) and Espegren (1996). The R2CROSS models how average depth, percent wetted perimeter and average velocity vary with discharge. According to the criteria established by Nehring (1979), for a stream like the Clear Fork of East Muddy Creek with a bankfull width of 38.9 feet, the relevant minimum requirements are an average depth of 0.39 feet, a wetted perimeter of 50%, and an average velocity of 1.0 ft/sec. Protecting salmonids during the summer season is accomplished by insuring all three criteria are met while during the winter protection can be accomplished by protecting 2 of three criteria.

Thus, the fishery of the Clear Fork of East Muddy Creek can be protected with minimum summer flows of 13.0 cfs and minimum winter flows of 10.4 cfs. However, because spring and late summer water availability is often insufficient for meeting this requirement, we recommend adjusting the ISF requirement to reflect water availability. Therefore, Trout Unlimited and CDOW recommend that the CWCB appropriate the following flow amounts to preserve the natural environment of Clear Fork of East Muddy Creek to a reasonable degree:

- From **March 15 through March 31** a flow appropriation of **5 cfs** is recommended based on water availability limitations;
- From **April 1 through June 30** a flow appropriation of **13 cfs** is recommended to maintain the three principal criteria of average depth, average velocity, and percent wetted perimeter;
- From **July 1 to July 15**, a flow appropriation of **10 cfs** is recommended based on water availability limitations;
- From **July 16 to August 15** a flow appropriation of **5 cfs** is recommended based on water availability limitations;
- From **August 16 to March 14** a flow appropriation of **3.5 cfs** is recommended based on water availability limitations.

The modeling results from this survey effort are within the confidence interval produced by the R2CROSS model (See Appendix A).

**Water Availability.** The USGS maintained a gage (USGS gage 09129800) on Clear Fork of East Muddy Creek (Clear Fork near Ragged Mountain, CO) between October, 1965 and October, 1973. This gage was located slightly downstream of the lower terminus and above the confluence of the Clear Fork and Little Muddy Creek. Using an aerial apportionment approach, we were able to estimate the proportion of discharge passing the USGS gage that would have passed the lower terminus of the instream flow reach (LT). The watershed area above the gage was approximately 38.53 square miles with 38.22 square miles lying above the LT. Thus more than 99% of the flow passing the USGS gage was expected to pass by the LT.

Based on this analysis the recommended ISF were adjusted so that our estimate of average daily flows through Clear Fork of East Muddy Creek during the period of record (10/1/65 to 9/30/73) typically exceeded the recommended flows (Fig. 2) and that 50% of monthly flows were approximately equal to or greater than the recommended flows throughout the year (Table 1).

There are a few existing diversion structures within the watershed. At the top of the watershed near the headwaters of the Clear Fork is the Divide Creek Highline Feeder Ditch (CDSS ID Nos. 577 & 4657), a transbasin structure that has the water rights for 33.3 cfs (1915 appropriation date) and 16.26 cfs (1955 appropriation date). Although there are no recorded diversions on the Structure Summary Report (Appendix B) prior to 1970, it is likely this ditch was operating during the USGS gage's period of record. Although CDSS plots this structure in two locations, it

appears to be one structure with one set of water rights, but two sets of records. This is presumably because it is a transbasin structure.

Lower down in the watershed on Gooseberry Creek, a tributary to the Clear Fork, is the Welch Mesa Ditch which has water rights totaling 21 cfs (appropriation dates 1930 – 1954). Once again, early records are spotty but it assumed that the ditch was active during the USGS gage's period of record.

The last structure is the Elks Beaver ditch located on the mainstem of the Clear Fork just above Gooseberry Creek. This structure has a 7.0 cfs water right (appropriation date 1955). Once again there are few early records of diversion, but we assume the ditch was diverting during the period of record.

If the assumption that the ditches were active during the period of record is correct, then the gaged discharge indicates the true water availability at that point and few modifications are needed. If CWCB's water availability analysis indicates that more water is available than currently expected, the ISF right for those periods where our request was reduced do to lack of water availability should be adjusted accordingly.

**Relationship to Existing State Policy.** Trout Unlimited and the CDOW are forwarding this stream flow recommendation to the CWCB to meet 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). Further, the CDOW Strategic Plan states "Healthy aquatic environments are essential to maintain healthy and viable fisheries, and critical for self-sustaining populations. The Division desires to protect and enhance the quality and quantity of aquatic habitats." TU and CDOW recommend that Clear Fork East Muddy Creek be considered for inclusion in the Instream Flow Program because doing so would help meet these stated policies. Specifically, establishing minimum flows through this reach would preserve the natural environment of the stream to a reasonable degree.

Attached in Appendix A, please find copies of the field data sheets, the R2CROSS modeling runs, and stream photographs. Attached in Appendix B, please find copies of the Structure Summary Reports for the structures in the watershed. If you have any questions regarding the attached information or the instream flow recommendations, please feel free to contact me at (303) 440-2937.

Trout Unlimited thanks the Colorado Division of Wildlife and the Colorado Water Conservation Board Staff for their support in preparing this recommendation.

Sincerely,

W. John Roach, Ph.D.
Trout Unlimited
Aquatic Specialist

Cc: Jay Skinner, CDOW Water Unit Program Manager – w/o attachments
Mark Uppendahl, CDOW Instream Flow Program Coordinator

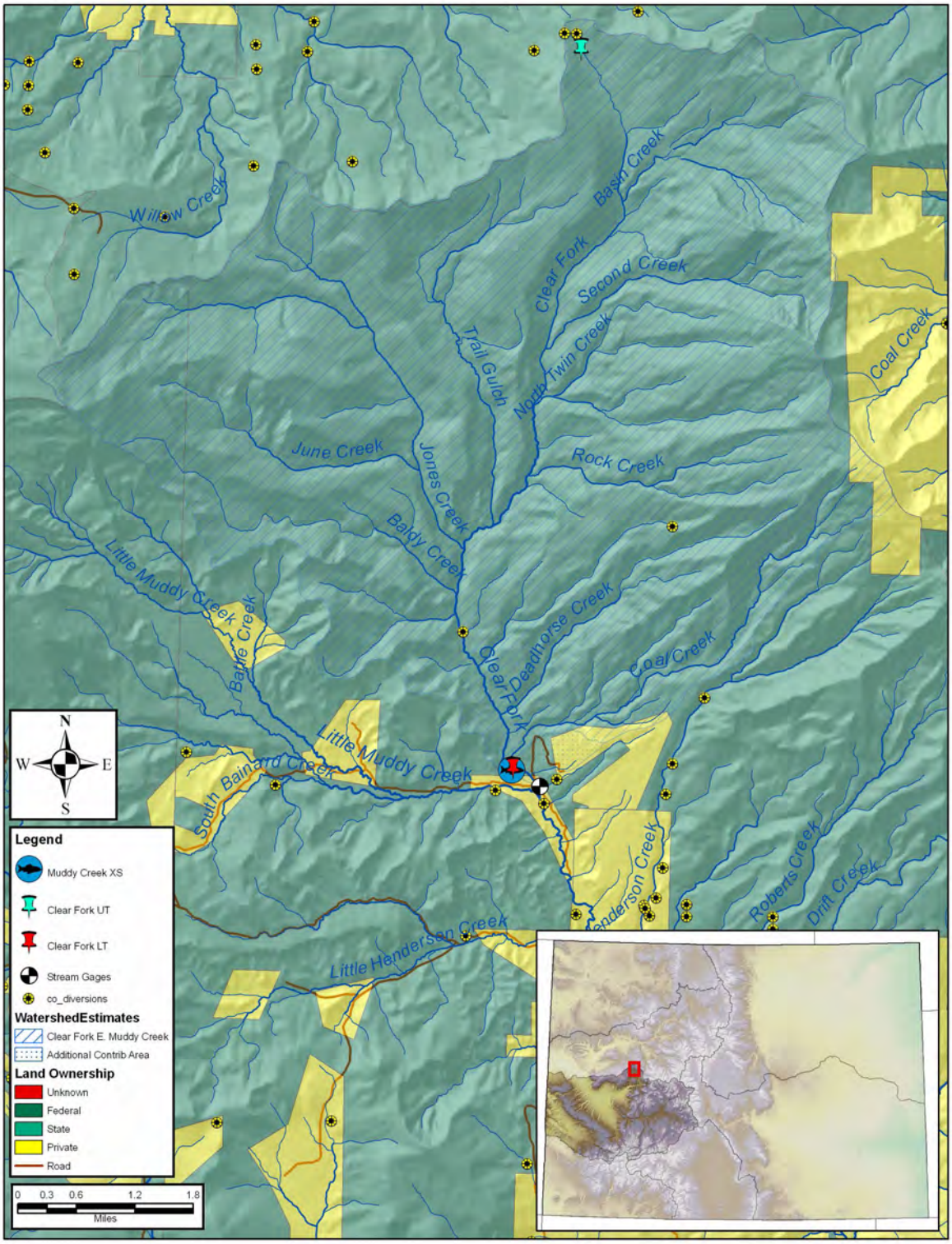



Fig. 1. Map of Clear Fork East Muddy Creek watershed. Positions of upper and lower termini of the proposed instream flow reach are noted as is the location of the R2CROSS cross section. Additionally, locations known diversion structures and stream gages are plotted. This includes USGS gage 09129800, located near the confluence of Little Muddy Creek and the Clear Fork, which was used in the water availability analysis. The watershed's location within Division 4 is indicated by the red box on the inset map of Colorado

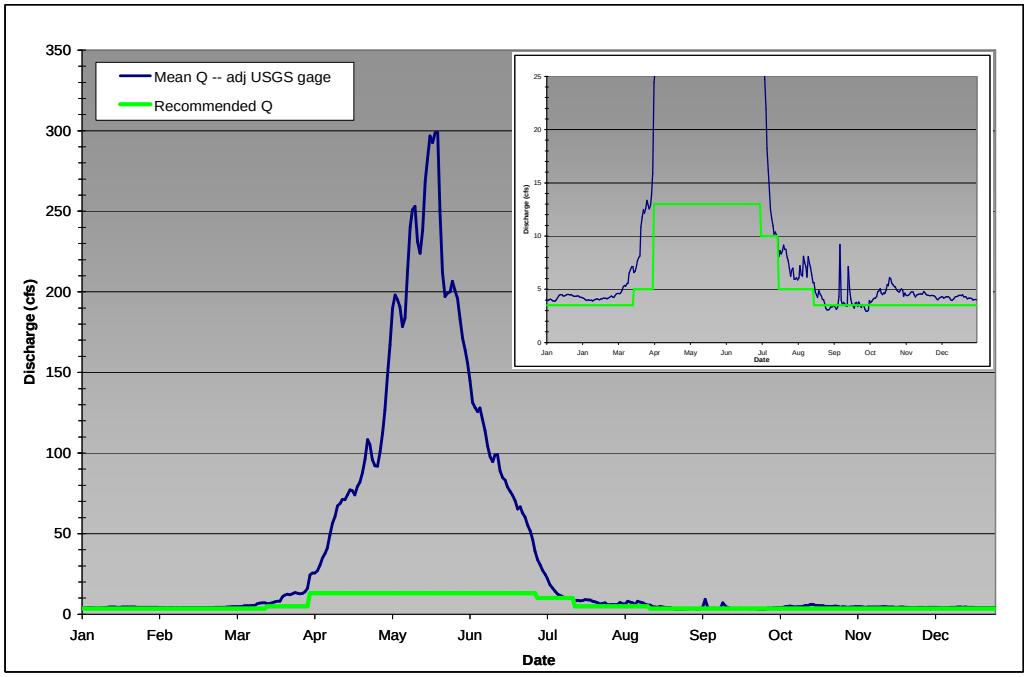



Fig. 2. Recommended instream flow appropriations (green line) as compared to estimated average daily discharge past LT of proposed ISF reach on Clear Fork East Muddy Creek based on aerial apportionment from the USGS gage dark blue. To ease comparisons, the inset plot shows flows under 25 cfs.

Table 1. Summary statistics of estimated mean daily discharge through Clear Fork East Muddy Creek base on aerial apportionment of flow records from USGS Gage 0912980, Clear Fork near Ragged Mountain. For each month, the discharge that 50% of the flows were equal to or greater than is highlighted Yellow indicates summer months and blue indicates winter months.

Monthly Statistics

| | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Annual |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| # days | 248 | 226 | 248 | 240 | 248 | 240 | 248 | 248 | 240 | 248 | 240 | 248 | **2922** |
| Avg Day | 4.27 | 4.12 | 8.50 | 68.14 | 219.73 | 96.07 | 12.37 | 5.24 | 3.86 | 4.81 | 4.46 | 4.22 | **36.32** |
| Max Day | 9 | 8 | 31 | 446 | 683 | 456 | 97 | 35 | 54 | 13 | 11 | 10 | **683** |
| Min Day | 2.08 | 2.28 | 2.78 | 5.75 | 36.71 | 5.66 | 1.89 | 0.60 | 0.69 | 0.40 | 0.60 | 2.18 | **0.40** |
| # months | 8 | 7 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | **7** |
| Sdev Month | 1.85 | 1.73 | 3.76 | 47.67 | 86.32 | 66.67 | 7.64 | 4.39 | 2.81 | 2.60 | 2.58 | 1.74 | |
| Skew Month | 1.17 | 1.49 | 0.98 | 0.53 | 0.37 | 0.70 | 1.54 | 2.30 | 2.20 | 0.28 | 1.05 | 1.06 | |
| Min Month | 2.35 | 2.62 | 4.80 | 16.87 | 116.95 | 24.65 | 4.37 | 1.85 | 1.15 | 1.75 | 1.59 | 2.42 | |
| Max Month | 7.89 | 7.72 | 15.40 | 147.50 | 337.05 | 208.42 | 28.86 | 15.54 | 10.42 | 8.54 | 9.29 | 7.39 | |
| | | | | | | | | | | | | | |
| Percentiles* | | | | | | | | | | | | | |
| 1% | 8.93 | 8.43 | 26.38 | 347.26 | 619.54 | 387.01 | 85.04 | 25.92 | 18.73 | 11.91 | 10.91 | 8.93 | 430.56 |
| 5% | 8.43 | 7.94 | 24.80 | 219.92 | 523.87 | 301.62 | 32.05 | 15.87 | 7.94 | 9.92 | 9.92 | 7.94 | 207.37 |
| 10% | 6.95 | 7.19 | 17.16 | 140.79 | 441.52 | 179.98 | 22.42 | 10.22 | 6.45 | 9.02 | 8.48 | 6.55 | 115.09 |
| 20% | 5.75 | 5.16 | 12.90 | 97.63 | 305.59 | 130.37 | 16.87 | 6.41 | 4.66 | 7.86 | 6.95 | 5.95 | 34.53 |
| **50%** | 3.77 | 3.47 | 6.00 | 46.63 | 188.02 | 73.42 | 7.94 | 3.77 | 2.88 | 3.57 | 3.47 | 3.67 | **5.46** |
| 80% | 2.88 | 2.88 | 4.37 | 17.86 | 105.17 | 31.55 | 4.86 | 2.18 | 1.89 | 2.38 | 2.48 | 2.78 | 2.88 |
| 90% | 2.48 | 2.58 | 3.67 | 12.90 | 85.03 | 23.71 | 3.77 | 1.59 | 1.39 | 1.95 | 2.08 | 2.48 | 2.38 |
| 95% | 2.28 | 2.41 | 3.28 | 7.72 | 60.87 | 18.85 | 2.68 | 1.09 | 0.99 | 0.81 | 1.09 | 2.38 | 1.98 |
| 99% | 2.18 | 2.28 | 2.78 | 5.99 | 40.62 | 6.59 | 2.03 | 0.69 | 0.79 | 0.50 | 0.73 | 2.28 | 0.79 |

* Percentiles estimate the value (discharge) in the record associated with a given percentile. They provide an estimate of the percentage of days on which a given flow is exceeded. Percentiles were calculated using the PERCENTILE function in MicroSoft Excel.

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

LOCATION INFORMATION

| | |
|---|---|
| STREAM NAME: | Clear Fork E. Muddy Creek |
| XS LOCATION: | 50' u/s of Rd Xing @ 39 08 44.4; 107 26 11.4 |
| XS NUMBER: | 1 |
| DATE: | 26-Jul-07 |
| OBSERVERS: | Uppendahl, Roach, H. Skinner |
| 1/4 SEC: | SE |
| SECTION: | 33 |
| TWP: | 10 S |
| RANGE: | 90 W |
| PM: | 6 |
| COUNTY: | Gunnison |
| WATERSHED: | MUDDY CREEK |
| DIVISION: | 4 |
| DOW CODE: | 41753 |
| 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: | 0.01275168 |

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

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

STREAM NAME: Clear Fork E. Muddy Creek
XS LOCATION: 50' u/s of Rd Xing @ 39 08 44.4; 107 26 11.4
XS NUMBER: 1

# DATA POINTS= 48

VALUES COMPUTED FROM RAW FIELD DATA

| FEATURE | DIST | VERT DEPTH | WATER DEPTH | VEL | WETTED PERIM. | WATER DEPTH | AREA (Am) | Q (Qm) | % Q CELL |
|---|---|---|---|---|---|---|---|---|---|
| TS | 0.00 | 4.26 | | | 0.00 | | 0.00 | 0.00 | 0.0% |
| 1 BS | 0.01 | 5.37 | | | 0.00 | | 0.00 | 0.00 | 0.0% |
| | 1.00 | 5.35 | | | 0.00 | | 0.00 | 0.00 | 0.0% |
| | 1.20 | 5.45 | | | 0.00 | | 0.00 | 0.00 | 0.0% |
| | 3.10 | 5.60 | | | 0.00 | | 0.00 | 0.00 | 0.0% |
| | 4.00 | 5.75 | | | 0.00 | | 0.00 | 0.00 | 0.0% |
| | 5.00 | 5.91 | | | 0.00 | | 0.00 | 0.00 | 0.0% |
| | 6.00 | 6.15 | | | 0.00 | | 0.00 | 0.00 | 0.0% |
| | 7.00 | 6.29 | | | 0.00 | | 0.00 | 0.00 | 0.0% |
| W | 7.30 | 6.63 | 0.00 | 0.00 | 0.00 | | 0.00 | 0.00 | 0.0% |
| | 7.80 | 6.80 | 0.20 | 0.27 | 0.53 | 0.20 | 0.08 | 0.02 | 0.2% |
| | 8.10 | 7.00 | 0.35 | 0.24 | 0.36 | 0.35 | 0.30 | 0.07 | 0.7% |
| | 9.50 | 6.80 | 0.15 | 0.00 | 1.41 | 0.15 | 0.22 | 0.00 | 0.0% |
| | 11.00 | 6.75 | 0.10 | 0.00 | 1.50 | 0.10 | 0.15 | 0.00 | 0.0% |
| | 12.50 | 6.80 | 0.15 | 0.00 | 1.50 | 0.15 | 0.23 | 0.00 | 0.0% |
| | 14.00 | 6.95 | 0.25 | 0.61 | 1.51 | 0.25 | 0.31 | 0.19 | 2.0% |
| | 15.00 | 6.85 | 0.20 | 0.87 | 1.00 | 0.20 | 0.20 | 0.17 | 1.8% |
| | 16.00 | 6.95 | 0.30 | 1.39 | 1.00 | 0.30 | 0.30 | 0.42 | 4.3% |
| | 17.00 | 7.07 | 0.45 | 0.12 | 1.01 | 0.45 | 0.45 | 0.05 | 0.6% |
| | 18.00 | 7.10 | 0.40 | 1.12 | 1.00 | 0.40 | 0.40 | 0.45 | 4.6% |
| | 19.00 | 7.05 | 0.45 | 1.50 | 1.00 | 0.45 | 0.45 | 0.68 | 6.9% |
| | 20.00 | 6.90 | 0.20 | 0.97 | 1.01 | 0.20 | 0.20 | 0.19 | 2.0% |
| | 21.00 | 7.00 | 0.30 | -0.17 | 1.00 | 0.30 | 0.30 | -0.05 | -0.5% |
| | 22.00 | 7.15 | 0.50 | 0.58 | 1.01 | 0.50 | 0.50 | 0.29 | 3.0% |
| | 23.00 | 7.05 | 0.40 | 1.33 | 1.00 | 0.40 | 0.40 | 0.53 | 5.5% |
| | 24.00 | 7.05 | 0.40 | 1.17 | 1.00 | 0.40 | 0.40 | 0.47 | 4.8% |
| | 25.00 | 7.02 | 0.30 | 1.37 | 1.00 | 0.30 | 0.30 | 0.41 | 4.2% |
| | 26.00 | 7.00 | 0.30 | 1.23 | 1.00 | 0.30 | 0.30 | 0.37 | 3.8% |
| | 27.00 | 6.95 | 0.20 | 0.80 | 1.00 | 0.20 | 0.20 | 0.16 | 1.6% |
| | 28.00 | 7.00 | 0.20 | 0.94 | 1.00 | 0.20 | 0.20 | 0.19 | 1.9% |
| | 29.00 | 6.95 | 0.25 | 0.84 | 1.00 | 0.25 | 0.25 | 0.21 | 2.2% |
| | 30.00 | 7.05 | 0.35 | 0.45 | 1.00 | 0.35 | 0.35 | 0.16 | 1.6% |
| | 31.00 | 7.10 | 0.40 | 1.26 | 1.00 | 0.40 | 0.35 | 0.44 | 4.5% |
| | 31.75 | 7.10 | 0.40 | 2.10 | 0.75 | 0.40 | 0.30 | 0.63 | 6.5% |
| | 32.50 | 7.20 | 0.45 | 1.11 | 0.76 | 0.45 | 0.34 | 0.37 | 3.8% |
| | 33.25 | 7.30 | 0.60 | 1.15 | 0.76 | 0.60 | 0.45 | 0.52 | 5.3% |
| | 34.00 | 7.30 | 0.60 | 1.10 | 0.75 | 0.60 | 0.45 | 0.50 | 5.1% |
| | 34.75 | 7.25 | 0.55 | 2.04 | 0.75 | 0.55 | 0.41 | 0.84 | 8.6% |
| | 35.50 | 7.25 | 0.55 | 1.71 | 0.75 | 0.55 | 0.41 | 0.71 | 7.2% |
| | 36.25 | 7.25 | 0.60 | 1.09 | 0.75 | 0.60 | 0.45 | 0.49 | 5.0% |
| | 37.00 | 7.15 | 0.40 | 0.81 | 0.76 | 0.40 | 0.33 | 0.27 | 2.7% |
| W | 37.90 | 6.63 | 0.00 | 0.00 | 1.04 | | 0.00 | 0.00 | 0.0% |
| | 38.50 | 6.05 | | | 0.00 | | 0.00 | 0.00 | 0.0% |
| | 39.50 | 5.75 | | | 0.00 | | 0.00 | 0.00 | 0.0% |
| 1 G | 40.50 | 4.90 | | | 0.00 | | 0.00 | 0.00 | 0.0% |
| | 41.65 | 3.55 | | | 0.00 | | 0.00 | 0.00 | 0.0% |
| BS | 43.00 | 2.90 | | | 0.00 | | 0.00 | 0.00 | 0.0% |
| TS | 43.00 | 2.10 | | | 0.00 | | 0.00 | 0.00 | 0.0% |
| TOTALS ---------- | | | | | 30.93 | 0.6 (Max.) | 9.98 | 9.74 | 100.0% |

Manning's n = 0.0808
Hydraulic Radius= 0.322451774

STREAM NAME: Clear Fork E. Muddy Creek
XS LOCATION: 50' u/s of Rd Xing @ 39 08 44.4; 107 26 11.4
XS NUMBER: 1

WATER LINE COMPARISON TABLE

| WATER LINE | MEAS AREA | COMP AREA | AREA ERROR |
|---|---|---|---|
| | 9.98 | 11.54 | 15.7% |
| 6.38 | 9.98 | 19.25 | 93.0% |
| 6.40 | 9.98 | 18.63 | 86.8% |
| 6.42 | 9.98 | 18.01 | 80.6% |
| 6.44 | 9.98 | 17.39 | 74.4% |
| 6.46 | 9.98 | 16.77 | 68.2% |
| 6.48 | 9.98 | 16.16 | 62.0% |
| 6.50 | 9.98 | 15.54 | 55.8% |
| 6.52 | 9.98 | 14.92 | 49.6% |
| 6.54 | 9.98 | 14.31 | 43.4% |
| 6.56 | 9.98 | 13.69 | 37.3% |
| 6.58 | 9.98 | 13.08 | 31.1% |
| 6.59 | 9.98 | 12.77 | 28.0% |
| 6.60 | 9.98 | 12.46 | 24.9% |
| 6.61 | 9.98 | 12.16 | 21.9% |
| 6.62 | 9.98 | 11.85 | 18.8% |
| 6.63 | 9.98 | 11.54 | 15.7% |
| 6.64 | 9.98 | 11.24 | 12.7% |
| 6.65 | 9.98 | 10.93 | 9.6% |
| 6.66 | 9.98 | 10.63 | 6.6% |
| 6.67 | 9.98 | 10.32 | 3.5% |
| 6.68 | 9.98 | 10.02 | 0.5% |
| 6.70 | 9.98 | 9.41 | -5.6% |
| 6.72 | 9.98 | 8.81 | -11.7% |
| 6.74 | 9.98 | 8.21 | -17.7% |
| 6.76 | 9.98 | 7.61 | -23.7% |
| 6.78 | 9.98 | 7.03 | -29.5% |
| 6.80 | 9.98 | 6.48 | -35.0% |
| 6.82 | 9.98 | 5.95 | -40.3% |
| 6.84 | 9.98 | 5.43 | -45.6% |
| 6.86 | 9.98 | 4.91 | -50.7% |
| 6.88 | 9.98 | 4.41 | -55.7% |

WATERLINE AT ZERO
AREA ERROR = 6.682

STREAM NAME: Clear Fork E. Muddy Creek
XS LOCATION: 50' u/s of Rd Xing @ 39 08 44.4; 107 26 11.4
XS NUMBER: 1

Constant Manning's n

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

STAGING TABLE

| | 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* | 5.37 | 38.91 | 1.39 | 1.93 | 54.17 | 39.90 | 100.0% | 1.36 | 137.96 | 2.55 |
| | 5.68 | 35.99 | 1.18 | 1.62 | 42.47 | 36.84 | 92.3% | 1.15 | 96.99 | 2.28 |
| | 5.73 | 35.63 | 1.14 | 1.57 | 40.68 | 36.46 | 91.4% | 1.12 | 90.90 | 2.23 |
| | 5.78 | 35.20 | 1.11 | 1.52 | 38.91 | 36.01 | 90.2% | 1.08 | 85.10 | 2.19 |
| | 5.83 | 34.72 | 1.07 | 1.47 | 37.16 | 35.52 | 89.0% | 1.05 | 79.54 | 2.14 |
| | 5.88 | 34.24 | 1.03 | 1.42 | 35.43 | 35.03 | 87.8% | 1.01 | 74.17 | 2.09 |
| | 5.93 | 33.81 | 1.00 | 1.37 | 33.73 | 34.58 | 86.7% | 0.98 | 68.92 | 2.04 |
| | 5.98 | 33.43 | 0.96 | 1.32 | 32.05 | 34.19 | 85.7% | 0.94 | 63.77 | 1.99 |
| | 6.03 | 33.06 | 0.92 | 1.27 | 30.39 | 33.80 | 84.7% | 0.90 | 58.80 | 1.93 |
| | 6.08 | 32.75 | 0.88 | 1.22 | 28.75 | 33.48 | 83.9% | 0.86 | 53.94 | 1.88 |
| | 6.13 | 32.49 | 0.83 | 1.17 | 27.12 | 33.19 | 83.2% | 0.82 | 49.22 | 1.82 |
| | 6.18 | 32.14 | 0.79 | 1.12 | 25.50 | 32.82 | 82.2% | 0.78 | 44.77 | 1.76 |
| | 6.23 | 31.73 | 0.75 | 1.07 | 23.90 | 32.38 | 81.2% | 0.74 | 40.55 | 1.70 |
| | 6.28 | 31.32 | 0.71 | 1.02 | 22.33 | 31.95 | 80.1% | 0.70 | 36.52 | 1.64 |
| | 6.33 | 31.17 | 0.67 | 0.97 | 20.76 | 31.76 | 79.6% | 0.65 | 32.49 | 1.56 |
| | 6.38 | 31.08 | 0.62 | 0.92 | 19.21 | 31.62 | 79.3% | 0.61 | 28.62 | 1.49 |
| | 6.43 | 30.98 | 0.57 | 0.87 | 17.66 | 31.49 | 78.9% | 0.56 | 24.94 | 1.41 |
| | 6.48 | 30.88 | 0.52 | 0.82 | 16.11 | 31.35 | 78.6% | 0.51 | 21.47 | 1.33 |
| | 6.53 | 30.79 | 0.47 | 0.77 | 14.57 | 31.21 | 78.2% | 0.47 | 18.21 | 1.25 |
| | 6.58 | 30.69 | 0.42 | 0.72 | 13.03 | 31.07 | 77.9% | 0.42 | 15.17 | 1.16 |
| | 6.63 | 30.59 | 0.38 | 0.67 | 11.50 | 30.93 | 77.5% | 0.37 | 12.35 | 1.07 |
| *WL* | 6.68 | 30.36 | 0.33 | 0.62 | 9.97 | 30.67 | 76.9% | 0.33 | 9.80 | 0.98 |
| | 6.73 | 30.13 | 0.28 | 0.57 | 8.46 | 30.42 | 76.2% | 0.28 | 7.49 | 0.89 |
| | 6.78 | 28.00 | 0.25 | 0.52 | 6.99 | 28.27 | 70.9% | 0.25 | 5.72 | 0.82 |
| | 6.83 | 26.17 | 0.22 | 0.47 | 5.65 | 26.41 | 66.2% | 0.21 | 4.20 | 0.74 |
| | 6.88 | 24.53 | 0.18 | 0.42 | 4.38 | 24.73 | 62.0% | 0.18 | 2.87 | 0.65 |
| | 6.93 | 21.99 | 0.15 | 0.37 | 3.21 | 22.15 | 55.5% | 0.14 | 1.84 | 0.57 |
| | 6.98 | 17.62 | 0.13 | 0.32 | 2.21 | 17.73 | 44.4% | 0.12 | 1.14 | 0.52 |
| | 7.03 | 13.24 | 0.11 | 0.27 | 1.44 | 13.32 | 33.4% | 0.11 | 0.68 | 0.47 |
| | 7.08 | 8.62 | 0.10 | 0.22 | 0.90 | 8.67 | 21.7% | 0.10 | 0.41 | 0.46 |
| | 7.13 | 5.35 | 0.11 | 0.17 | 0.57 | 5.38 | 13.5% | 0.11 | 0.27 | 0.47 |
| | 7.18 | 4.40 | 0.08 | 0.12 | 0.33 | 4.42 | 11.1% | 0.08 | 0.12 | 0.37 |
| | 7.23 | 3.65 | 0.04 | 0.07 | 0.13 | 3.66 | 9.2% | 0.04 | 0.03 | 0.23 |
| | 7.28 | 1.17 | 0.02 | 0.02 | 0.02 | 1.17 | 2.9% | 0.02 | 0.00 | 0.13 |

2.5 0.4

$Q_R = 24.4 - 3.9$

3/3 = 13.0

2/3 = 10.4

STREAM NAME: Clear Fork E. Muddy Creek
XS LOCATION: 50' u/s of Rd Xing @ 39 08 44.4; 107 26 11.4
XS NUMBER: 1

SUMMARY SHEET

| | | |
|---|---|---|
| MEASURED FLOW (Qm)= | 9.74 | cfs |
| CALCULATED FLOW (Qc)= | 9.80 | cfs |
| (Qm-Qc)/Qm * 100 = | -0.6 | % |
| MEASURED WATERLINE (WLm)= | 6.63 | ft |
| CALCULATED WATERLINE (WLc)= | 6.68 | ft |
| (WLm-WLc)/WLm * 100 = | -0.8 | % |
| MAX MEASURED DEPTH (Dm)= | 0.60 | ft |
| MAX CALCULATED DEPTH (Dc)= | 0.62 | ft |
| (Dm-Dc)/Dm * 100 | -3.1 | % |
| MEAN VELOCITY= | 0.98 | ft/sec |
| MANNING'S N= | 0.081 | |
| SLOPE= | 0.01275168 | ft/ft |
| .4 * Qm = | 3.9 | cfs |
| 2.5 * Qm= | 24.4 | cfs |

RECOMMENDED INSTREAM FLOW:

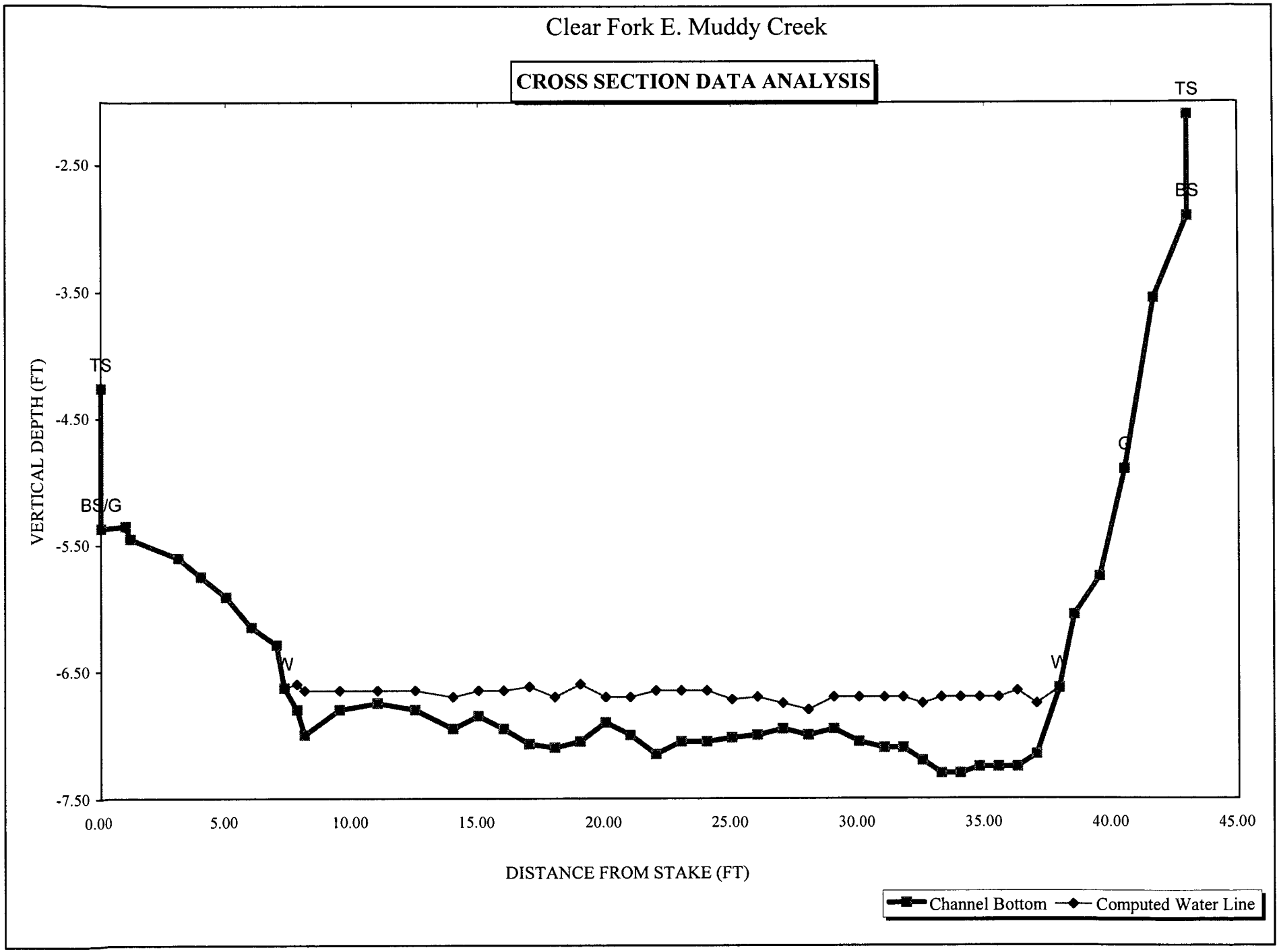
| FLOW (CFS) | PERIOD |
|---|---|
| | |
| | |
| | |
| | |

RATIONALE FOR RECOMMENDATION:

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

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

Clear Fork E. Muddy Creek



STREAM NAME: Clear Fork E. Muddy Creek
XS LOCATION: 50' u/s of Rd Xing @ 39 08 44.4; 107 26 11.4
XS NUMBER: 1

Thorne-Zevenbergen D84 Correction Applied
**Estimated D84 =** 0.37

STAGING TABLE

*GL* = lowest Grassline elevation corrected for sag
*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* | 5.37 | 38.91 | 1.39 | 1.93 | 54.17 | 39.90 | 100.0% | 1.36 | 249.44 | 4.60 |
| | 5.68 | 35.99 | 1.18 | 1.62 | 42.47 | 36.84 | 92.3% | 1.15 | 168.38 | 3.96 |
| | 5.73 | 35.63 | 1.14 | 1.57 | 40.68 | 36.46 | 91.4% | 1.12 | 156.52 | 3.85 |
| | 5.78 | 35.20 | 1.11 | 1.52 | 38.91 | 36.01 | 90.2% | 1.08 | 145.30 | 3.73 |
| | 5.83 | 34.72 | 1.07 | 1.47 | 37.16 | 35.52 | 89.0% | 1.05 | 134.64 | 3.62 |
| | 5.88 | 34.24 | 1.03 | 1.42 | 35.43 | 35.03 | 87.8% | 1.01 | 124.38 | 3.51 |
| | 5.93 | 33.81 | 1.00 | 1.37 | 33.73 | 34.58 | 86.7% | 0.98 | 114.41 | 3.39 |
| | 5.98 | 33.43 | 0.96 | 1.32 | 32.05 | 34.19 | 85.7% | 0.94 | 104.69 | 3.27 |
| | 6.03 | 33.06 | 0.92 | 1.27 | 30.39 | 33.80 | 84.7% | 0.90 | 95.39 | 3.14 |
| | 6.08 | 32.75 | 0.88 | 1.22 | 28.75 | 33.48 | 83.9% | 0.86 | 86.35 | 3.00 |
| | 6.13 | 32.49 | 0.83 | 1.17 | 27.12 | 33.19 | 83.2% | 0.82 | 77.65 | 2.86 |
| | 6.18 | 32.14 | 0.79 | 1.12 | 25.50 | 32.82 | 82.2% | 0.78 | 69.55 | 2.73 |
| | 6.23 | 31.73 | 0.75 | 1.07 | 23.90 | 32.38 | 81.2% | 0.74 | 61.96 | 2.59 |
| | 6.28 | 31.32 | 0.71 | 1.02 | 22.33 | 31.95 | 80.1% | 0.70 | 54.79 | 2.45 |
| | 6.33 | 31.17 | 0.67 | 0.97 | 20.76 | 31.76 | 79.6% | 0.65 | 47.69 | 2.30 |
| | 6.38 | 31.08 | 0.62 | 0.92 | 19.21 | 31.62 | 79.3% | 0.61 | 40.97 | 2.13 |
| | 6.43 | 30.98 | 0.57 | 0.87 | 17.66 | 31.49 | 78.9% | 0.56 | 34.71 | 1.97 |
| | 6.48 | 30.88 | 0.52 | 0.82 | 16.11 | 31.35 | 78.6% | 0.51 | 28.91 | 1.79 |
| | 6.53 | 30.79 | 0.47 | 0.77 | 14.57 | 31.21 | 78.2% | 0.47 | 23.60 | 1.62 |
| | 6.58 | 30.69 | 0.42 | 0.72 | 13.03 | 31.07 | 77.9% | 0.42 | 18.77 | 1.44 |
| | 6.63 | 30.59 | 0.38 | 0.67 | 11.50 | 30.93 | 77.5% | 0.37 | 13.26 | 1.15 |
| *WL* | 6.68 | 30.36 | 0.33 | 0.62 | 9.97 | 30.67 | 76.9% | 0.33 | 9.80 | 0.98 |
| | 6.73 | 30.13 | 0.28 | 0.57 | 8.46 | 30.42 | 76.2% | 0.28 | 7.02 | 0.83 |
| | 6.78 | 28.00 | 0.25 | 0.52 | 6.99 | 28.27 | 70.9% | 0.25 | 5.21 | 0.75 |
| | 6.83 | 26.17 | 0.22 | 0.47 | 5.65 | 26.41 | 66.2% | 0.21 | 3.71 | 0.66 |
| | 6.88 | 24.53 | 0.18 | 0.42 | 4.38 | 24.73 | 62.0% | 0.18 | 2.48 | 0.57 |
| | 6.93 | 21.99 | 0.15 | 0.37 | 3.21 | 22.15 | 55.5% | 0.14 | 1.58 | 0.49 |
| | 6.98 | 17.62 | 0.13 | 0.32 | 2.21 | 17.73 | 44.4% | 0.12 | 0.96 | 0.43 |
| | 7.03 | 13.24 | 0.11 | 0.27 | 1.44 | 13.32 | 33.4% | 0.11 | 0.55 | 0.38 |
| | 7.08 | 8.62 | 0.10 | 0.22 | 0.90 | 8.67 | 21.7% | 0.10 | 0.30 | 0.33 |
| | 7.13 | 5.35 | 0.11 | 0.17 | 0.57 | 5.38 | 13.5% | 0.11 | 0.17 | 0.30 |
| | 7.18 | 4.40 | 0.08 | 0.12 | 0.33 | 4.42 | 11.1% | 0.08 | 0.07 | 0.21 |
| | 7.23 | 3.65 | 0.04 | 0.07 | 0.13 | 3.66 | 9.2% | 0.04 | 0.02 | 0.14 |
| | 7.28 | 1.17 | 0.02 | 0.02 | 0.02 | 1.17 | 2.9% | 0.02 | 0.00 | 0.05 |

## Data Input & Proofing

STREAM NAME: Clear Fork E. Muddy Creek
XS LOCATION: 50' u/s of Rd Xing @ 39 08 44.4; 107 26 11.4
XS NUMBER: 1
DATE: 7/26/2007
OBSERVERS: Uppendahl, Roach, H. Skinner

1/4 SEC: SE
SECTION: 33
TWP: 10 S
RANGE: 90 W
PM: 6

COUNTY:
WATERSHED: MUDDY CREEK
DIVISION: 4
DOW CODE:
USGS MAP:
USFS MAP:

Level and Rod Survey

TAPE WT: 0.0106 lbs / ft
TENSION: 99999 lbs

SLOPE: 0.012751678 ft / ft

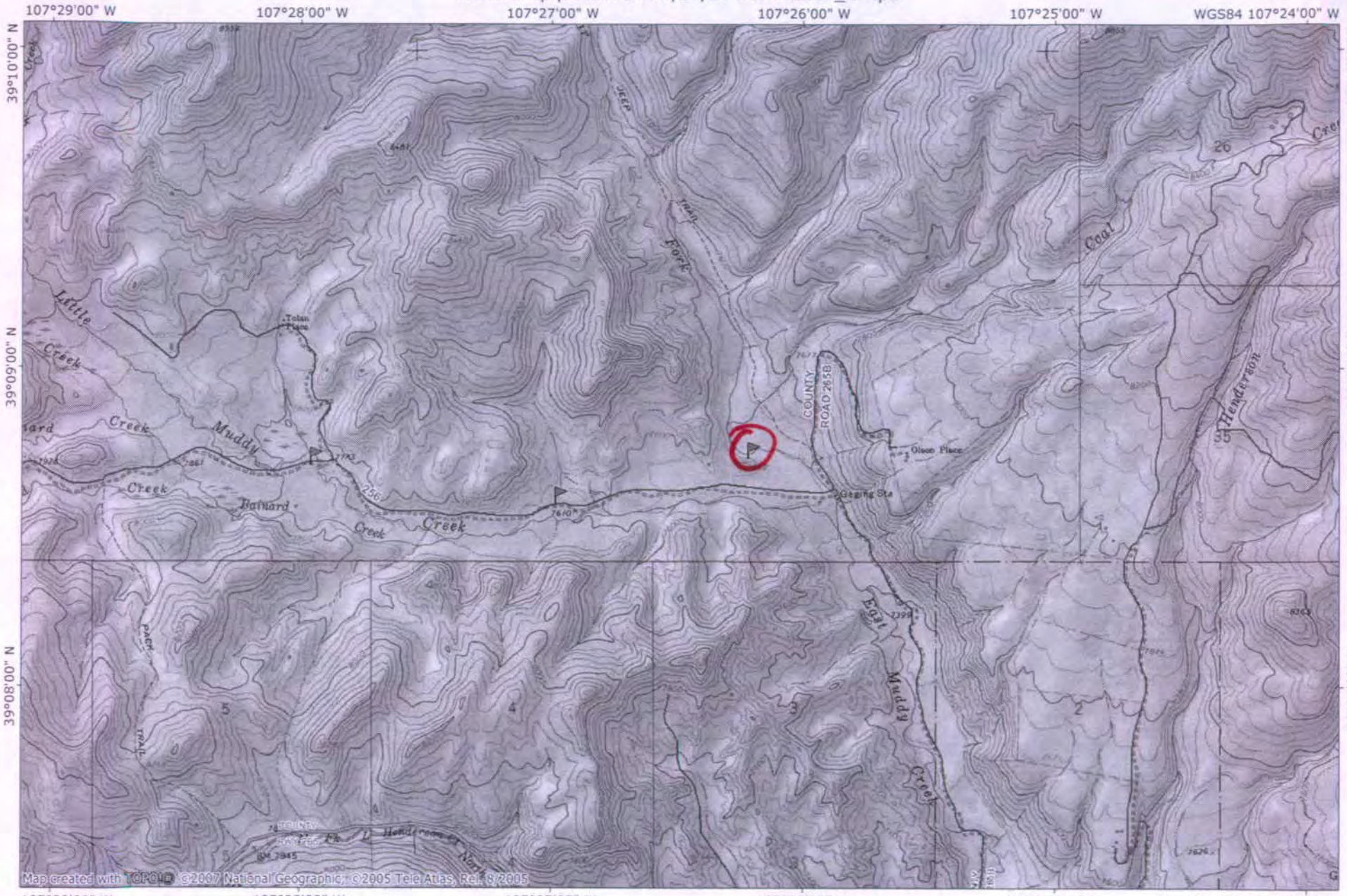
CHECKED BY:.....DATE.....

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

Total Data Points = 48

| GL=1 | FEATURE | DIST | VERT DEPTH | WATER DEPTH | VEL | A | Q | Tape to Water |
|---|---|---|---|---|---|---|---|---|
| | TS | 0.00 | 4.26 | | | 0.00 | 0.00 | 0.00 |
| 1 | BS/G | 0.01 | 5.37 | | | 0.00 | 0.00 | 0.00 |
| | | 1.00 | 5.35 | | | 0.00 | 0.00 | 0.00 |
| | | 1.20 | 5.45 | | | 0.00 | 0.00 | 0.00 |
| | | 3.10 | 5.60 | | | 0.00 | 0.00 | 0.00 |
| | | 4.00 | 5.75 | | | 0.00 | 0.00 | 0.00 |
| | | 5.00 | 5.91 | | | 0.00 | 0.00 | 0.00 |
| | | 6.00 | 6.15 | | | 0.00 | 0.00 | 0.00 |
| | | 7.00 | 6.29 | | | 0.00 | 0.00 | 0.00 |
| | W | 7.30 | 6.63 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | | 7.80 | 6.80 | 0.20 | 0.27 | 0.08 | 0.02 | 6.60 |
| | | 8.10 | 7.00 | 0.35 | 0.24 | 0.30 | 0.07 | 6.65 |
| | | 9.50 | 6.80 | 0.15 | 0.00 | 0.22 | 0.00 | 6.65 |
| | | 11.00 | 6.75 | 0.10 | 0.00 | 0.15 | 0.00 | 6.65 |
| | | 12.50 | 6.80 | 0.15 | 0.00 | 0.23 | 0.00 | 6.65 |
| | | 14.00 | 6.95 | 0.25 | 0.61 | 0.31 | 0.19 | 6.70 |
| | | 15.00 | 6.85 | 0.20 | 0.87 | 0.20 | 0.17 | 6.65 |
| | | 16.00 | 6.95 | 0.30 | 1.39 | 0.30 | 0.42 | 6.65 |
| | | 17.00 | 7.07 | 0.45 | 0.12 | 0.45 | 0.05 | 6.62 |
| | | 18.00 | 7.10 | 0.40 | 1.12 | 0.40 | 0.45 | 6.70 |
| | | 19.00 | 7.05 | 0.45 | 1.50 | 0.45 | 0.68 | 6.60 |
| | | 20.00 | 6.90 | 0.20 | 0.97 | 0.20 | 0.19 | 6.70 |
| | | 21.00 | 7.00 | 0.30 | -0.17 | 0.30 | -0.05 | 6.70 |
| | | 22.00 | 7.15 | 0.50 | 0.58 | 0.50 | 0.29 | 6.65 |
| | | 23.00 | 7.05 | 0.40 | 1.33 | 0.40 | 0.53 | 6.65 |
| | | 24.00 | 7.05 | 0.40 | 1.17 | 0.40 | 0.47 | 6.65 |
| | | 25.00 | 7.02 | 0.30 | 1.37 | 0.30 | 0.41 | 6.72 |
| | | 26.00 | 7.00 | 0.30 | 1.23 | 0.30 | 0.37 | 6.70 |
| | | 27.00 | 6.95 | 0.20 | 0.80 | 0.20 | 0.16 | 6.75 |
| | | 28.00 | 7.00 | 0.20 | 0.94 | 0.20 | 0.19 | 6.80 |
| | | 29.00 | 6.95 | 0.25 | 0.84 | 0.25 | 0.21 | 6.70 |
| | | 30.00 | 7.05 | 0.35 | 0.45 | 0.35 | 0.16 | 6.70 |
| | | 31.00 | 7.10 | 0.40 | 1.26 | 0.35 | 0.44 | 6.70 |
| | | 31.75 | 7.10 | 0.40 | 2.10 | 0.30 | 0.63 | 6.70 |
| | | 32.50 | 7.20 | 0.45 | 1.11 | 0.34 | 0.37 | 6.75 |
| | | 33.25 | 7.30 | 0.60 | 1.15 | 0.45 | 0.52 | 6.70 |
| | | 34.00 | 7.30 | 0.60 | 1.10 | 0.45 | 0.50 | 6.70 |
| | | 34.75 | 7.25 | 0.55 | 2.04 | 0.41 | 0.84 | 6.70 |
| | | 35.50 | 7.25 | 0.55 | 1.71 | 0.41 | 0.71 | 6.70 |
| | | 36.25 | 7.25 | 0.60 | 1.09 | 0.45 | 0.49 | 6.65 |
| | | 37.00 | 7.15 | 0.40 | 0.81 | 0.33 | 0.27 | 6.75 |
| | W | 37.90 | 6.63 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | | 38.50 | 6.05 | | | 0.00 | 0.00 | 0.00 |
| | | 39.50 | 5.75 | | | 0.00 | 0.00 | 0.00 |
| 1 | G | 40.50 | 4.90 | | | 0.00 | 0.00 | 0.00 |
| | | 41.65 | 3.55 | | | 0.00 | 0.00 | 0.00 |
| | BS | 43.00 | 2.90 | | | 0.00 | 0.00 | 0.00 |
| | TS | 43.00 | 2.10 | | | 0.00 | 0.00 | 0.00 |
| | | | | | Totals | 9.98 | 9.74 | |

TOPO! map printed on 07/27/07 from "2007_isf.tpo"




NATIONAL GEOGRAPHIC

MILES
FEET
KILOMETERS
METERS

TN * MN
10½°
07/27/07

COLORADO WATER CONSERVATION BOARD

# FIELD DATA FOR INSTREAM FLOW DETERMINATIONS

COLORADO DIVISION OF WILDLIFE

## LOCATION INFORMATION

| | | | | | | |
|---|---|---|---|---|---|---|
| STREAM NAME: Clear Fork E. Muddy Creek (Age 1/2) | | | | | | CROSS-SECTION NO.: 1 |
| CROSS-SECTION LOCATION: 50' u/s of USFS Road Xing | | | | | | |
| 39°08'44.4" 107°26'11.4" | | | | | | |
| DATE: 07/26/07 | OBSERVERS: Oppendahl, A. Skinner, Roach | | | | | |
| LEGAL DESCRIPTION | ¼ SECTION: SE | SECTION: 33 | TOWNSHIP: 10 N/S | RANGE: 90 E/W | PM: 6 | |
| COUNTY: Gunnison | WATERSHED: Muddy Creek | WATER DIVISION: 4 | DOW WATER CODE: 41753 | | | |
| MAP(S): USGS: | | | | | | |
| USFS: | | | | | | |

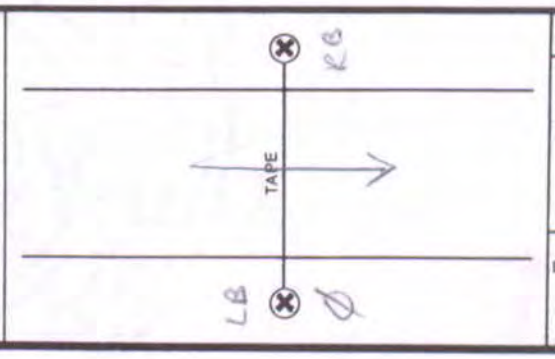
## SUPPLEMENTAL DATA

| | | | | |
|---|---|---|---|---|
| SAG TAPE SECTION SAME AS DISCHARGE SECTION: (YES) / NO | METER TYPE: Marsh / McBirney | | | |
| METER NUMBER: | DATE RATED: | CALIB/SPIN: ____ sec | TAPE WEIGHT: ____ lbs/foot | 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 | 6.63 / 6.63 |
| ② WS Upstream | 16.5 | 6.55 |
| ③ WS Downstream | 58.0 | 7.50 |
| SLOPE | .95/74.5 = Ø.01275 | |

SKETCH




LEGEND:
Stake ⊗
Station ①
Photo ◇
Direction of Flow

## 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:
Caddis

## COMMENTS

Rain night before in Area.

FORM #ISF FD 1-85

# DISCHARGE/CROSS SECTION NOTES

| STREAM NAME: Clear Fork E Muddy Creek | CROSS-SECTION NO.: | DATE: 07/26/07 | SHEET 1 OF 2 |
|---|---|---|---|
| BEGINNING OF MEASUREMENT | EDGE OF WATER LOOKING DOWNSTREAM: (0.0 AT STAKE) LEFT / RIGHT | Gage Reading: ____ ft | TIME: 12:00 |

| 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 Obser-vation (ft) | Revolutions | Time (sec) | Velocity (ft/sec) At Point | Velocity (ft/sec) Mean in Vertical | Area ($ft^2$) | Discharge (cfs) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| TS | Ø | | 4.26 | | | | | | | | |
| BS/b | Ø | | 5.37 | | | | | | | | |
| | 1.0 | | 5.35 | | | | | | | | |
| | 1.2 | | 5.45 | | | | | | | | |
| | 3.1 | | 5.60 | | | | | | | | |
| | 4.0 | | 5.75 | | | | | | | | |
| | 5.0 | | 5.91 | | | | | | | | |
| | 6.0 | | 6.15 | | | | | | | | |
| Top of Bank | 7.0 | | 6.29 | | | | | | | | |
| W | 7.3 | | 6.63 | Ø | | | | Ø | | | |
| | 7.8 | | 6.80 | 0.20 | | | | 0.27 | | | |
| | 8.1 | | 7.00 | 0.35 | | | | 0.24 | | | |
| | 9.5 | | 6.80 | 0.15 | | | | Ø | | | |
| | 11.0 | | 6.75 | 0.10 | | | | Ø | | | |
| | 12.5 | | 6.80 | 0.15 | | | | Ø | | | |
| | 14.0 | | 6.95 | 0.25 | | | | 0.61 | | | |
| | 15.0 | | 6.85 | 0.20 | | | | 0.87 | | | |
| | 16.0 | | 6.95 | 0.30 | | | | 1.39 | | | |
| | 17.0 | | 7.07 | 0.45 | | | | 0.12 | | | |
| | 18.0 | | 7.10 | 0.40 | | | | 1.12 | | | |
| | 19.0 | | 7.05 | 0.45 | | | | 1.50 | | | |
| | 20.0 | | 6.90 | 0.20 | | | | 0.97 | | | |
| | 21.0 | | 7.00 | 0.30 | | | | -0.17 | | | |
| | 22.0 | | 7.15 | 0.50 | | | | 0.58 | | | |
| | 23.0 | | 7.05 | 0.40 | | | | 1.33 | | | |
| | 24.0 | | 7.05 | 0.40 | | | | 1.17 | | | |
| | 25.0 | | 7.02 | 0.30 | | | | 1.37 | | | |
| | 26.0 | | 7.00 | 0.30 | | | | 1.23 | | | |
| | 27.0 | | 6.95 | 0.20 | | | | 0.80 | | | |
| | 28.0 | | 7.00 | 0.20 | | | | 0.94 | | | |
| | 29.0 | | 6.95 | 0.25 | | | | 0.84 | | | |
| | 30.0 | | 7.05 | 0.35 | | | | 0.45 | | | |
| | 31.0 | | 7.10 | 0.40 | | | | 1.26 | | | |
| | 31.75 | | 7.10 | 0.40 | | | | 2.10 | | | |
| | 32.5 | | 7.20 | 0.45 | | | | 1.11 | | | |
| | 33.25 | | 7.30 | 0.60 | | | | 1.15 | | | |
| | 34.0 | | 7.30 | 0.60 | | | | 1.10 | | | |
| | 34.75 | | 7.25 | 0.55 | | | | 2.04 | | | |
| | 35.5 | | 7.25 | 0.55 | | | | 1.71 | | | |
| | 36.25 | | 7.25 | 0.60 | | | | 1.09 | | | |
| | 37.00 | | 7.15 | 0.40 | | | | 0.81 | | | |
| W | 37.90 | | 0.63 | Ø | | | | Ø | | | |
| TOTALS: | | | | | | | | | | | |

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

COLORADO WATER CONSERVATION BOARD

# FIELD DATA FOR INSTREAM FLOW DETERMINATIONS

COLORADO DIVISION OF WILDLIFE

## LOCATION INFORMATION

| | | | | | |
|---|---|---|---|---|---|
| STREAM NAME: Clear Fk E. Muddy Creek (Page 2/2) | | | | | CROSS-SECTION NO.: |
| CROSS-SECTION LOCATION: | | | | | |
| | | | | | |
| DATE: | OBSERVERS: | | | | |
| LEGAL DESCRIPTION | ¼ SECTION: | SECTION: | TOWNSHIP: N/S | RANGE: E/W | PM: |
| COUNTY: | WATERSHED: | WATER DIVISION: | DOW WATER CODE: | | |
| MAP(S): USGS: | | | | | |
| USFS: | | | | | |

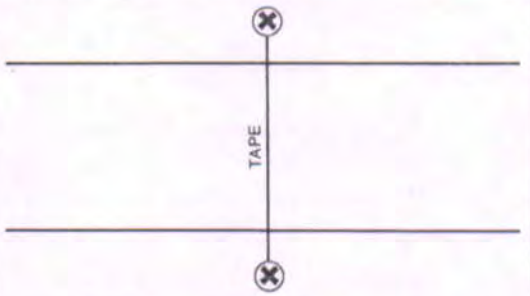
## SUPPLEMENTAL DATA

| | | | | |
|---|---|---|---|---|
| SAG TAPE SECTION SAME AS DISCHARGE SECTION: YES / NO | METER TYPE: | | | |
| METER NUMBER: | DATE RATED: | CALIB/SPIN: _____ sec | TAPE WEIGHT: _____ lbs/foot | 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 | | |
| ③ WS Downstream | | |
| SLOPE | | |

SKETCH




LEGEND:

Stake ⊗

Station ①

Photo ◇①→

Direction of Flow ← →

## 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

# DISCHARGE/CROSS SECTION NOTES

| STREAM NAME: Clear Fork E. Muddy Creek | CROSS-SECTION NO.: 07/26/07 | DATE: | SHEET 2 OF 2 |
|---|---|---|---|
| BEGINNING OF MEASUREMENT | EDGE OF WATER LOOKING DOWNSTREAM: (0.0 AT STAKE) LEFT / RIGHT | Gage Reading: _____ ft | TIME: |

| 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 Obser-vation (ft) | Revolutions | Time (sec) | Velocity (ft/sec) | | Area ($ft^2$) | Discharge (cfs) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | At Point | Mean in Vertical | | |
| | 38.5 | | 6.05 | | | | | | | | |
| | 39.5 | | 5.75 | | | | | | | | |
| G | 40.5 | | 4.90 | | | | | | | | |
| | 41.65 | | 3.55 | | | | | | | | |
| BS | 43.0 | | 2.90 | | | | | | | | |
| TS | 43.0 | | 2.10 | | | | | | | | |
| TOTALS: | | | | | | | | | | | |

| End of Measurement | Time: 13:00 | Gage Reading: _____ ft | CALCULATIONS PERFORMED BY: | CALCULATIONS CHECKED BY: |
|---|---|---|---|---|

# CLEAR FK MUDDY CREEK

## 50' U/S OF USFS RD

## SE S33 T10S R90W 6PM

# CLEAR FK MUDDY CREEK

## 50' U/S OF USFS RD

## SE S33 T10S R90W 6PM


# CLEAR FK MUDDY CREEK

# DITCH NEAR USFS ROAD

# LITTLE MUDDY CREEK
# AT USFS ROAD

Station: **CLEAR FORK NEAR RAGGED MOUNTAIN, CO.**
Parameter: STREAM FLOW CFS
Year: 1965-1973
State: CO
County: GUNNISON

ID: 09129800
Statistic: Mean
Latitude: 39:08:36
Longitude: 107:25:50
Elevation: 7450.00
Drainage Area: 38.50

**Monthly Statistics**

| | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Ann |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **# Days** | 248 | 226 | 248 | 240 | 248 | 240 | 248 | 248 | 240 | 248 | 240 | 248 | 2922 |
| **Avg Day** | 4.31 | 4.15 | 8.57 | 68.67 | 221.5 | 96.83 | 12.47 | 5.28 | 3.89 | 4.85 | 4.50 | 4.26 | 36.77 |
| **Max Day** | 9.00 | 8.50 | 31.00 | 450.0 | 688.0 | 460.0 | 98.00 | 35.00 | 54.00 | 13.00 | 11.00 | 10.00 | 688.0 |
| **Min Day** | 2.10 | 2.30 | 2.80 | 5.80 | 37.00 | 5.70 | 1.90 | 0.600 | 0.700 | 0.400 | 0.600 | 2.20 | 0.400 |
| **# Months** | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 |
| **SDev Month** | 1.87 | 1.75 | 3.79 | 48.05 | 87.00 | 67.20 | 7.70 | 4.42 | 2.83 | 2.62 | 2.60 | 1.75 | 11.29 |
| **Skew Month** | 1.17 | 1.49 | 0.983 | 0.528 | 0.367 | 0.697 | 1.54 | 2.30 | 2.20 | 0.276 | 1.05 | 1.06 | -0.052 |
| **Min Month** | 2.37 | 2.64 | 4.84 | 17.00 | 117.9 | 24.84 | 4.41 | 1.86 | 1.16 | 1.77 | 1.60 | 2.44 | 23.08 |
| **Max Month** | 7.95 | 7.79 | 15.52 | 148.7 | 339.7 | 210.1 | 29.09 | 15.66 | 10.51 | 8.61 | 9.37 | 7.45 | 53.11 |
| **Exceedences** | | | | | | | | | | | | | |
| **1%** | 9.00 | 8.50 | 29.04 | 380.0 | 638.3 | 433.2 | 92.12 | 30.08 | 31.60 | 12.00 | 11.00 | 9.00 | 442.8 |
| **5%** | 8.50 | 8.00 | 25.00 | 234.0 | 531.6 | 304.0 | 33.00 | 17.20 | 8.00 | 10.00 | 10.00 | 8.00 | 211.7 |
| **10%** | 7.00 | 7.50 | 18.00 | 150.0 | 446.0 | 203.0 | 24.00 | 11.00 | 6.50 | 9.30 | 9.00 | 6.60 | 116.8 |
| **20%** | 5.80 | 5.36 | 13.00 | 100.0 | 308.0 | 133.0 | 17.40 | 6.50 | 4.70 | 8.00 | 7.00 | 6.00 | 35.00 |
| **50%** | 4.00 | 3.50 | 6.10 | 47.00 | 191.0 | 74.00 | 8.00 | 3.80 | 2.90 | 3.60 | 3.50 | 3.70 | 5.50 |
| **80%** | 2.90 | 2.90 | 4.40 | 18.00 | 106.0 | 32.00 | 4.90 | 2.20 | 1.90 | 2.40 | 2.50 | 2.80 | 2.90 |
| **90%** | 2.50 | 2.60 | 3.70 | 13.00 | 85.80 | 24.00 | 3.80 | 1.60 | 1.40 | 1.98 | 2.10 | 2.50 | 2.40 |
| **95%** | 2.30 | 2.43 | 3.32 | 7.80 | 61.40 | 19.00 | 2.70 | 1.10 | 1.00 | 0.820 | 1.10 | 2.40 | 2.00 |
| **99%** | 2.20 | 2.30 | 2.80 | 6.04 | 40.96 | 6.66 | 2.05 | 0.700 | 0.800 | 0.500 | 0.740 | 2.30 | 0.800 |

13.0 (4/1 - 6/30)
5.5 (7/1 - 7/31)
3.5 (8/1 - 3/31)

| WATER | WATERNAME | ATI | COC | Expr1004 | SPEC | COMM | SAMPDATE | STATION |
|---|---|---|---|---|---|---|---|---|
| 41753 | MUDDY CR, CLEAR FK | 45 | C6 | 7/28/2005 | MTS | MOTTLED SCULPIN | 7/28/2005 | GU2485 |
| 41753 | MUDDY CR, CLEAR FK | 45 | C6 | 7/27/2005 | MTS | MOTTLED SCULPIN | 7/27/2005 | GU2487 |
| 41753 | MUDDY CR, CLEAR FK | 45 | C6 | 7/27/2005 | BRK | BROOK TROUT | 7/27/2005 | GU2486 |
| 41753 | MUDDY CR, CLEAR FK | 45 | C6 | 7/27/2005 | BRK | BROOK TROUT | 7/27/2005 | GU2487 |
| 41753 | MUDDY CR, CLEAR FK | 45 | C6 | 8/17/2000 | BRK | BROOK TROUT | 8/17/2000 | GU0001 |
| 41753 | MUDDY CR, CLEAR FK | 45 | C6 | 7/27/2005 | BRK | BROOK TROUT | 7/27/2005 | GU2485 |
| 41753 | MUDDY CR, CLEAR FK | 45 | C6 | 7/28/2005 | BRK | BROOK TROUT | 7/28/2005 | GU2485 |
| 41753 | MUDDY CR, CLEAR FK | 45 | C6 | 7/27/2005 | CRN | CO RIVER CUTTHROAT | 7/27/2005 | GU2485 |
| 41753 | MUDDY CR, CLEAR FK | 45 | C6 | 7/28/2005 | CRN | CO RIVER CUTTHROAT | 7/28/2005 | GU2485 |
| 41753 | MUDDY CR, CLEAR FK | 45 | C6 | 7/27/2005 | CRN | CO RIVER CUTTHROAT | 7/27/2005 | GU2487 |