# Stream: Newlin Creek

## Executive Summary

Water Division: 2
Water District: 12
CDOW#: 30514
CWCB ID: 08/2/A-005

**Segment:** Confl. with Unnamed Tributary to Confl. with Unnamed Tributary
**Upper Terminus:** CONFLUENCE WITH UNNAMED TRIBUTARY AT
(Latitude: 38º 16’ 11.8”N) (Longitude: 105º 14’ 23.17”W)

**Lower Terminus:** CONFLUENCE WITH UNNAMED TRIBUTARY AT
(Latitude: 38º 15’ 58.67”) Longitude: (105º 11’ 19.55”W)

**Watershed:** Upper Arkansas (HUC #: 11020002)
**Counties:** Fremont
**Length:** 4.0 miles
**USGS Quad(s):** Rockvale
**Flow Recommendation**: 1.20 cfs (June 1 – June 30)
0.60 cfs (July 1 – August 15)
0.40 cfs (August 16 – February 29)
0.80 cfs (March 1 – May 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

The State of Colorado's Instream Flow Program (ISFP) 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 Board 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 ISFP, the statute directs the Board to request instream flow recommendations from other state and federal agencies. The CDOW is recommending this segment of Newlin Creek to the Board for inclusion into the ISFP. Newlin Creek is being recommended for inclusion into the ISFP because it has a natural environment that can be preserved to a reasonable degree with an instream flow water right.

The CDOW is forwarding this stream flow recommendation to the Board to meet 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" (See §33-1-101 (1) C.R.S.). The CDOW Strategic Plan states "[h]ealthy aquatic environments are essential to maintain healthy and viable fisheries, and critical for self-sustaining populations. The [CDOW] desires to protect and enhance the quality and quantity of aquatic habitats."

Newlin Creek is approximately 15.5 miles long. It begins on the east side of Locke Mountain at an elevation of approximately 9100 feet and terminates at the confluence with Hardscrabble Creek at an elevation of approximately 5300 feet. Of the 4.5 mile segment addressed by this report, approximately 100% of the segment, or 4.0 miles, is located on public lands. Newlin Creek is located within Fremont County. The total drainage area of the creek upstream of the lower terminus of the proposed instream flow reach is approximately 10.32 square miles. Newlin Creek generally flows in an easterly direction.

The subject of this report is a segment of the Newlin Creek beginning at the confluence with an unnamed tributary and extends downstream to the confluence with another unnamed tributary. The proposed segment is located south of the City of Florence. The recommendation for this segment is discussed below.

## Instream Flow Recommendation(s)

The CDOW is recommending 1.20 cfs, 6/01 – 6/30; 0.60 cfs, 7/01 – 8/15; 0.40 cfs 8/16 – 2/29 and 0.80 cfs 3/01 – 5/31.

• 1.20 cubic feet per second is recommended is required to maintain the three principal hydraulic criteria of average depth, average velocity and percent wetted perimeter;

• 0.60 cubic feet per second is based on water availability limitations.

• 0.40 cubic feet per second is based on water availability limitations.

• 0.80 cubic feet per second is required to maintain two of the three principal hydraulic criteria.

The modeling results from this survey effort are within the confidence interval produced by the R2CROSS model (see Table 1).

## Land Status Review

| Upper Terminus | Lower Terminus | Total Length (miles) | Land Ownership | |
|---|---|---|---|---|
| | | | % Private | % Public |
| Unnamed Tributary | Unnamed Tributary | 4.0 | 0% | 100% |

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

## Biological Data

The CDOW, in August of 2006, collected stream cross section information, natural environment data, and other data needed to quantify the instream flow needs for this reach of Newlin Creek. Newlin Creek is classified as a minor stream (between 4 to 9 feet wide) and fishery surveys indicate the stream environment of Newlin Creek supports Greenback cutthroat trout (*Oncorhynchus clarkii stomias*) (See CDOW Fish Survey in Appendix B). Greenback cutthroat trout have been identified by the CDOW and federal agencies as "species of greatest conservation need". CDOW has been involved in developing a Conservation and Management Plan for this species (Greenback Cutthroat Trout Recovery Plan). The intention of this plan is to increase populations and distributions of identified species, thereby assisting in the long-term persistence of each species. The success of this plan could potentially curtail the need for federal listing of these species under the Endangered Species Act (ESA). This species is currently state and federally listed as "Threatened".

## Field Survey Data & Biological Flow Quantification

CDOW 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.

Board staff relies 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, two data sets were collected with the results shown in Table 1 below. Table 1 shows who collected the data (Party), the date the data was collected, 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: Newlin Creek R2Cross Summary**

| | | | **Confidence Intervals** | **Recommended Flows (cfs)** | |
|---|---|---|---|---|---|
| **Party** | **Date** | **Q (cfs)** | **250% - 40%** | **Summer 3/3** | **Winter 2/3** |
| USFS | 9/29/1997 | 0.35 | 0.9 - 0.1 | ? | 0.8 |
| DOW | 8/8/2006 | 0.78 | 2.0 - 0.3 | 1.2 | 1.2 |

DOW= Division of Wildlife USFS= United States Forest Service ?= Outside range of confidence interval

## 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 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 **Newlin Creek** no such gage is available at the LT. In fact, there is no gage on Newlin Creek. It is thus necessary to describe the normal flow regime at the Newlin Creek LT through a "representative" gage station. The gage station selected for this was GRAPE CREEK NEAR WESTCLIFFE, CO. (USGS 07095000), a gage with a 79 year period of record (POR) collected between 1925 and 2006. The gage is at an elevation of 7,690 ft above mean sea level (amsl) and has a drainage area of 320 $mi^2$. The hydrograph (plot of discharge over time) produced by this gage includes the consumptive uses of several upstream diversions. To make the measured data transferable to Newlin Creek the consumptive portions of these upstream diversions were added back to the measured hydrograph. The resulting adjusted hydrograph was then used on Newlin Creek by multiplying the adjusted Grape Creek near Westcliffe, CO discharge values (hydrograph) by the ratio of Newlin Creek basin area (10.32 $mi^2$ above the LT) to Grape Creek near Westcliffe, CO basin area (320 $mi^2$). The next step, to make the Newlin Creek hydrograph reflective of existing conditions, is to reduce the predicted flow values by the amount of upstream consumptive use.

The following hydrograph depicts the mean monthly discharge of Newlin Creek (proportioned off Grape Creek near Westcliffe, CO). Included in the hydrograph are the recommended ISF values. The data used in the creation of this hydrograph are displayed in Table #2.

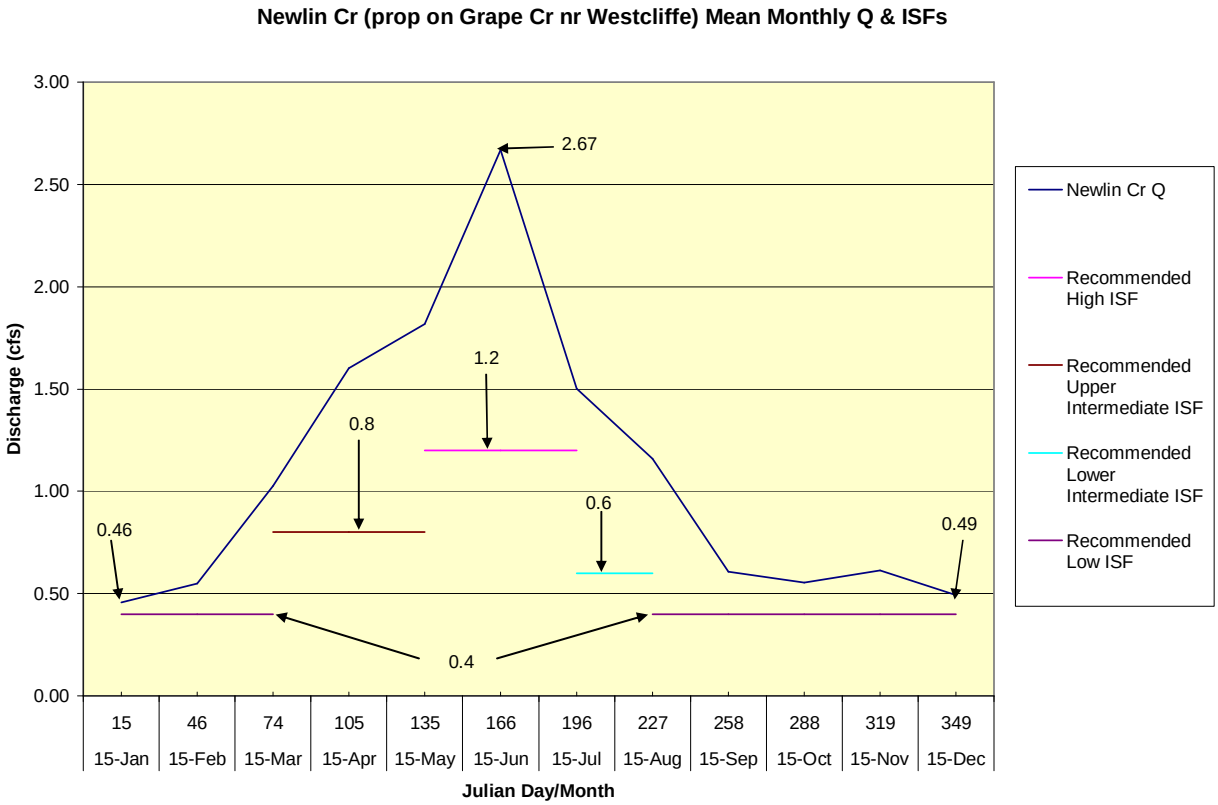

Newlin Cr (prop on Grape Cr nr Westcliffe) Mean Monthly Q & ISFs
Discharge (cfs)
3.00
2.50
2.00
1.50
1.00
0.50
0.00
2.67
1.2
0.8
0.6
0.46
0.49
0.4
15
15-Jan
46
15-Feb
74
15-Mar
105
15-Apr
135
15-May
166
15-Jun
196
15-Jul
227
15-Aug
258
15-Sep
288
15-Oct
319
15-Nov
349
15-Dec
Julian Day/Month
Newlin Cr Q
Recommended High ISF
Recommended Upper Intermediate ISF
Recommended Lower Intermediate ISF
Recommended Low ISF

Table 2 – Mean Monthly Discharge and Recommended Instream Flows – Newlin Creek

.

| | Julian Day (Leap Year) | Newlin Cr (cfs) | Recommended ISFs (cfs) |
|---|---|---|---|
| 15-Jan | 15 | 0.46 | 0.40 |
| 15-Feb | 46 | 0.55 | 0.40 |
| 29-Feb | 60 | 0.55 | 0.40 |
| 1-Mar | 61 | 1.03 | 0.80 |
| 15-Mar | 75 | 1.03 | 0.80 |
| 15-Apr | 106 | 1.60 | 0.80 |
| 30-Apr | 121 | 1.60 | 0.80 |
| 1-May | 122 | 1.82 | 0.80 |
| 15-May | 136 | 1.82 | 0.80 |
| 31-May | 152 | 1.82 | 0.80 |
| 1-Jun | 153 | 2.67 | 1.20 |
| 15-Jun | 167 | 2.67 | 1.20 |
| 30-Jun | 182 | 2.67 | 1.20 |
| 1-Jul | 183 | 1.50 | 0.60 |
| 15-Jul | 197 | 1.50 | 0.60 |
| 15-Aug | 228 | 1.16 | 0.60 |
| 16-Aug | 229 | 1.16 | 0.40 |
| 15-Sep | 259 | 0.61 | 0.40 |
| 15-Oct | 289 | 0.55 | 0.40 |
| 15-Nov | 320 | 0.61 | 0.40 |
| 15-Dec | 350 | 0.49 | 0.40 |

## Existing Water Right Information

Staff has analyzed the water rights tabulation to identify any potential water availability problems. Records indicate that there are no surface water diversions located within the proposed instream flow reach. However, there are existing diversions upstream and downstream of the proposed reach. Based on this analysis staff has determined that water is available for appropriation on Newlin Creek, from the confluence with Unnamed tributary to the Confluence with Unnamed Tributary, to preserve the natural environment to a reasonable degree without limiting or foreclosing the exercise of valid existing water rights.

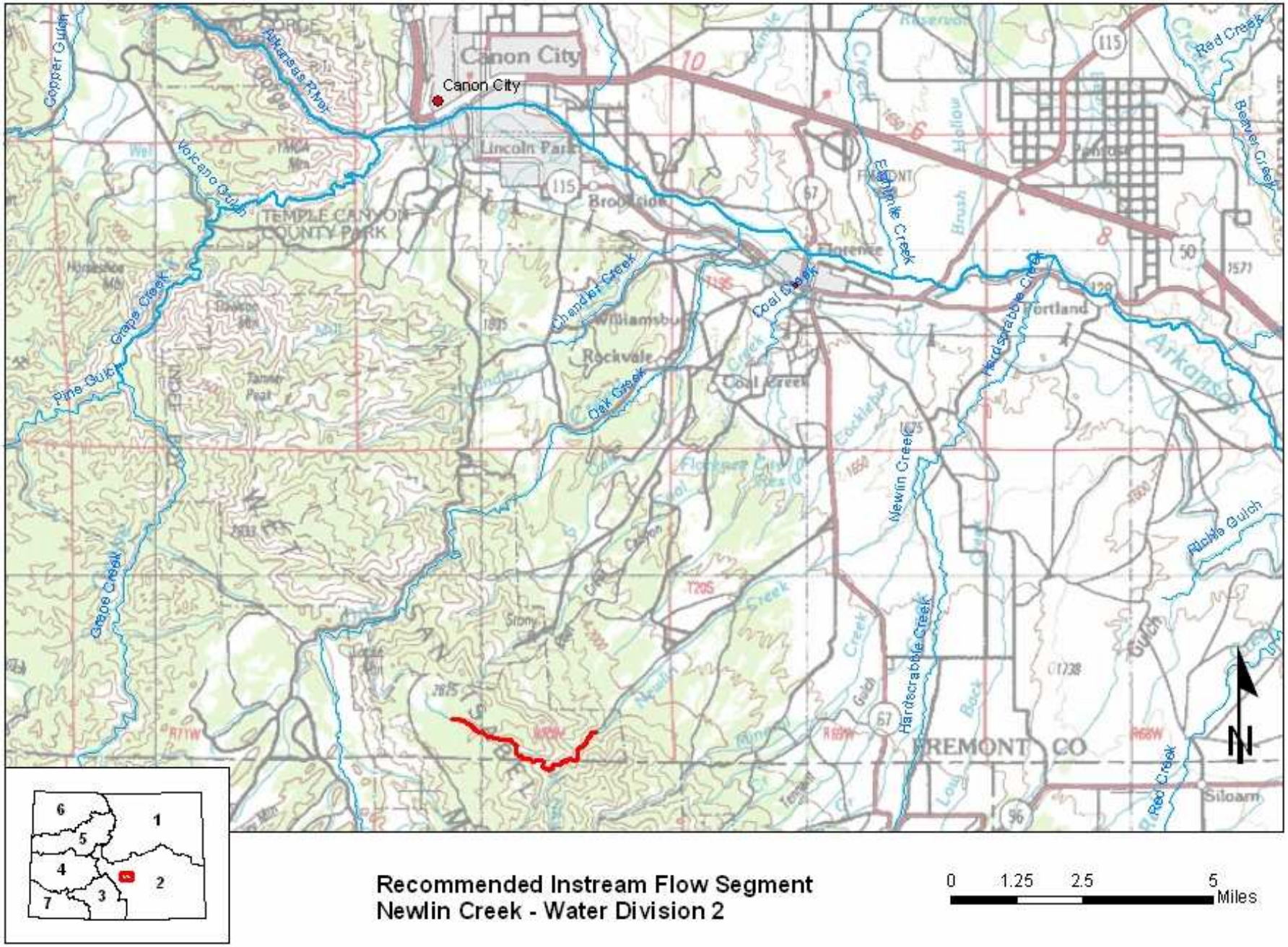
CWCB Staff's Instream Flow Recommendation
Staff recommends the Board form its intent to appropriate on the following stream reach:

**Segment:** Confl. with Unnamed Tributary to Confl. with Unnamed Tributary
**Upper Terminus:** CONFLUENCE WITH UNNAMED TRIBUTARY AT
(Latitude: 38º 16' 11.8"N) (Longitude: 105º 14' 23.17"W)
UTM = 4235793.7 N UTM = 479026.3 E
NE NW S32 T20S R70W 6PM
1040' South of the North Section Line; 1970' East of the West Section Line

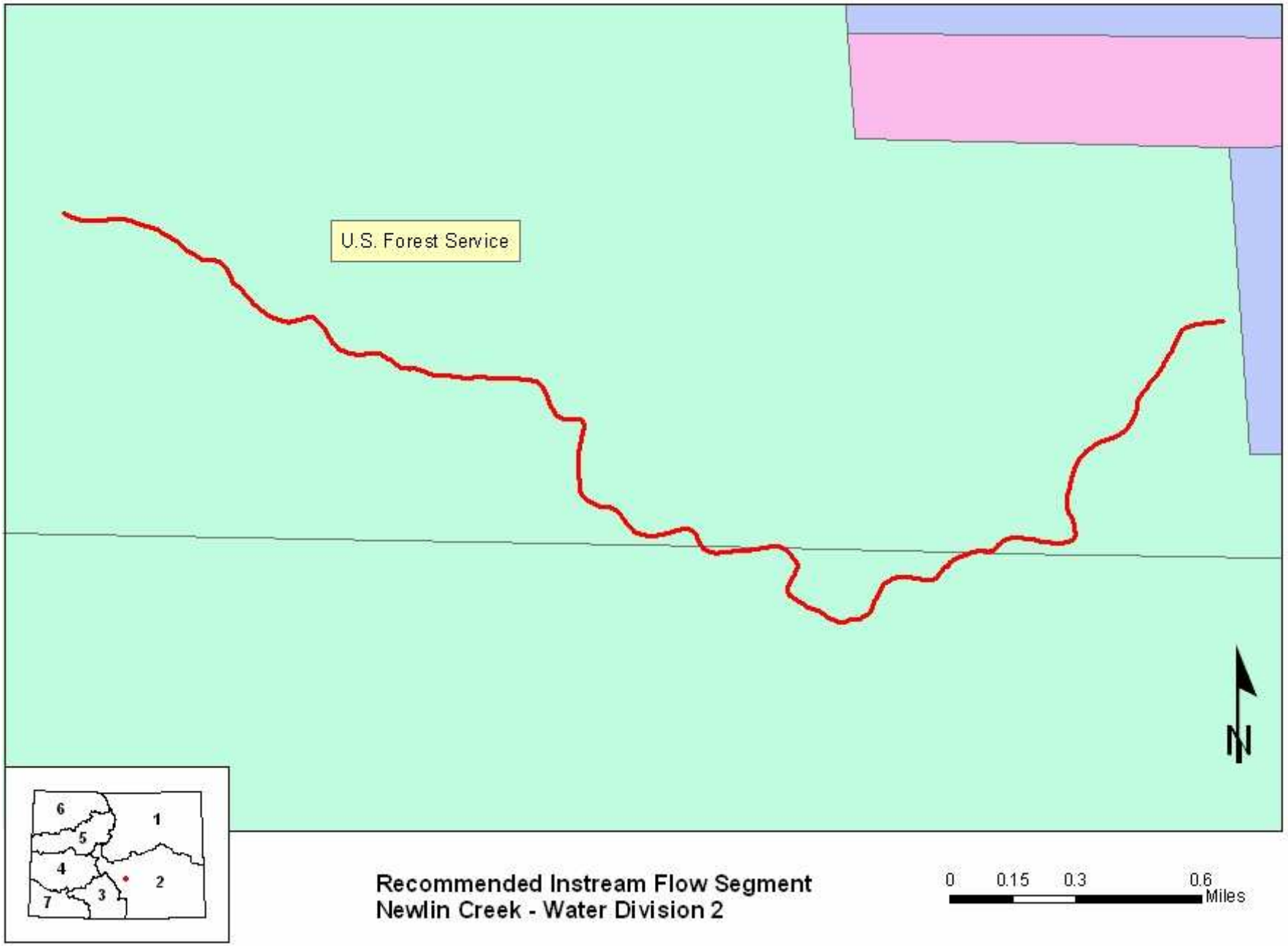
**Lower Terminus:** CONFLUENCE WITH UNNAMED TRIBUTARY AT
(Latitude: 38º 15' 58.67") Longitude: (105º 11' 19.55"W)
UTM = 4235378.7 N UTM = 483487.0 E
SE NW S35 T20S R70W 6PM
2248' South of the North Section Line; 2100' East of the West Section Line

**Watershed:** Upper Arkansas (HUC #: 11020002)
**Counties:** Fremont
**Length:** 4.0 miles
**USGS Quad(s):** Rockvale
Flow Recommendation 1.20 cfs (June 1 – June 30)
0.60 cfs (July 1 – August 15)
0.40 cfs (August 16 – February 29)
0.80 cfs (March 1 – May 31)

# Vicinity Map



# Land Use Map


U.S. Forest Service
N
6
1
5
4
2
3
7
Recommended Instream Flow Segment
Newlin Creek - Water Division 2
0
0.15
0.3
0.6
Miles

# Topographic & Water Rights Map