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

Dear Ms. Bassi:

The Bureau of Land Management (BLM) is writing this letter to formally communicate its recommendation for an instream flow water right on Goat Creek, located in Water Division 4.

**Location and Land Status**. Goat Creek originates on the east flank of Lone Cone, approximately eight miles southeast of Miramonte Reservoir. Goat Creek flows into Beaver Creek approximately eight miles east of Miramonte Reservoir. This recommendation addresses the entire length of Goat Creek from the headwaters to the confluence, a distance of approximately six miles. The BLM manages 6.0 miles of this reach, the U.S. Forest Service manages 3.3 miles, and approximately 2.0 miles are in private ownership.

**Biological Summary.** Goat Creek is a cold water, high gradient stream. The reach that is the subject of this recommendation flows through a narrow valley that ranges from ¼ to ½ mile in width. The creek flows mostly through densely forested areas, but occasionally flows through meadows and wetland areas. Substrate is generally from medium to large in size, ranging from gravels to 1-foot boulders. Water quality is good for supporting cold water species.

Goat Creek supports a healthy riparian community comprised of spruce, alder, and willow species. Bank stability appears to be good, except in areas of high livestock usage. Stream flow appears to be highly stable and is likely supported by spring discharge and well-developed beaver dam complexes. Almost bankfull flow was noted during extreme drought conditions in 2020.

**R2Cross Analysis.** The BLM collected the following R2Cross data from Goat Creek:

| Cross Section Date | Discharge Rate | Top Width | Winter Flow Recommendation (meets 2 of 3 hydraulic criteria) | Summer Flow Recommendation (meets 3 of 3 hydraulic criteria) |
|---|---|---|---|---|
| 06/30/2020 #1 | 0.51 cfs | 6.20 feet | 0.71 cfs | Out of range |
| 06/30/2020 #2 | 0.43 cfs | 4.07 feet | 0.57 cfs | 0.75 |
| | | Averages: | 0.64 cfs | 0.75 cfs |

BLM's analysis of this data indicates that the following flows are needed to protect the natural environment to a reasonable degree.

> 0.75 cubic feet per second is recommended during the snowmelt runoff period and summer, from April 1 through June 30. This recommendation is driven by the average velocity criteria. Goat Creek has limited riffle habitat, so protecting this flow rate will ensure that the limited habitat can be fully utilized during the snowmelt period, when fish are spawning and moving actively between pools.

0.60 cubic feet per second is recommended during summer and fall, from July 1 through November 30. This recommendation is driven by the average depth criteria. This flow rate should provide adequate physical habitat for the fish population to complete important parts of its life cycle before cold temperatures arrive.

0.4 cubic feet per second is recommended during the cold weather period from December 1 through March 31. This recommendation is driven by naturally limited water availability. This flow rate should prevent pools from completely icing and will allow the fish population to successfully overwinter.

**Water Availability.** BLM recommends using a variety of data sources to confirm water availability, because BLM is not aware of any historical gage data on this creek. Use of Streamstats can provide an estimate of natural hydrology. One nearby gage may provide an estimate of the seasonality of flows, because it is located within the same watershed. USGS Gage 09173000, on Beaver Creek near Norwood, has a 40-year period of record. However, this gage data must be adjusted to reflect the large volume of water that is diverted from the Beaver Creek watershed upstream from the gage.

BLM is aware of only one water right in the proposed instream flow reach:

Norwood Water Commission Goat Creek Pump Station – 175 cfs conditional, 2010 priority. An alternate point of diversion for this water right is located within the proposed instream flow reach.

**Relationship to Land Management Plans.** The BLM resource management plan calls for making instream flow recommendations to the Colorado Water Conservation Board to meet minimum instream flow requirements to maintain fisheries. The plans also calls for maintaining and improving the function of riparian areas to achieve advanced ecological stage for the riparian community, and it calls for protecting riparian and wetland systems from activities that could degrade those habitats. Establishing an instream flow water right would assist in meeting these objectives.

Data sheets, R2Cross output, fishery survey information, and photographs of the cross section were included with BLM's draft recommendation in February 2021. BLM thanks both Colorado Parks and Wildlife and the Colorado Water Conservation Board for their cooperation in this effort.

If you have any questions regarding our instream flow recommendation, please contact Roy Smith at 303-239-3940.

Sincerely,

Deputy State Director
Resources

Cc: Greg Larson, Uncompahgre Field Office
Jedd Sondergard, Uncompahgre Field Office
Stephanie Connolly, Southwest District Manager

## Data Input & Proofing

| | |
|---|---|
| STREAM NAME: | Goat Creek |
| XS LOCATION: | UTM Zone 12 745944 4205780 |
| XS NUMBER: | 1 |
| DATE: | 6/30/2020 |
| OBSERVERS: | R. Smith, J. Sondergard |
| 1/4 SEC: | SW |
| SECTION: | 21 |
| TWP: | 43N |
| RANGE: | 12W |
| PM: | NM |
| COUNTY: | San Miguel |
| WATERSHED: | San Miguel River |
| DIVISION: | 4 |
| DOW CODE: | 40345 |
| USGS MAP: | |
| USFS MAP: | |
| | Level and Rod Survey |
| TAPE WT: | 0.0106 lbs / ft |
| TENSION: | 99999 lbs |
| SLOPE: | 0.037 ft / ft |

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

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

| GL=1 | FEATURE | DIST | VERT DEPTH | WATER DEPTH | VEL | A | Q | Tape to Water |
|---|---|---|---|---|---|---|---|---|
| | | | Total Data Points = 27 | | | | | |
| | RS | 0.00 | 5.36 | | | 0.00 | 0.00 | 0.00 |
| 1 | G | 1.80 | 5.80 | | | 0.00 | 0.00 | 0.00 |
| | W | 2.50 | 6.25 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | | 2.80 | 6.40 | 0.15 | 0.47 | 0.04 | 0.02 | 6.25 |
| | | 3.00 | 6.35 | 0.10 | 0.95 | 0.02 | 0.02 | 6.25 |
| | | 3.20 | 6.35 | 0.10 | 0.40 | 0.02 | 0.01 | 6.25 |
| | | 3.40 | 6.40 | 0.15 | 0.28 | 0.03 | 0.01 | 6.25 |
| | | 3.60 | 6.40 | 0.15 | 0.00 | 0.03 | 0.00 | 6.25 |
| | | 3.80 | 6.45 | 0.20 | 0.36 | 0.04 | 0.01 | 6.25 |
| | | 4.00 | 6.45 | 0.20 | 0.57 | 0.04 | 0.02 | 6.25 |
| | | 4.20 | 6.45 | 0.20 | 0.92 | 0.04 | 0.04 | 6.25 |
| | | 4.40 | 6.45 | 0.20 | 1.76 | 0.04 | 0.07 | 6.25 |
| | | 4.60 | 6.45 | 0.20 | 0.96 | 0.04 | 0.04 | 6.25 |
| | | 4.80 | 6.45 | 0.20 | 0.10 | 0.04 | 0.00 | 6.25 |
| | | 5.00 | 6.45 | 0.20 | 0.72 | 0.04 | 0.03 | 6.25 |
| | | 5.20 | 6.45 | 0.20 | 1.61 | 0.04 | 0.06 | 6.25 |
| | | 5.40 | 6.40 | 0.15 | 1.35 | 0.03 | 0.04 | 6.25 |
| | | 5.60 | 6.40 | 0.15 | 0.80 | 0.03 | 0.02 | 6.25 |
| | | 5.80 | 6.50 | 0.25 | 0.19 | 0.05 | 0.01 | 6.25 |
| | | 6.00 | 6.55 | 0.30 | 0.08 | 0.06 | 0.00 | 6.25 |
| | | 6.20 | 6.45 | 0.20 | 0.17 | 0.04 | 0.01 | 6.25 |
| | | 6.40 | 6.40 | 0.15 | 0.60 | 0.03 | 0.02 | 6.25 |
| | | 6.60 | 6.40 | 0.15 | 1.45 | 0.03 | 0.04 | 6.25 |
| | | 6.80 | 6.40 | 0.15 | 1.14 | 0.03 | 0.03 | 6.25 |
| | W | 7.00 | 6.25 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 1 | G | 8.00 | 5.80 | | | 0.00 | 0.00 | 0.00 |
| | LS | 9.50 | 5.55 | | | 0.00 | 0.00 | 0.00 |
| | | | | | Totals | 0.76 | 0.51 | |

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

LOCATION INFORMATION

| | |
|---|---|
| STREAM NAME: | Goat Creek |
| XS LOCATION: | UTM Zone 12 745944 4205780 |
| XS NUMBER: | 1 |
| DATE: | 30-Jun-20 |
| OBSERVERS: | R. Smith, J. Sondergard |
| 1/4 SEC: | SW |
| SECTION: | 21 |
| TWP: | 43N |
| RANGE: | 12W |
| PM: | NM |
| COUNTY: | San Miguel |
| WATERSHED: | San Miguel River |
| DIVISION: | 4 |
| DOW CODE: | 40345 |
| USGS MAP: | 0 |
| USFS MAP: | 0 |

SUPPLEMENTAL DATA

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

CHANNEL PROFILE DATA

| | |
|---|---|
| SLOPE: | 0.037 |

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

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

STREAM NAME: Goat Creek
XS LOCATION: UTM Zone 12 745944 4205780
XS NUMBER: 1

# DATA POINTS= 27

VALUES COMPUTED FROM RAW FIELD DATA

| | FEATURE | DIST | VERT DEPTH | WATER DEPTH | VEL | WETTED PERIM. | WATER DEPTH | AREA (Am) | Q (Qm) | % Q CELL |
|---|---|---|---|---|---|---|---|---|---|---|
| | RS | 0.00 | 5.36 | | | 0.00 | | 0.00 | 0.00 | 0.0% |
| 1 | G | 1.80 | 5.80 | | | 0.00 | | 0.00 | 0.00 | 0.0% |
| | W | 2.50 | 6.25 | 0.00 | 0.00 | 0.00 | | 0.00 | 0.00 | 0.0% |
| | | 2.80 | 6.40 | 0.15 | 0.47 | 0.34 | 0.15 | 0.04 | 0.02 | 3.4% |
| | | 3.00 | 6.35 | 0.10 | 0.95 | 0.21 | 0.10 | 0.02 | 0.02 | 3.7% |
| | | 3.20 | 6.35 | 0.10 | 0.40 | 0.20 | 0.10 | 0.02 | 0.01 | 1.6% |
| | | 3.40 | 6.40 | 0.15 | 0.28 | 0.21 | 0.15 | 0.03 | 0.01 | 1.6% |
| | | 3.60 | 6.40 | 0.15 | 0.00 | 0.20 | 0.15 | 0.03 | 0.00 | 0.0% |
| | | 3.80 | 6.45 | 0.20 | 0.36 | 0.21 | 0.20 | 0.04 | 0.01 | 2.8% |
| | | 4.00 | 6.45 | 0.20 | 0.57 | 0.20 | 0.20 | 0.04 | 0.02 | 4.4% |
| | | 4.20 | 6.45 | 0.20 | 0.92 | 0.20 | 0.20 | 0.04 | 0.04 | 7.2% |
| | | 4.40 | 6.45 | 0.20 | 1.76 | 0.20 | 0.20 | 0.04 | 0.07 | 13.7% |
| | | 4.60 | 6.45 | 0.20 | 0.96 | 0.20 | 0.20 | 0.04 | 0.04 | 7.5% |
| | | 4.80 | 6.45 | 0.20 | 0.10 | 0.20 | 0.20 | 0.04 | 0.00 | 0.8% |
| | | 5.00 | 6.45 | 0.20 | 0.72 | 0.20 | 0.20 | 0.04 | 0.03 | 5.6% |
| | | 5.20 | 6.45 | 0.20 | 1.61 | 0.20 | 0.20 | 0.04 | 0.06 | 12.5% |
| | | 5.40 | 6.40 | 0.15 | 1.35 | 0.21 | 0.15 | 0.03 | 0.04 | 7.9% |
| | | 5.60 | 6.40 | 0.15 | 0.80 | 0.20 | 0.15 | 0.03 | 0.02 | 4.7% |
| | | 5.80 | 6.50 | 0.25 | 0.19 | 0.22 | 0.25 | 0.05 | 0.01 | 1.8% |
| | | 6.00 | 6.55 | 0.30 | 0.08 | 0.21 | 0.30 | 0.06 | 0.00 | 0.9% |
| | | 6.20 | 6.45 | 0.20 | 0.17 | 0.22 | 0.20 | 0.04 | 0.01 | 1.3% |
| | | 6.40 | 6.40 | 0.15 | 0.60 | 0.21 | 0.15 | 0.03 | 0.02 | 3.5% |
| | | 6.60 | 6.40 | 0.15 | 1.45 | 0.20 | 0.15 | 0.03 | 0.04 | 8.5% |
| | | 6.80 | 6.40 | 0.15 | 1.14 | 0.20 | 0.15 | 0.03 | 0.03 | 6.6% |
| | W | 7.00 | 6.25 | 0.00 | 0.00 | 0.25 | | 0.00 | 0.00 | 0.0% |
| 1 | G | 8.00 | 5.80 | | | 0.00 | | 0.00 | 0.00 | 0.0% |
| | LS | 9.50 | 5.55 | | | 0.00 | | 0.00 | 0.00 | 0.0% |
| | TOTALS ---------- | | | | | 4.67 | 0.3 (Max.) | 0.76 | 0.51 | 100.0% |

Manning's n = 0.1252
Hydraulic Radius= 0.162221009

STREAM NAME: Goat Creek
XS LOCATION: UTM Zone 12 745944 4205780
XS NUMBER: 1

WATER LINE COMPARISON TABLE

| WATER LINE | MEAS AREA | COMP AREA | AREA ERROR |
|---|---|---|---|
| | 0.76 | 0.76 | 0.0% |
| 6.00 | 0.76 | 2.00 | 164.1% |
| 6.02 | 0.76 | 1.89 | 149.8% |
| 6.04 | 0.76 | 1.79 | 135.7% |
| 6.06 | 0.76 | 1.68 | 121.9% |
| 6.08 | 0.76 | 1.58 | 108.2% |
| 6.10 | 0.76 | 1.48 | 94.7% |
| 6.12 | 0.76 | 1.37 | 81.4% |
| 6.14 | 0.76 | 1.28 | 68.4% |
| 6.16 | 0.76 | 1.18 | 55.5% |
| 6.18 | 0.76 | 1.08 | 42.8% |
| 6.20 | 0.76 | 0.99 | 30.3% |
| 6.21 | 0.76 | 0.94 | 24.2% |
| 6.22 | 0.76 | 0.89 | 18.0% |
| 6.23 | 0.76 | 0.85 | 12.0% |
| 6.24 | 0.76 | 0.80 | 6.0% |
| 6.25 | 0.76 | 0.76 | 0.0% |
| 6.26 | 0.76 | 0.71 | -5.9% |
| 6.27 | 0.76 | 0.67 | -11.8% |
| 6.28 | 0.76 | 0.62 | -17.6% |
| 6.29 | 0.76 | 0.58 | -23.4% |
| 6.30 | 0.76 | 0.54 | -29.2% |
| 6.32 | 0.76 | 0.45 | -40.5% |
| 6.34 | 0.76 | 0.37 | -51.7% |
| 6.36 | 0.76 | 0.29 | -62.4% |
| 6.38 | 0.76 | 0.21 | -72.2% |
| 6.40 | 0.76 | 0.14 | -81.5% |
| 6.42 | 0.76 | 0.09 | -88.0% |
| 6.44 | 0.76 | 0.05 | -93.8% |
| 6.46 | 0.76 | 0.02 | -97.0% |
| 6.48 | 0.76 | 0.01 | -98.1% |
| 6.50 | 0.76 | 0.01 | -99.0% |

WATERLINE AT ZERO
AREA ERROR = 6.250

STREAM NAME: Goat Creek
XS LOCATION: UTM Zone 12 745944 4205780
XS NUMBER: 1 Constant Manning's n

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

| | 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* | 5.80 | 6.20 | 0.51 | 0.75 | 3.17 | 6.60 | 100.0% | 0.48 | 4.43 | 1.40 |
| | 5.80 | 6.20 | 0.51 | 0.75 | 3.16 | 6.60 | 100.0% | 0.48 | 4.43 | 1.40 |
| | 5.85 | 6.01 | 0.48 | 0.70 | 2.86 | 6.38 | 96.8% | 0.45 | 3.82 | 1.34 |
| | 5.90 | 5.82 | 0.44 | 0.65 | 2.56 | 6.17 | 93.5% | 0.42 | 3.26 | 1.27 |
| | 5.95 | 5.63 | 0.40 | 0.60 | 2.28 | 5.96 | 90.3% | 0.38 | 2.74 | 1.20 |
| | 6.00 | 5.44 | 0.37 | 0.55 | 2.00 | 5.74 | 87.0% | 0.35 | 2.26 | 1.13 |
| | 6.05 | 5.26 | 0.33 | 0.50 | 1.73 | 5.53 | 83.8% | 0.31 | 1.83 | 1.05 |
| | 6.10 | 5.07 | 0.29 | 0.45 | 1.47 | 5.31 | 80.5% | 0.28 | 1.43 | 0.97 |
| | 6.15 | 4.88 | 0.25 | 0.40 | 1.23 | 5.10 | 77.3% | 0.24 | 1.08 | 0.88 |
| | 6.20 | 4.69 | 0.21 | 0.35 | 0.99 | 4.88 | 74.0% | 0.20 | 0.78 | 0.79 |
| *WL* | 6.25 | 4.50 | 0.17 | 0.30 | 0.76 | 4.67 | 70.8% | 0.16 | 0.51 | 0.68 |
| | 6.30 | 4.33 | 0.12 | 0.25 | 0.54 | 4.47 | 67.8% | 0.12 | 0.30 | 0.56 |
| | 6.35 | 3.97 | 0.08 | 0.20 | 0.32 | 4.08 | 61.8% | 0.08 | 0.14 | 0.42 |
| | 6.40 | 2.60 | 0.05 | 0.15 | 0.14 | 2.67 | 40.5% | 0.05 | 0.04 | 0.32 |
| | 6.45 | 0.50 | 0.06 | 0.10 | 0.03 | 0.54 | 8.2% | 0.05 | 0.01 | 0.31 |
| | 6.50 | 0.30 | 0.03 | 0.05 | 0.01 | 0.32 | 4.8% | 0.02 | 0.00 | 0.19 |
| | 6.55 | 0.00 | #DIV/0! | 0.00 | 0.00 | 0.00 | 0.0% | #DIV/0! | #DIV/0! | #DIV/0! |

STREAM NAME: Goat Creek
XS LOCATION: UTM Zone 12 745944 4205780
XS NUMBER: 1

SUMMARY SHEET

| | | |
|---|---|---|
| MEASURED FLOW (Qm)= | 0.51 | cfs |
| CALCULATED FLOW (Qc)= | 0.51 | cfs |
| (Qm-Qc)/Qm * 100 = | 0.0 | % |
| MEASURED WATERLINE (WLm)= | 6.25 | ft |
| CALCULATED WATERLINE (WLc)= | 6.25 | ft |
| (WLm-WLc)/WLm * 100 = | 0.0 | % |
| MAX MEASURED DEPTH (Dm)= | 0.30 | ft |
| MAX CALCULATED DEPTH (Dc)= | 0.30 | ft |
| (Dm-Dc)/Dm * 100 | 0.0 | % |
| MEAN VELOCITY= | 0.68 | ft/sec |
| MANNING'S N= | 0.125 | |
| SLOPE= | 0.037 | ft/ft |
| .4 * Qm = | 0.2 | cfs |
| 2.5 * Qm= | 1.3 | cfs |

RECOMMENDED INSTREAM FLOW:
==========

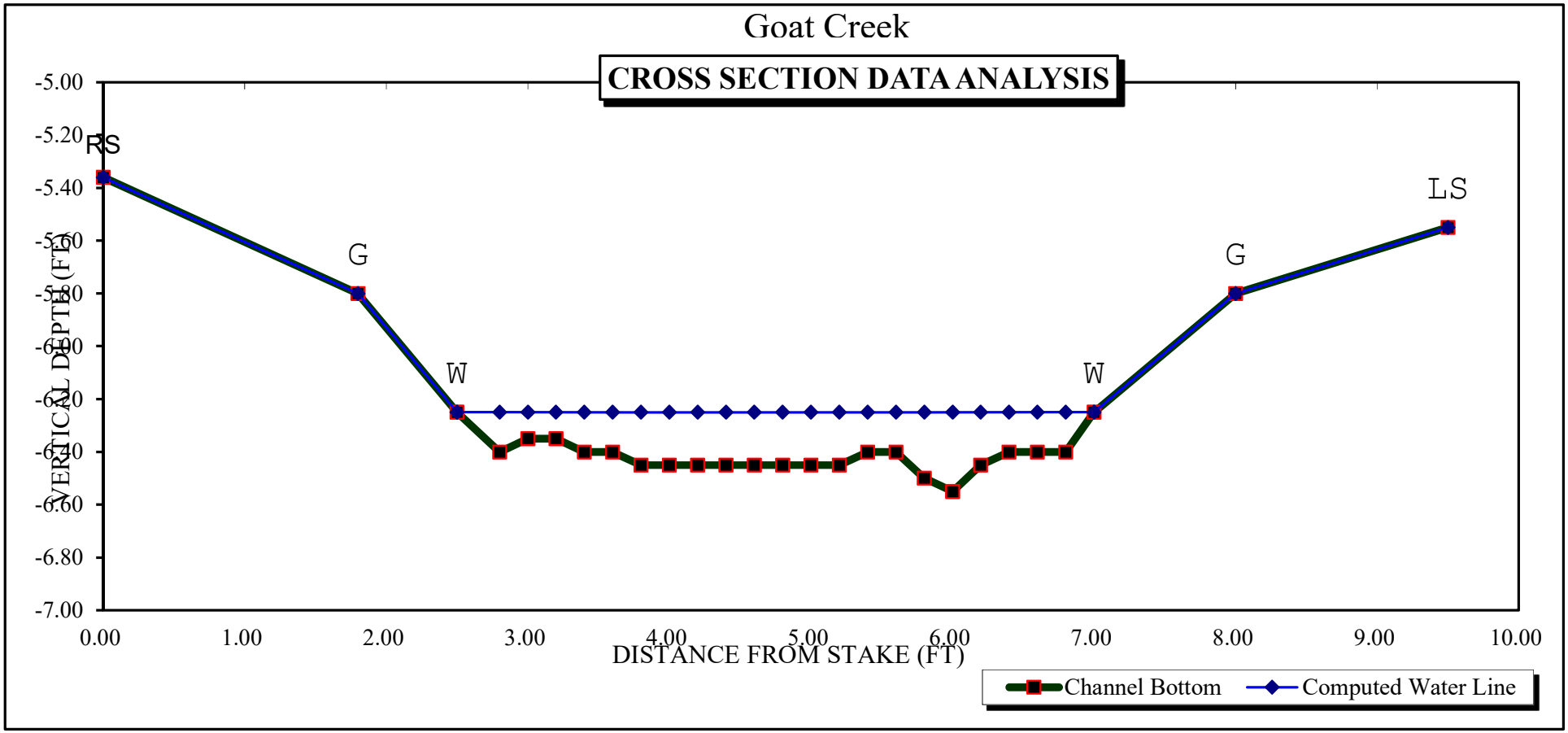
| FLOW (CFS) | PERIOD |
|---|---|
| ========== | ======== |
| _____ | _____ |
| _____ | _____ |
| _____ | _____ |
| _____ | _____ |

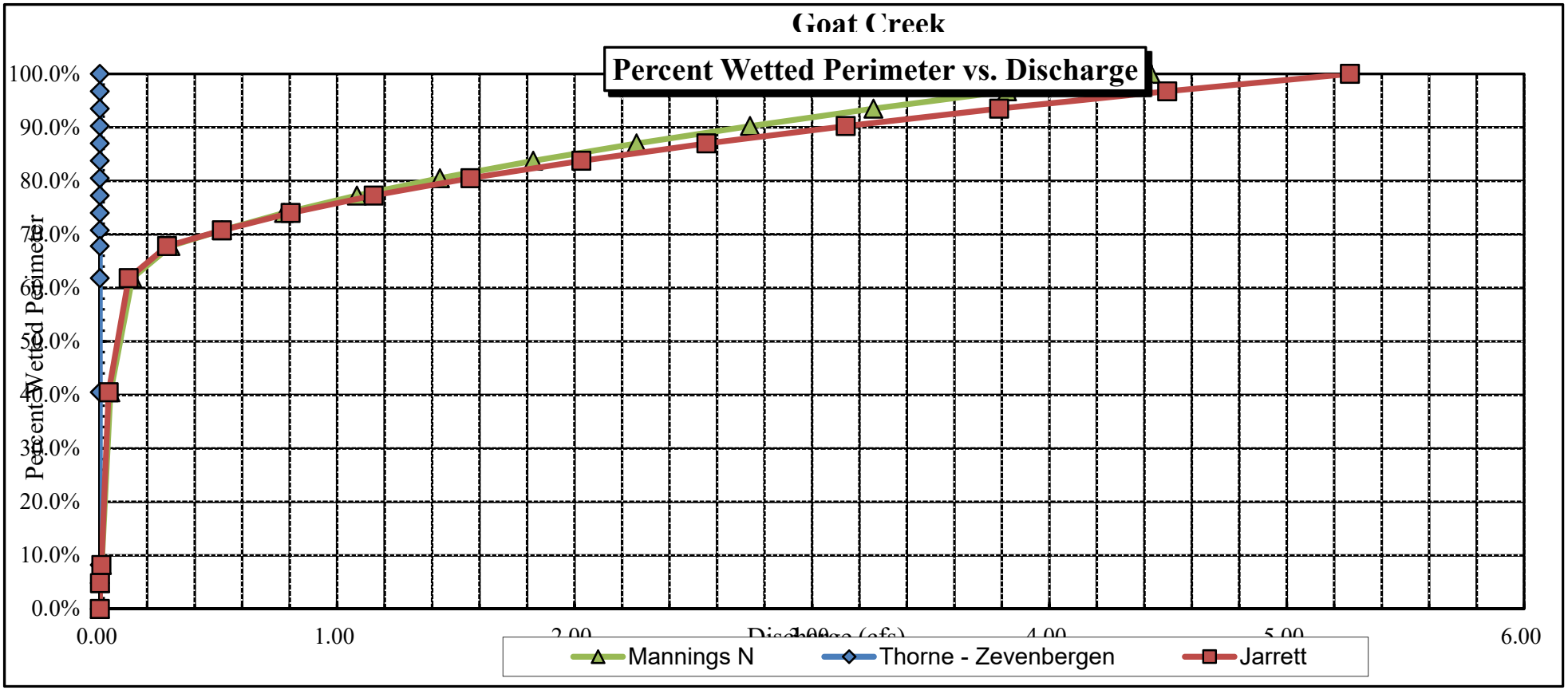
RATIONALE FOR RECOMMENDATION:
==========

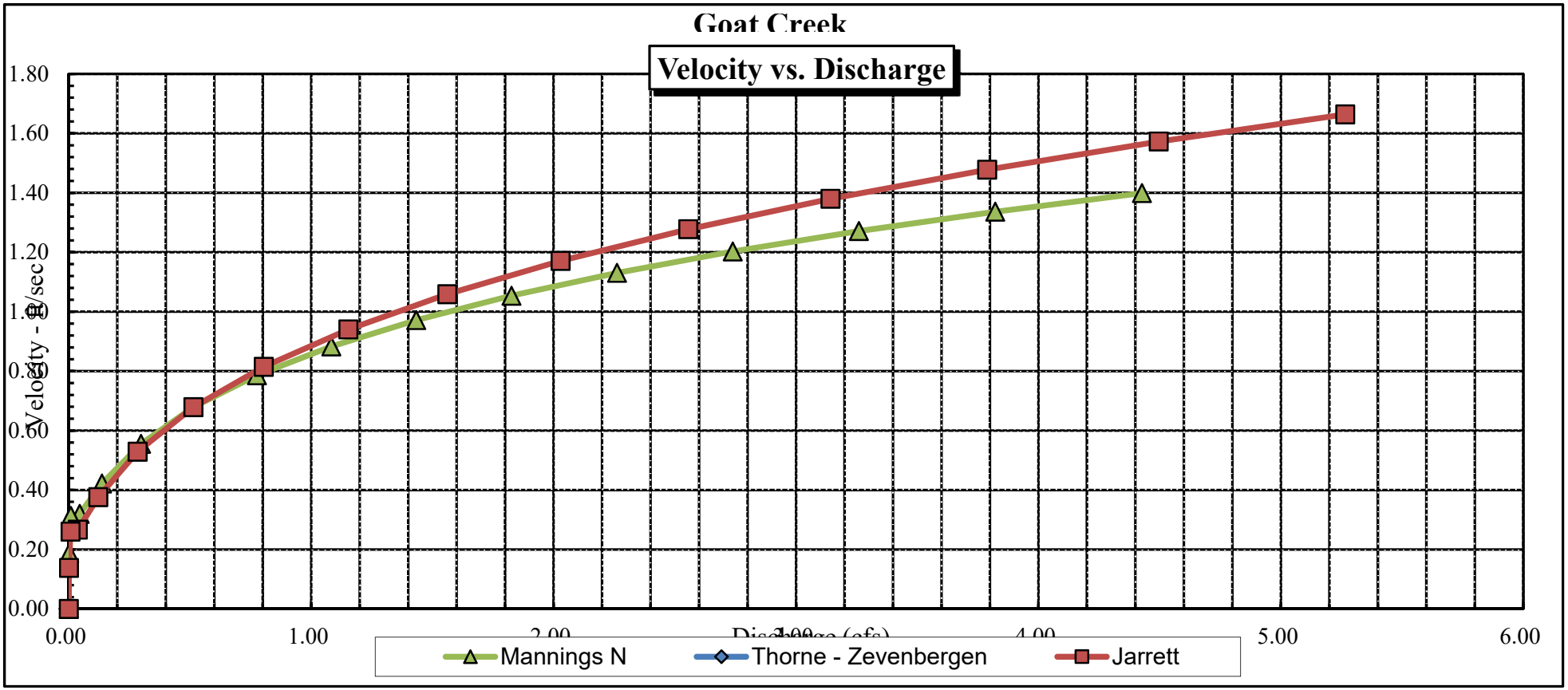
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____

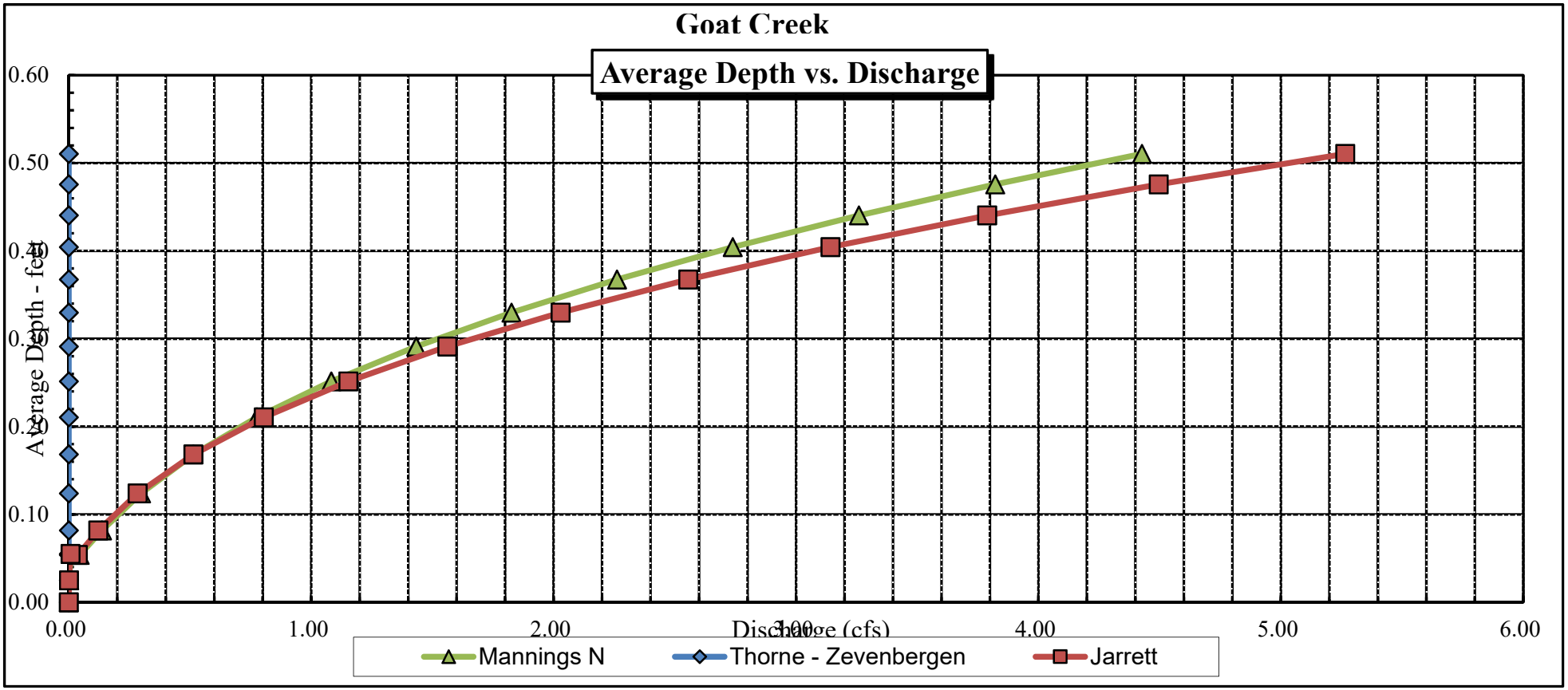
RECOMMENDATION BY: ..... AGENCY..... DATE:.....

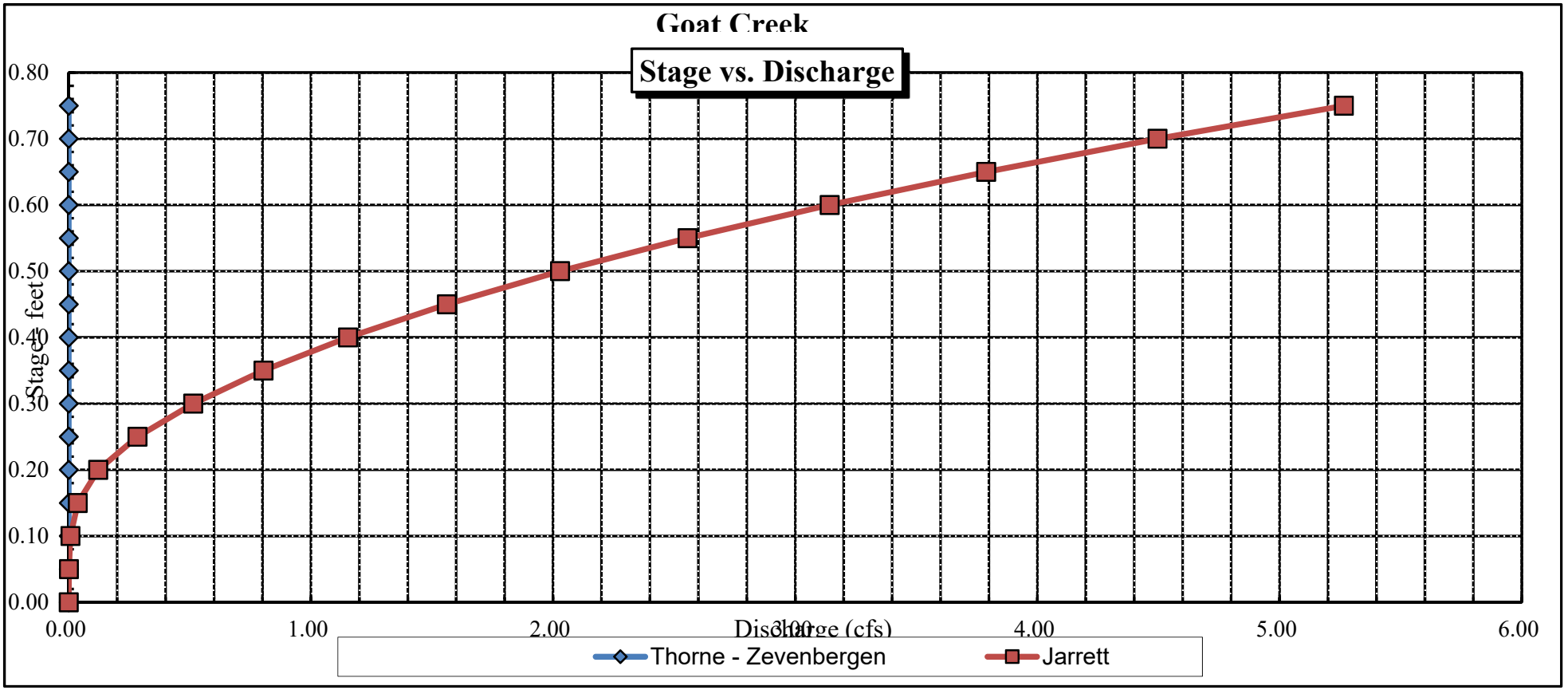
CWCB REVIEW BY: ..... DATE:.....


Goat Creek
CROSS SECTION DATA ANALYSIS
-5.00
-5.20
-5.40
-5.60
-5.80
-6.00
-6.20
-6.40
-6.60
-6.80
-7.00
VERTICAL DEPTH (FT)
RS
G
W
W
G
LS
0.00
1.00
2.00
3.00
4.00
5.00
6.00
7.00
8.00
9.00
10.00
DISTANCE FROM STAKE (FT)
Channel Bottom
Computed Water Line


Goat Creek
Percent Wetted Perimeter vs. Discharge
100.0%
90.0%
80.0%
70.0%
60.0%
50.0%
40.0%
30.0%
20.0%
10.0%
0.0%
Percent Wetted Perimeter
0.00
1.00
2.00
4.00
5.00
6.00
Mannings N
Thorne - Zevenbergen
Jarrett


Goat Creek
Velocity vs. Discharge
1.80
1.60
1.40
1.20
0.60
0.40
0.20
0.00
0.00
1.00
5.00
6.00
Mannings N
Thorne - Zevenbergen
Jarrett


Goat Creek
Average Depth vs. Discharge
Average Depth - feet
0.60
0.50
0.40
0.30
0.20
0.10
0.00
0.00
1.00
2.00
3.00
4.00
5.00
6.00
Discharge (cfs)
Mannings N
Thorne - Zevenbergen
Jarrett


Goat Creek
Stage vs. Discharge
0.80
0.70
0.60
0.50
0.40
0.30
0.20
0.10
0.00
Stage - feet
0.00
1.00
2.00
3.00
4.00
5.00
6.00
Discharge (cfs)
Thorne - Zevenbergen
Jarrett

## Data Input & Proofing

| | |
|---|---|
| STREAM NAME: | Goat Creek |
| XS LOCATION: | UTM Zone 13 219143 4207067 |
| XS NUMBER: | 2 |
| DATE: | 6/30/2020 |
| OBSERVERS: | R. Smith, J. Sondergard |
| 1/4 SEC: | SW |
| SECTION: | 21 |
| TWP: | 43N |
| RANGE: | 12E |
| PM: | NM |
| COUNTY: | San Miguel |
| WATERSHED: | San Miguel River |
| DIVISION: | 4 |
| DOW CODE: | 40345 |
| USGS MAP: | |
| USFS MAP: | |
| | Level and Rod Survey |
| TAPE WT: | 0.0106 lbs / ft |
| TENSION: | 99999 lbs |
| SLOPE: | 0.031 ft / ft |

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

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

| GL=1 | FEATURE | DIST | VERT DEPTH | WATER DEPTH | VEL | A | Q | Tape to Water |
|---|---|---|---|---|---|---|---|---|
| | | | Total Data Points = 20 | | | | | |
| | RS | 0.00 | 2.95 | | | 0.00 | 0.00 | 0.00 |
| 1 | G | 3.40 | 3.36 | | | 0.00 | 0.00 | 0.00 |
| | W | 3.70 | 3.65 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | | 3.80 | 3.70 | 0.05 | 0.07 | 0.01 | 0.00 | 3.65 |
| | | 4.20 | 3.70 | 0.05 | 0.03 | 0.02 | 0.00 | 3.65 |
| | | 4.40 | 3.75 | 0.10 | 0.73 | 0.02 | 0.01 | 3.65 |
| | | 4.60 | 3.85 | 0.20 | 1.88 | 0.04 | 0.08 | 3.65 |
| | | 4.80 | 3.90 | 0.25 | 1.38 | 0.05 | 0.07 | 3.65 |
| | | 5.00 | 3.85 | 0.20 | 0.53 | 0.04 | 0.02 | 3.65 |
| | | 5.20 | 3.90 | 0.25 | 0.59 | 0.05 | 0.03 | 3.65 |
| | | 5.40 | 3.90 | 0.25 | 0.90 | 0.05 | 0.04 | 3.65 |
| | | 5.60 | 3.90 | 0.25 | 1.46 | 0.05 | 0.07 | 3.65 |
| | | 5.80 | 3.85 | 0.20 | 1.16 | 0.04 | 0.05 | 3.65 |
| | | 6.00 | 3.85 | 0.20 | 1.24 | 0.04 | 0.05 | 3.65 |
| | | 6.20 | 3.85 | 0.20 | 0.14 | 0.04 | 0.01 | 3.65 |
| | | 6.40 | 3.85 | 0.20 | 0.00 | 0.04 | 0.00 | 3.65 |
| | | 6.60 | 3.85 | 0.20 | 0.10 | 0.03 | 0.00 | 3.65 |
| | W | 6.70 | 3.65 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 1 | G | 7.50 | 3.35 | | | 0.00 | 0.00 | 0.00 |
| | LS | 9.90 | 2.74 | | | 0.00 | 0.00 | 0.00 |
| | | | | | Totals | 0.52 | 0.43 | |

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

LOCATION INFORMATION

| | |
|---|---|
| STREAM NAME: | Goat Creek |
| XS LOCATION: | UTM Zone 13 219143 4207067 |
| XS NUMBER: | 2 |
| DATE: | 30-Jun-20 |
| OBSERVERS: | R. Smith, J. Sondergard |
| 1/4 SEC: | SW |
| SECTION: | 21 |
| TWP: | 43N |
| RANGE: | 12E |
| PM: | NM |
| COUNTY: | San Miguel |
| WATERSHED: | San Miguel River |
| DIVISION: | 4 |
| DOW CODE: | 40345 |
| USGS MAP: | 0 |
| USFS MAP: | 0 |

SUPPLEMENTAL DATA

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

CHANNEL PROFILE DATA

| | |
|---|---|
| SLOPE: | 0.031 |

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

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

STREAM NAME: Goat Creek
XS LOCATION: UTM Zone 13 219143 4207067
XS NUMBER: 2

# DATA POINTS= 20

VALUES COMPUTED FROM RAW FIELD DATA

| | FEATURE | DIST | VERT DEPTH | WATER DEPTH | VEL | WETTED PERIM. | WATER DEPTH | AREA (Am) | Q (Qm) | % Q CELL |
|---|---|---|---|---|---|---|---|---|---|---|
| | RS | 0.00 | 2.95 | | | 0.00 | | 0.00 | 0.00 | 0.0% |
| 1 | G | 3.40 | 3.36 | | | 0.00 | | 0.00 | 0.00 | 0.0% |
| | W | 3.70 | 3.65 | 0.00 | 0.00 | 0.00 | | 0.00 | 0.00 | 0.0% |
| | | 3.80 | 3.70 | 0.05 | 0.07 | 0.11 | 0.05 | 0.01 | 0.00 | 0.2% |
| | | 4.20 | 3.70 | 0.05 | 0.03 | 0.40 | 0.05 | 0.02 | 0.00 | 0.1% |
| | | 4.40 | 3.75 | 0.10 | 0.73 | 0.21 | 0.10 | 0.02 | 0.01 | 3.4% |
| | | 4.60 | 3.85 | 0.20 | 1.88 | 0.22 | 0.20 | 0.04 | 0.08 | 17.4% |
| | | 4.80 | 3.90 | 0.25 | 1.38 | 0.21 | 0.25 | 0.05 | 0.07 | 15.9% |
| | | 5.00 | 3.85 | 0.20 | 0.53 | 0.21 | 0.20 | 0.04 | 0.02 | 4.9% |
| | | 5.20 | 3.90 | 0.25 | 0.59 | 0.21 | 0.25 | 0.05 | 0.03 | 6.8% |
| | | 5.40 | 3.90 | 0.25 | 0.90 | 0.20 | 0.25 | 0.05 | 0.04 | 10.4% |
| | | 5.60 | 3.90 | 0.25 | 1.46 | 0.20 | 0.25 | 0.05 | 0.07 | 16.8% |
| | | 5.80 | 3.85 | 0.20 | 1.16 | 0.21 | 0.20 | 0.04 | 0.05 | 10.7% |
| | | 6.00 | 3.85 | 0.20 | 1.24 | 0.20 | 0.20 | 0.04 | 0.05 | 11.4% |
| | | 6.20 | 3.85 | 0.20 | 0.14 | 0.20 | 0.20 | 0.04 | 0.01 | 1.3% |
| | | 6.40 | 3.85 | 0.20 | 0.00 | 0.20 | 0.20 | 0.04 | 0.00 | 0.0% |
| | | 6.60 | 3.85 | 0.20 | 0.10 | 0.20 | 0.20 | 0.03 | 0.00 | 0.7% |
| | W | 6.70 | 3.65 | 0.00 | 0.00 | 0.22 | | 0.00 | 0.00 | 0.0% |
| 1 | G | 7.50 | 3.35 | | | 0.00 | | 0.00 | 0.00 | 0.0% |
| | LS | 9.90 | 2.74 | | | 0.00 | | 0.00 | 0.00 | 0.0% |
| | TOTALS ---------- | | | | | 3.19 | 0.25 (Max.) | 0.52 | 0.43 | 100.0% |

Manning's n = 0.0929
Hydraulic Radius= 0.162236213

STREAM NAME: Goat Creek
XS LOCATION: UTM Zone 13 219143 4207067
XS NUMBER: 2

WATER LINE COMPARISON TABLE

| WATER LINE | MEAS AREA | COMP AREA | AREA ERROR |
|---|---|---|---|
| | 0.52 | 0.52 | 0.0% |
| 3.40 | 0.52 | 1.38 | 167.3% |
| 3.42 | 0.52 | 1.31 | 152.3% |
| 3.44 | 0.52 | 1.23 | 137.5% |
| 3.46 | 0.52 | 1.15 | 123.1% |
| 3.48 | 0.52 | 1.08 | 108.9% |
| 3.50 | 0.52 | 1.01 | 95.0% |
| 3.52 | 0.52 | 0.94 | 81.4% |
| 3.54 | 0.52 | 0.87 | 68.1% |
| 3.56 | 0.52 | 0.80 | 55.1% |
| 3.58 | 0.52 | 0.74 | 42.3% |
| 3.60 | 0.52 | 0.67 | 29.9% |
| 3.61 | 0.52 | 0.64 | 23.8% |
| 3.62 | 0.52 | 0.61 | 17.7% |
| 3.63 | 0.52 | 0.58 | 11.7% |
| 3.64 | 0.52 | 0.55 | 5.8% |
| 3.65 | 0.52 | 0.52 | 0.0% |
| 3.66 | 0.52 | 0.49 | -5.8% |
| 3.67 | 0.52 | 0.46 | -11.5% |
| 3.68 | 0.52 | 0.43 | -17.2% |
| 3.69 | 0.52 | 0.40 | -22.8% |
| 3.70 | 0.52 | 0.37 | -28.4% |
| 3.72 | 0.52 | 0.32 | -37.8% |
| 3.74 | 0.52 | 0.28 | -46.8% |
| 3.76 | 0.52 | 0.23 | -55.5% |
| 3.78 | 0.52 | 0.19 | -64.0% |
| 3.80 | 0.52 | 0.14 | -72.3% |
| 3.82 | 0.52 | 0.10 | -80.5% |
| 3.84 | 0.52 | 0.06 | -88.4% |
| 3.86 | 0.52 | 0.03 | -94.4% |
| 3.88 | 0.52 | 0.01 | -97.8% |
| 3.90 | 0.52 | 0.00 | -100.0% |

WATERLINE AT ZERO
AREA ERROR = 3.650

STREAM NAME: Goat Creek
XS LOCATION: UTM Zone 13 219143 4207067
XS NUMBER: 2

Constant Manning's n

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

| | DIST TO WATER (FT) | TOP WIDTH (FT) | AVG. DEPTH (FT) | MAX. DEPTH (FT) | AREA (SQ FT) | WETTED PERIM. (FT) | PERCENT WET PERIM (%) | HYDR RADIUS (FT) | FLOW (CFS) | AVG. VELOCITY (FT/SEC) |
|---|---|---|---|---|---|---|---|---|---|---|
| *GL* | 3.36 | 4.07 | 0.38 | 0.54 | 1.54 | 4.43 | 100.0% | 0.35 | 2.15 | 1.39 |
| | 3.40 | 3.93 | 0.35 | 0.50 | 1.38 | 4.26 | 96.1% | 0.32 | 1.84 | 1.33 |
| | 3.45 | 3.74 | 0.32 | 0.45 | 1.19 | 4.05 | 91.3% | 0.29 | 1.48 | 1.25 |
| | 3.50 | 3.56 | 0.28 | 0.40 | 1.01 | 3.83 | 86.5% | 0.26 | 1.17 | 1.16 |
| | 3.55 | 3.37 | 0.25 | 0.35 | 0.84 | 3.62 | 81.6% | 0.23 | 0.89 | 1.06 |
| | 3.60 | 3.19 | 0.21 | 0.30 | 0.67 | 3.40 | 76.8% | 0.20 | 0.64 | 0.95 |
| *WL* | 3.65 | 3.00 | 0.17 | 0.25 | 0.52 | 3.19 | 72.0% | 0.16 | 0.43 | 0.84 |
| | 3.70 | 2.47 | 0.15 | 0.20 | 0.37 | 2.62 | 59.1% | 0.14 | 0.28 | 0.76 |
| | 3.75 | 2.25 | 0.11 | 0.15 | 0.25 | 2.36 | 53.2% | 0.11 | 0.16 | 0.63 |
| | 3.80 | 2.13 | 0.07 | 0.10 | 0.14 | 2.19 | 49.5% | 0.07 | 0.07 | 0.46 |
| | 3.85 | 1.20 | 0.03 | 0.05 | 0.04 | 1.22 | 27.6% | 0.03 | 0.01 | 0.29 |
| | 3.90 | 0.00 | #DIV/0! | 0.00 | 0.00 | 0.00 | 0.0% | #DIV/0! | #DIV/0! | #DIV/0! |

STREAM NAME: Goat Creek
XS LOCATION: UTM Zone 13 219143 4207067
XS NUMBER: 2

SUMMARY SHEET

| | | |
|---|---|---|
| MEASURED FLOW (Qm)= | 0.43 | cfs |
| CALCULATED FLOW (Qc)= | 0.43 | cfs |
| (Qm-Qc)/Qm * 100 = | 0.0 | % |
| MEASURED WATERLINE (WLm)= | 3.65 | ft |
| CALCULATED WATERLINE (WLc)= | 3.65 | ft |
| (WLm-WLc)/WLm * 100 = | 0.0 | % |
| MAX MEASURED DEPTH (Dm)= | 0.25 | ft |
| MAX CALCULATED DEPTH (Dc)= | 0.25 | ft |
| (Dm-Dc)/Dm * 100 | 0.0 | % |
| MEAN VELOCITY= | 0.84 | ft/sec |
| MANNING'S N= | 0.093 | |
| SLOPE= | 0.031 | ft/ft |
| .4 * Qm = | 0.2 | cfs |
| 2.5 * Qm= | 1.1 | cfs |

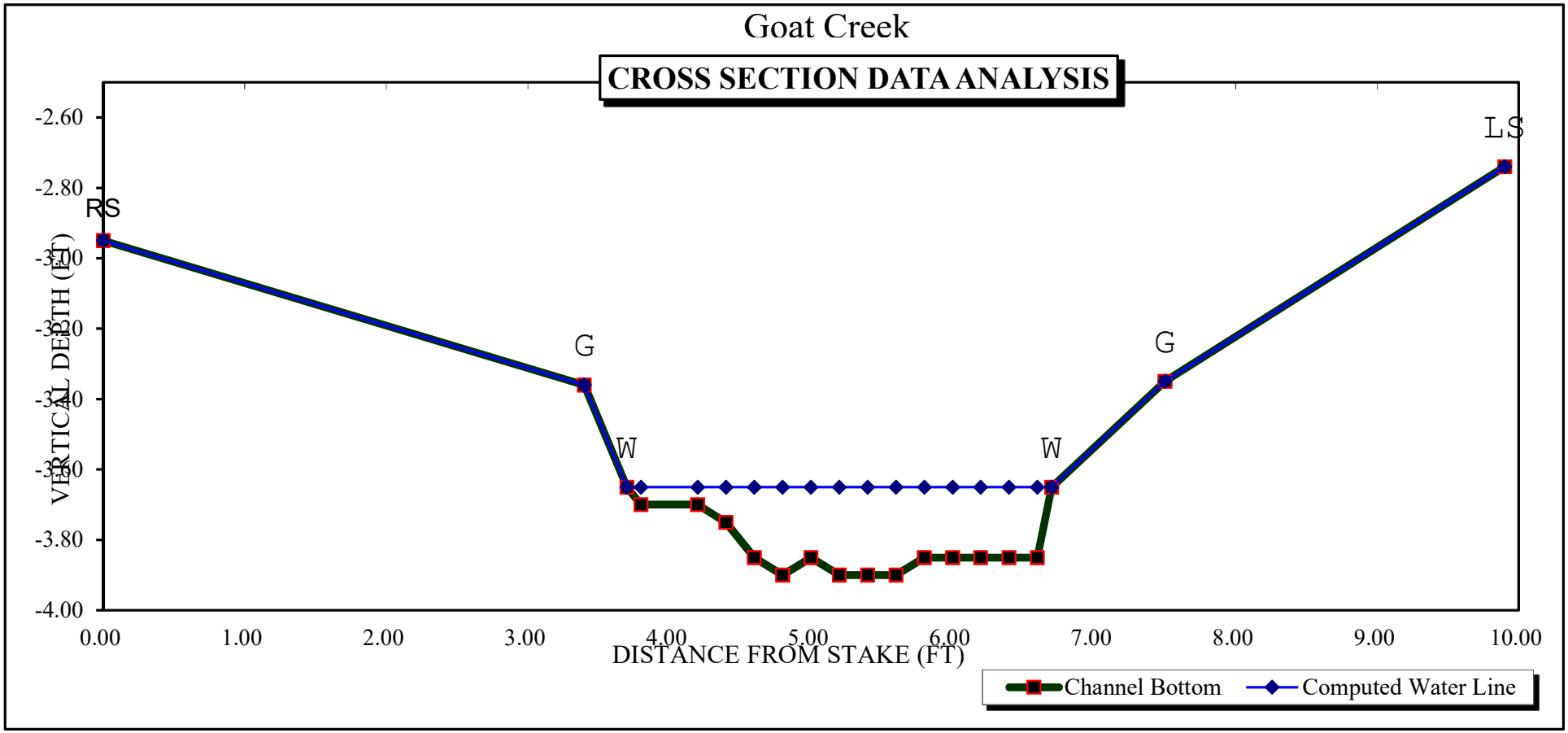
RECOMMENDED INSTREAM FLOW:
==========

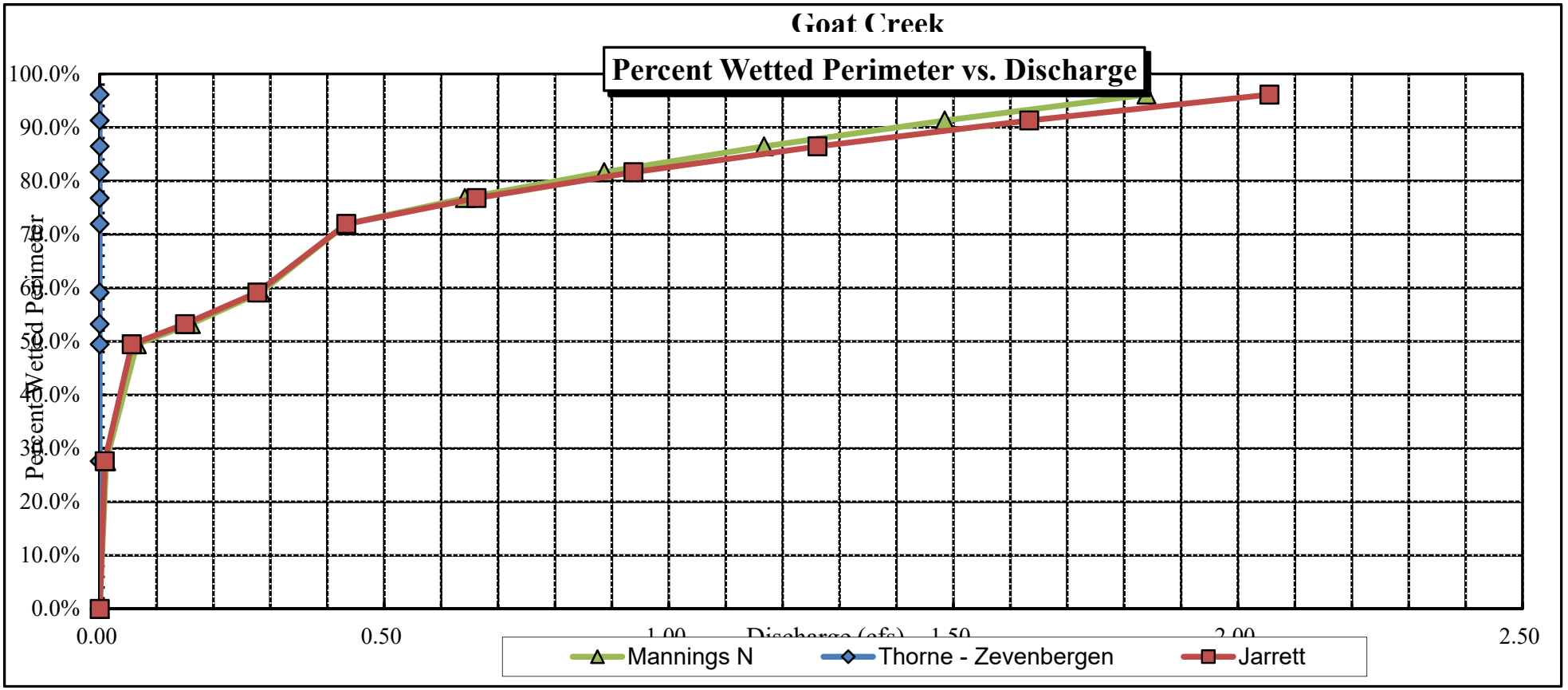
| FLOW (CFS) | PERIOD |
|---|---|
| ========== | ======== |
| _____ | _____ |
| _____ | _____ |
| _____ | _____ |
| _____ | _____ |

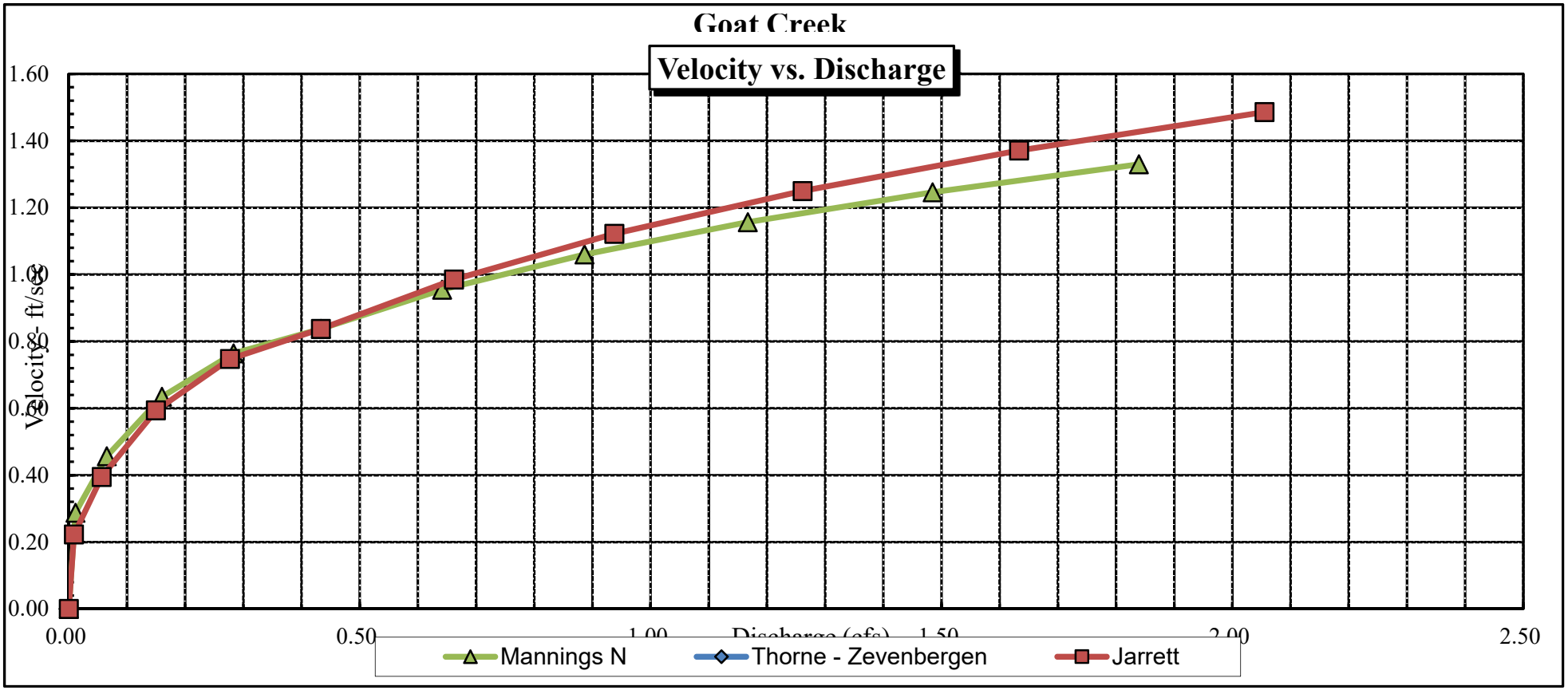
RATIONALE FOR RECOMMENDATION:
==========

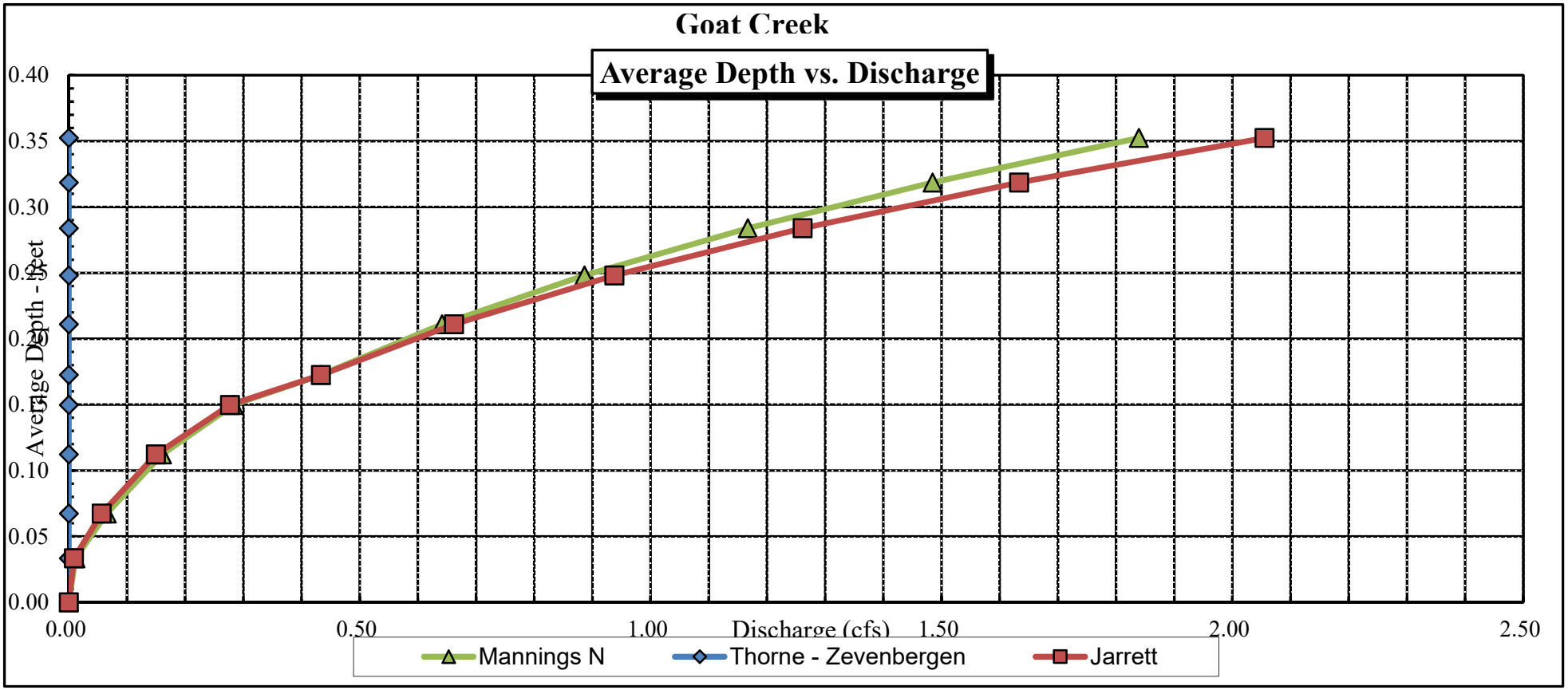
RECOMMENDATION BY: ..... AGENCY..... DATE:.....

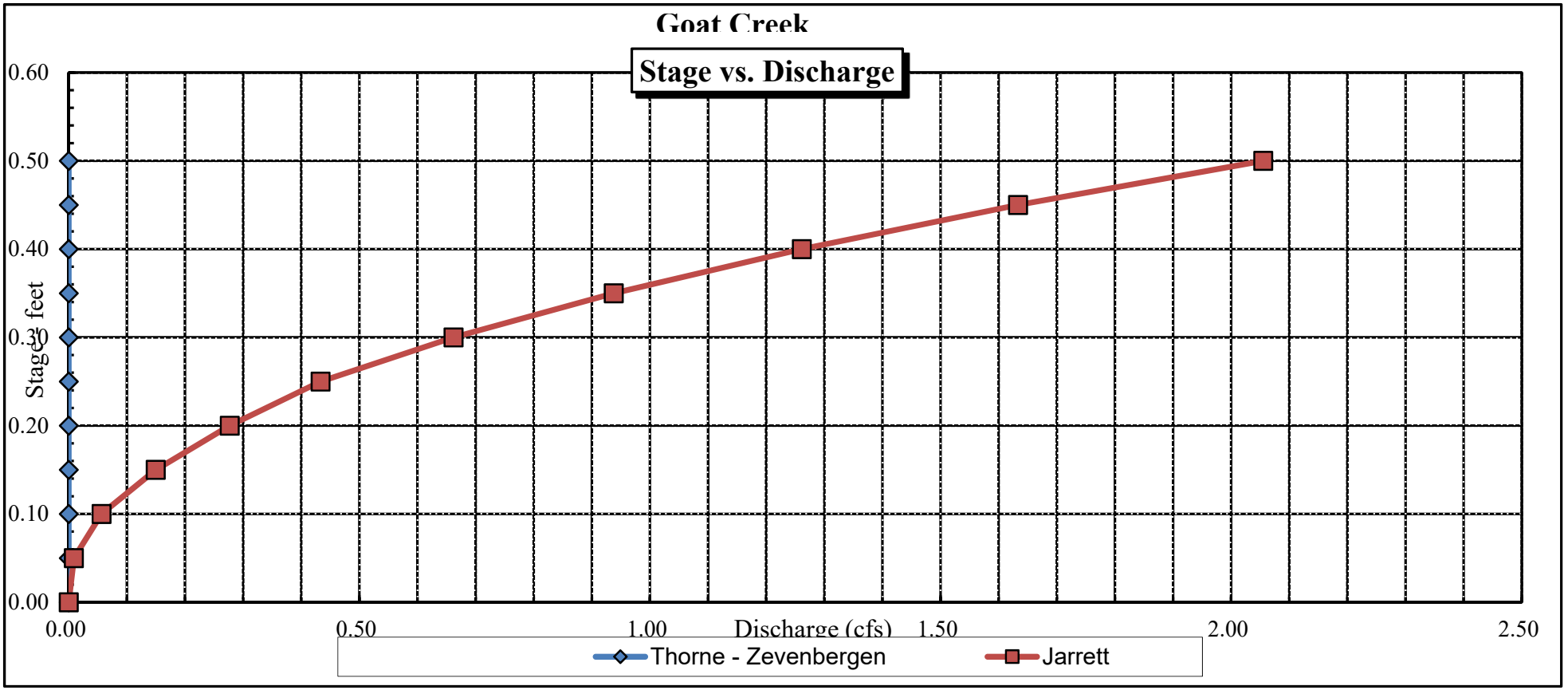
CWCB REVIEW BY: ..... DATE:.....


Goat Creek
CROSS SECTION DATA ANALYSIS
-2.60
-2.80
-3.00
-3.20
-3.40
-3.60
-3.80
-4.00
VERTICAL DEPTH (FT)
RS
G
W
W
G
LS
0.00
1.00
2.00
3.00
4.00
5.00
6.00
7.00
8.00
9.00
10.00
DISTANCE FROM STAKE (FT)
Channel Bottom
Computed Water Line


Goat Creek
Percent Wetted Perimeter vs. Discharge
100.0%
90.0%
80.0%
70.0%
60.0%
50.0%
40.0%
30.0%
20.0%
10.0%
0.0%
Percent Wetted Perimeter
0.00
0.50
1.00
1.50
2.00
2.50
Mannings N
Thorne - Zevenbergen
Jarrett


Goat Creek
Velocity vs. Discharge
1.60
1.40
1.20
1.00
0.80
0.60
0.40
0.20
0.00
0.00
0.50
1.00
1.50
2.00
2.50
Mannings N
Thorne - Zevenbergen
Jarrett


Goat Creek
Average Depth vs. Discharge
Average Depth - feet
0.40
0.35
0.30
0.25
0.20
0.15
0.10
0.05
0.00
0.00
0.50
1.00
Discharge (cfs)
1.50
2.00
2.50
Mannings N
Thorne - Zevenbergen
Jarrett


Goat Creek
Stage vs. Discharge
0.60
0.50
0.40
0.30
0.20
0.10
0.00
Stage - feet
0.00
0.50
1.00
1.50
2.00
2.50
Discharge (cfs)
Thorne - Zevenbergen
Jarrett

COLORADO WATER CONSERVATION BOARD

# FIELD DATA FOR INSTREAM FLOW DETERMINATIONS

COLORADO DIVISION OF WILDLIFE

## LOCATION INFORMATION

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| STREAM NAME: Goat Creek | | | | | | CROSS-SECTION NO.: 1 | |
| CROSS-SECTION LOCATION: 250 ft. upstream from Beef Trail Road Crossing | | | | | | | |
| DATE: 6-30-20 | OBSERVERS: R. Smith, J. Sondergaard | | | | | | |
| LEGAL DESCRIPTION | ¼ SECTION: SW | SECTION: 21 | TOWNSHIP: 43 (N)/S | RANGE: 12 (E)/W | PM: NM | | |
| COUNTY: San Miguel | WATERSHED: San Miguel R | WATER DIVISION: 4 | DOW WATER CODE: 40345 | | | | |
| MAP(S): USGS: Zone 12 37.96636 | | | | | | | |
| USFS: 745944 4205780 -108.20028 | | | | | | | |

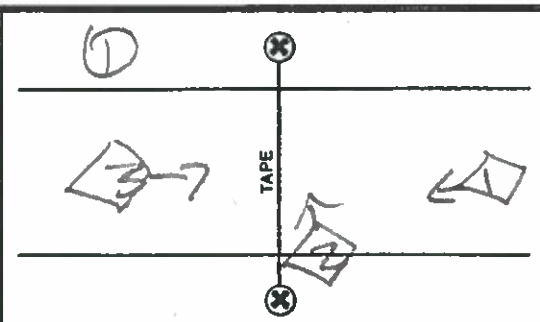
## SUPPLEMENTAL DATA

| | | | | |
|---|---|---|---|---|
| SAG TAPE SECTION SAME AS DISCHARGE SECTION: (YES) / NO | METER TYPE: M-M | | | |
| METER NUMBER: | DATE RATED: | CALIB/SPIN: ____ sec | TAPE WEIGHT: surveyed ____ lbs/foot | TAPE TENSION: surveyed ____ lbs |
| CHANNEL BED MATERIAL SIZE RANGE: gravel to 1-foot boulders | PHOTOGRAPHS TAKEN: (YES)/NO | NUMBER OF PHOTOGRAPHS: 3 | | |

## CHANNEL PROFILE DATA

| STATION | DISTANCE FROM TAPE (ft) | ROD READING (ft) |
|---|---|---|
| ⊗ Tape @ Stake LB | 0.0 | surveyed |
| ⊗ Tape @ Stake RB | 0.0 | surveyed |
| ① WS @ Tape LB/RB | 0.0 | 6.25/6.25 |
| ② WS Upstream | 7.8' | 6.00 |
| ③ WS Downstream | 10.8' | 6.66 |
| SLOPE | 0.66 / 17.8' = 0.037 | |

SKETCH




## AQUATIC SAMPLING SUMMARY

| STREAM ELECTROFISHED: YES/(NO) | DISTANCE ELECTROFISHED: ____ ft | FISH CAUGHT: YES/NO | WATER CHEMISTRY SAMPLED: YES/(NO) |
|---|---|---|---|

LENGTH - FREQUENCY DISTRIBUTION BY ONE-INCH SIZE GROUPS (1.0-1.9, 2.0-2.9, ETC.)

| SPECIES (FILL IN) | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | >15 | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | |

AQUATIC INSECTS IN STREAM SECTION BY COMMON OR SCIENTIFIC ORDER NAME:

abundant stonefly, limited mayfly & caddisfly

## COMMENTS

Strong evidence of spring-fed flow. In extreme, drought conditions, flow is only slightly below bankfull, as indicated by moss lines & vegetation. Willow - alder - spruce riparian

# DISCHARGE/CROSS SECTION NOTES

| STREAM NAME: | CROSS-SECTION NO.: | DATE: | SHEET ___ OF ___ |
|---|---|---|---|
| Goat Creek | 1 | 6-30-23 | |

| BEGINNING OF MEASUREMENT | EDGE OF WATER LOOKING DOWNSTREAM: (0.0 AT STAKE) | LEFT / RIGHT | Gage Reading: _____ ft | TIME: 2:00 pm |
|---|---|---|---|---|

| Features: Stake (S), Grassline (G), Waterline (W), Rock (R) | Distance From Initial Point (ft) | Width (ft) | Total Vertical Depth From Tape/Inst (ft) | Water Depth (ft) | Depth of Observation (ft) | Revolutions | Time (sec) | Velocity (ft/sec) | | Area ($ft^2$) | Discharge (cfs) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | At Point | Mean in Vertical | | |
| RS | 0.0 | | 5.36 | | | | | | | | |
| G | 1.8 | | 5.80 | | | | | | | | |
| W | 2.5 | | 6.25 | | | | | | | | |
| | 2.8 | | 6.40 | | 0.15 | | | 0.47 | | | |
| | 3.0 | | 6.35 | | 0.10 | | | 0.95 | | | |
| | 3.2 | | 6.35 | | 0.10 | | | 0.40 | | | |
| | 3.4 | | 6.4 | | 0.15 | | | 0.28 | | | |
| | 3.6 | | 6.4 | | 0.15 | | | 0 | | | |
| | 3.8 | | 6.45 | | 0.20 | | | 0.36 | | | |
| | 4.0 | | 6.45 | | 0.20 | | | 0.57 | | | |
| | 4.2 | | 6.45 | | 0.20 | | | 0.92 | | | |
| | 4.4 | | 6.45 | | 0.20 | | | 1.76 | | | |
| | 4.6 | | 6.45 | | 0.20 | | | 0.96 | | | |
| | 4.8 | | 6.45 | | 0.20 | | | 0.10 | | | |
| | 5.0 | | 6.45 | | 0.20 | | | 0.72 | | | |
| | 5.2 | | 6.45 | | 0.20 | | | 1.61 | | | |
| | 5.4 | | 6.4 | | 0.15 | | | 1.35 | | | |
| | 5.6 | | 6.4 | | 0.15 | | | 0.80 | | | |
| | 5.8 | | 6.5 | | 0.25 | | | 0.19 | | | |
| | 6.0 | | 6.55 | | 0.30 | | | 0.08 | | | |
| | 6.2 | | 6.45 | | 0.20 | | | 0.17 | | | |
| | 6.4 | | 6.4 | | 0.15 | | | 0.60 | | | |
| | 6.6 | | 6.4 | | 0.15 | | | 1.45 | | | |
| | 6.8 | | 6.4 | | 0.15 | | | 1.14 | | | |
| | | | | | | | | | | | |
| | | | | | | | | | | | |
| | | | | | | | | | | | |
| | | | | | | | | | | | |
| | | | | | | | | | | | |
| | | | | | | | | | | | |
| | | | | | | | | | | | |
| | | | | | | | | | | | |
| | | | | | | | | | | | |
| | | | | | | | | | | | |
| | | | | | | | | | | | |
| | | | | | | | | | | | |
| | | | | | | | | | | | |
| | | | | | | | | | | | |
| W | 7.0 | | 6.25 | | | | | | | | |
| G | 8.0 | | 5.80 | | | | | | | | |
| LS | 9.5 | | 5.55 | | | | | | | | |
| | | | | | | | | | | | |
| | | | | | | | | | | | |
| | | | | | | | | | | | |
| 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: Goat Creek | | | | | | CROSS-SECTION NO.: 2 |
| CROSS-SECTION LOCATION: 100 ft. downstream from Beef Trail Road Crossing | | | | | | |
| DATE: 10-30-20 | OBSERVERS: R. Smith, J. Sondergard | | | | | |
| LEGAL DESCRIPTION | ¼ SECTION: SW | SECTION: 21 | TOWNSHIP: 43(N)/S | RANGE: 12 (E)W | PM: NM | |
| COUNTY: San Miguel | WATERSHED: San Miguel R. | WATER DIVISION: 4 | DOW WATER CODE: 40345 | | | |
| MAP(S): USGS: | Zone 13 219143 | | | | | |
| USFS: | 4207067 | | | | | |

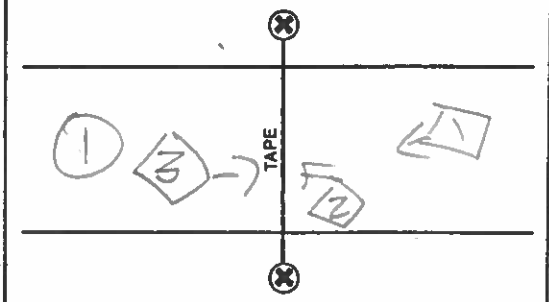
## SUPPLEMENTAL DATA

| | | | | |
|---|---|---|---|---|
| SAG TAPE SECTION SAME AS DISCHARGE SECTION: YES / NO | METER TYPE: M-M | | | |
| METER NUMBER: | DATE RATED: | CALIB/SPIN: ____ sec | TAPE WEIGHT: surveyed ____ lbs/foot | TAPE TENSION: surveyed ____ lbs |
| CHANNEL BED MATERIAL SIZE RANGE: gravel to 2-foot boulders | PHOTOGRAPHS TAKEN: (YES)/NO | NUMBER OF PHOTOGRAPHS: 3 | | |

## CHANNEL PROFILE DATA

| STATION | DISTANCE FROM TAPE (ft) | ROD READING (ft) |
|---|---|---|
| ⊗ Tape @ Stake LB | 0.0 | surveyed |
| ⊗ Tape @ Stake RB | 0.0 | surveyed |
| ① WS @ Tape LB/RB | 0.0 | 3.65/3.65 |
| ② WS Upstream | 8.4' | 3.16 |
| ③ WS Downstream | 23.0' | 4.12 |
| SLOPE | 0.96/31.4 = .031 | |

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:

stonefly - abundant mayfly & caddisfly - a few

## COMMENTS

# DISCHARGE/CROSS SECTION NOTES

| STREAM NAME: | CROSS-SECTION NO.: | DATE: | SHEET ___ OF ___ |
|---|---|---|---|
| Goat Creek | 2 | 6-30-20 | |

| BEGINNING OF MEASUREMENT | EDGE OF WATER LOOKING DOWNSTREAM: (0.0 AT STAKE) LEFT / RIGHT | Gage Reading: _____ ft | TIME: 3:10 |
|---|---|---|---|

| 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) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| RS | 0.0 | | 2.95 | | | | | | | | |
| G | 3.4 | | 3.36 | | | | | | | | |
| W | 3.7 | | 3.65 | | | | | | | | |
| | 3.8 | | 3.7 | | 0.05 | | | 0.07 | | | |
| | 4.2 | | 3.7 | | 0.05 | | | 0.03 | | | |
| | 4.4 | | 3.75 | | 0.10 | | | 0.73 | | | |
| | 4.6 | | 3.85 | | 0.20 | | | 1.88 | | | |
| | 4.8 | | 3.9 | | 0.25 | | | 1.38 | | | |
| | 5.0 | | 3.85 | | 0.20 | | | 0.53 | | | |
| | 5.2 | | 3.9 | | 0.25 | | | 0.59 | | | |
| | 5.4 | | 3.9 | | 0.25 | | | 0.90 | | | |
| | 5.6 | | 3.9 | | 0.25 | | | 1.46 | | | |
| | 5.8 | | 3.85 | | 0.20 | | | 1.16 | | | |
| | 6.0 | | 3.85 | | 0.20 | | | 1.24 | | | |
| | 6.2 | | 3.85 | | 0.20 | | | 0.14 | | | |
| | 6.4 | | 3.85 | | 0.20 | | | 0 | | | |
| | 6.6 | | 3.85 | | 0.20 | | | 0.10 | | | |
| W | 10.7 | | 3.65 | | | | | | | | |
| G | 11.5 | | 3.35 | | | | | | | | |
| LS | 9.9 | | 2.74 | | | | | | | | |
| TOTALS: | | | | | | | | | | | |

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