



# United States Department of the Interior



BUREAU OF LAND MANAGEMENT  
Colorado State Office  
2850 Youngfield Street  
Lakewood, Colorado 80215-7210

In Reply Refer To:  
CO-932 (7250)

Mr. Rob Viehl  
Colorado Water Conservation Board  
1313 Sherman Street, Room 721  
Denver, Colorado 80203

Dear Mr Viehl:

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

**Location and Land Status.** Van Boxel Creek originates on High Mesa, approximately 10 miles south of Morrow Point Reservoir. The subject of this recommendation is a reach that begins at the headwaters and extends to the confluence with the Little Cimarron River, a distance of approximately 6.5 miles. The BLM manages approximately 3.2 miles of this reach, the U.S. Forest Service manages 2.0 miles, and 1.3 miles are in private ownership.

**Existing Instream Flow Water Rights.** The Colorado Water Conservation Board appropriated an instream flow water right on the Little Cimarron River in 1976. The water right extends from the headwaters to the confluence with the Little Cimarron River. The instream flow water right is for 2.0 cfs, year-round.

**Biological Summary.** Overall, Van Boxel Creek is a cold-water, high gradient stream. It starts out as a low gradient stream on the top of High Mesa, and then transitions rapidly into a high gradient stream that flow through a narrow canyon. The lower portions of the creek have large substrate, consisting of mostly of small cobbles and boulders of up to two feet in size. The stream has limited riffle habitat because of the high gradient, but it has a good supply of woody debris that provides an abundance of pool habitat.

Fishery surveys have revealed a self-sustaining population of brook trout. Intensive macro-invertebrate surveys have not been conducted, but spot samples have revealed various species of mayfly, caddisfly, and stonefly.

The riparian community is generally comprised of blue spruce, alder, and willow species. The riparian community is in very good condition and provides abundant shading and cover for fish habitat.

**R2Cross Analysis.** The BLM collected the following R2Cross data from Van Boxel 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) |
|--------------------|----------------|------------|--------------------------------------------------------------|--------------------------------------------------------------|
| 06/07/2021 #1      | 11.30 cfs      | 31.71 feet | 7.31 cfs                                                     | 8.01 cfs                                                     |
| 06/07/2021 #2      | 11.76 cfs      | 35.16 feet | 2.98 cfs                                                     | 11.58 cfs                                                    |
| Averages:          |                |            | 5.15 cfs                                                     | 9.80 cfs                                                     |

BLM's analysis of this data indicates that the following flows are needed to protect the fishery and natural environment to a reasonable degree. Please note that with the exception of the May 1 through June 30 period, BLM's recommended flow rates have been modified to reflect limited water availability on the creek.

4.5 cubic feet per second is recommended from April 1 through April 30. Protecting this flow rate would require an increase of 2.5 cfs to the existing instream flow water right. An increase during this period is important because the fish population is starting to become more active after stream ice melts and water temperatures start rising.

9.80 cubic feet per second is recommended during the peak snowmelt runoff period from May 1 through June 30. Protecting this flow rate would require an increase of 7.80 cfs to the existing instream flow water right. This recommendation is driven by the wetted perimeter criteria. It is important to protect a flow rate that makes most habitat possible available to the fish population while they are completing critical life history functions during snowmelt runoff.

9.1 cubic feet per second is recommended from July 1 through July 31. Protecting this flow rate would require an increase of 7.10 cfs to the existing instream flow water right. This is still a very active period for the fish community, but the recommended flow rate has been decreased because of water availability.

3.5 cubic feet per second is recommended from August 1 through August 31. Protecting this flow rate would require an increase of 1.50 cfs to the existing instream flow water right. During this period, fish are feeding aggressively and gaining weight for the upcoming winter, so it is important to provide as much habitat as possible for feeding.

2.4 cubic feet per second is recommended from September 1 through September 30. Protecting this flow rate would require an increase of 0.4 cfs to the existing instream flow water right. This flow rate will provide a transitional flow rate for the fish community between the higher flows during the warmer part of the year and low base flows during winter, allowing the population to adjust to gradually reduced physical habitat. This flow rate will also provide ample pool habitat, where the fish population resides during much of warm portion of the year.

2.0 cubic feet per second is recommended during cold weather period from October 1 to March 31 because of limited water availability. Protecting this flow rate would require no change to the existing instream flow water right.

**Rationale for Instream Flow Increase.** BLM believes an instream flow increase for Van Boxel Creek is warranted because of physical habitat characteristics. The R2Cross data clearly indicates that the current instream flow water right does not provide sufficient physical habitat during the warm weather portions of the year when the fish populations are feeding, growing, and spawning. When the existing instream flow rights are applied to the cross sections that were collected, the stream would exhibit between 20.9% and 28.6% wetted perimeter, so a large portion of the potential habitat is not available. During the warm weather season, the fish population needs to have access to as much of the stream channel as possible for feeding, resting, and spawning if it is to survive the pronounced cold winters in this location.

**Water Availability.** Nearby gages on other streams are affected by reservoir releases, so BLM does not recommend use of a basin apportionment approach. In addition, Van Boxel Creek has never been historically gaged, so BLM recommends using regression models to identify water availability.

The BLM is aware of the following water right within the instream flow reach:

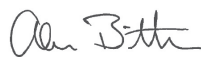
Ramsey Hydro Pipeline – 0.68 cfs absolute; 2.32 cfs conditional.

**Relationship to Land Management Plans.** BLM's land use plan calls for Van Boxel Creek to be managed to maintain, restore, or improve riparian conditions, such that proper functioning conditions are achieved. It also specifies that instream flow appropriations will be pursued on fishery streams to ensure sufficient flows rates for fisheries protection. Appropriation of an instream flow water right would assist BLM in long-term management of outstanding riparian values and important fishery values.

Data sheets, R2Cross output, fishery survey information, and photographs of the cross section were included with BLM's draft recommendation in February 2022. 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,



Digitally signed by ALAN  
BITTNER  
Date: 2022.11.29 14:50:05  
-07'00'

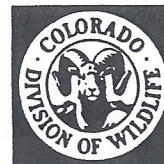
Alan Bittner  
Deputy State Director, Division of Resources

Cc: Jon Kaminsky, Gunnison Field Office  
Andrew Breibart, Gunnison Field Office  
Russ Japuntich, Gunnison Field Office  
Stephanie Connolly, Southwest District Office



COLORADO WATER  
CONSERVATION BOARD

# FIELD DATA FOR INSTREAM FLOW DETERMINATIONS



## LOCATION INFORMATION

|                                                                  |                                  |                      |                       |
|------------------------------------------------------------------|----------------------------------|----------------------|-----------------------|
| STREAM NAME: Van Boxel Creek                                     |                                  | CROSS-SECTION NO.: 1 |                       |
| CROSS-SECTION LOCATION: 200 ft. downstream from County Road 864A |                                  |                      |                       |
| DATE: 6-7-21                                                     | OBSERVERS: R. Smith, A. Breibant |                      |                       |
| LEGAL DESCRIPTION                                                | 1/4 SECTION: SE                  | SECTION: 26          | TOWNSHIP: 47 N/S      |
|                                                                  |                                  | RANGE: 6 E/W         | PM: NM                |
| COUNTY: Gunnison                                                 | WATERSHED: Gunnison R.           | WATER DIVISION: 4    | DOW WATER CODE: 46599 |
| MAP(S):                                                          | USGS: Gaia 282408                | USFS: 4241493        |                       |

## SUPPLEMENTAL DATA

|                                                            |                           |                          |
|------------------------------------------------------------|---------------------------|--------------------------|
| SAG TAPE SECTION SAME AS DISCHARGE SECTION:                | YES/NO                    | METER TYPE: M-M          |
| METER NUMBER:                                              | DATE RATED:               | CALIB/SPIN: sec          |
|                                                            |                           | TAPE WEIGHT: lbs/foot    |
|                                                            |                           | TAPE TENSION: 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 35.9                | 5.55 / 5.55      |
| ② WS Upstream     | 2.0                     | 5.46             |
| ③ WS Downstream   | 17.0                    | 6.05             |
| SLOPE             | 0.51 / 19.0 = .027      |                  |

SKETCH

10.7

1

**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

|              |
|--------------|
| pH - 7.36    |
| Cond - 21.1  |
| Temp - 9.6°C |

### DISCHARGE/CROSS SECTION N

**STREAM NAME:**

Van Boxel Creek

CROSS-SECTION NO.:

DATE:

DATE: 6-7-7

SHEET OF

### BEGINNING OF MEASUREMENT

EDGE OF WATER LOOKING DOWNSTREAM:  
(0.0 AT STAKE)

LEFT / RIGHT

Gage Reading: \_\_\_\_\_ft

TIME: 3:20 PM

| Features | Stake (S)<br>Grassline (G)<br>Waterline (W)<br>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 <sup>2</sup> ) | Discharge (cfs) |
|----------|---------------------------------------------------------|----------------------------------|------------|------------------------------------------|------------------|---------------------------|-------------|------------|-------------------|------------------|-------------------------|-----------------|
|          |                                                         |                                  |            |                                          |                  |                           |             |            | At Point          | Mean in Vertical |                         |                 |
| R/S      |                                                         | 0.0                              |            | 2.0                                      |                  |                           |             |            |                   |                  |                         |                 |
|          |                                                         | 5.0                              |            | 4.62                                     |                  |                           |             |            |                   |                  |                         |                 |
|          | B/F                                                     | 14.5                             |            | 4.10                                     |                  |                           |             |            |                   |                  |                         |                 |
|          |                                                         | 15.7                             |            | 4.29                                     |                  |                           |             |            |                   |                  |                         |                 |
|          | 18.1                                                    |                                  | 4.96       |                                          |                  |                           |             |            |                   |                  |                         |                 |
|          | 18.7                                                    |                                  | 5.55       |                                          |                  |                           |             |            |                   |                  |                         |                 |
|          |                                                         | 21                               |            | 5.8                                      | 0.25             |                           |             |            | 0.35              |                  |                         |                 |
|          |                                                         | 22                               |            | 5.8                                      | .25              |                           |             |            | 0.73              |                  |                         |                 |
|          |                                                         | 23                               |            | 5.75                                     | .20              |                           |             |            | .89               |                  |                         |                 |
|          |                                                         | 24                               |            | 5.8                                      | .25              |                           |             |            | .40               |                  |                         |                 |
|          |                                                         | 25                               |            | 6.05                                     | .50              |                           |             |            | .88               |                  |                         |                 |
|          |                                                         | 26                               |            | 6.5                                      | .95              |                           |             |            | 1.17              |                  |                         |                 |
|          |                                                         | 26.5                             |            | 6.6                                      | 1.05             |                           |             |            | 1.34              |                  |                         |                 |
|          |                                                         | 27                               |            | 6.55                                     | 1.0              |                           |             |            | 1.10              |                  |                         |                 |
|          |                                                         | 27.5                             |            | 6.6                                      | 1.05             |                           |             |            | 2.48              |                  |                         |                 |
|          |                                                         | 28                               |            | 6.8                                      | 1.25             |                           |             |            | 0.06              |                  |                         |                 |
|          |                                                         | 28.5                             |            | 6.75                                     | 1.2              |                           |             |            | 1.85              |                  |                         |                 |
|          |                                                         | 29                               |            | 6.65                                     | 1.1              |                           |             |            | 0.48              |                  |                         |                 |
|          |                                                         | 29.5                             |            | 6.35                                     | 0.8              |                           |             |            | 2.46              |                  |                         |                 |
|          |                                                         | 30                               |            | 6.45                                     | 0.9              |                           |             |            | 0.69              |                  |                         |                 |
|          |                                                         | 30.5                             |            | 6.4                                      | 0.85             |                           |             |            | 1.72              |                  |                         |                 |
|          |                                                         | 31                               |            | 6.2                                      | 0.65             |                           |             |            | 2.40              |                  |                         |                 |
|          |                                                         | 31.5                             |            | 6.1                                      | 0.55             |                           |             |            | 2.55              |                  |                         |                 |
|          |                                                         | 32                               |            | 6.1                                      | 0.55             |                           |             |            | 1.77              |                  |                         |                 |
|          |                                                         | 32.5                             |            | 6.2                                      | 0.65             |                           |             |            | 1.14              |                  |                         |                 |
|          |                                                         | 33                               |            | 6.25                                     | 0.7              |                           |             |            | 1.5               |                  |                         |                 |
|          | 33.5                                                    |                                  | 6.0        | 0.45                                     |                  |                           |             | 0.92       |                   |                  |                         |                 |
|          | 34                                                      |                                  | 6.15       | 0.6                                      |                  |                           |             | 1.0        |                   |                  |                         |                 |
|          | 34.5                                                    |                                  | 5.75       | 0.2                                      |                  |                           |             | 0.34       |                   |                  |                         |                 |
|          | 35                                                      |                                  | 5.75       | 0.2                                      |                  |                           |             | 0.14       |                   |                  |                         |                 |
| LW       |                                                         | 35.9                             | 5.55       | →                                        |                  |                           |             |            |                   |                  |                         |                 |
|          |                                                         | 38.5                             | 4.60       | →                                        |                  |                           |             |            |                   |                  |                         |                 |
|          |                                                         | 41.4                             | 4.73       | →                                        |                  |                           |             |            |                   |                  |                         |                 |
|          |                                                         | 43.7                             | 4.00       | →                                        |                  |                           |             |            |                   |                  |                         |                 |
|          | B/F                                                     |                                  | 46.9       | 4.21                                     | →                |                           |             |            |                   |                  |                         |                 |
|          |                                                         | 50                               | 3.01       | →                                        |                  |                           |             |            |                   |                  |                         |                 |
|          |                                                         | 55                               | 2.85       | →                                        |                  |                           |             |            |                   |                  |                         |                 |
| LS       |                                                         | 60.8                             | 1.84       | →                                        |                  |                           |             |            |                   |                  |                         |                 |
| TOTALS:  |                                                         |                                  |            |                                          |                  |                           |             |            |                   |                  |                         |                 |

End of Measurement

Time:

Gage Reading: \_\_\_\_\_ ft

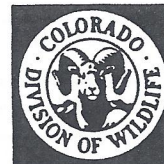
CALCULATIONS PERFORMED BY:

CALCULATIONS CHECKED BY:



COLORADO WATER  
CONSERVATION BOARD

# FIELD DATA FOR INSTREAM FLOW DETERMINATIONS



## LOCATION INFORMATION

|                                                                         |                                         |                             |                              |
|-------------------------------------------------------------------------|-----------------------------------------|-----------------------------|------------------------------|
| STREAM NAME: <u>Van Boxel Creek</u>                                     |                                         | CROSS-SECTION NO.: <u>2</u> |                              |
| CROSS-SECTION LOCATION: <u>300 ft. downstream from County Road 864A</u> |                                         |                             |                              |
| DATE: <u>6-7-71</u>                                                     | OBSERVERS: <u>R. Smith, A. Breibart</u> |                             |                              |
| LEGAL DESCRIPTION                                                       | 1/4 SECTION: <u>SE</u>                  | SECTION: <u>26</u>          | TOWNSHIP: <u>47N/S</u>       |
|                                                                         |                                         | RANGE: <u>6E/W</u>          | PM: <u>NM</u>                |
| COUNTY: <u>Gunnison</u>                                                 | WATERSHED: <u>Gunnison R</u>            | WATER DIVISION:             | DOW WATER CODE: <u>46599</u> |
| MAP(S):                                                                 | USGS: <u>282408</u>                     |                             |                              |
|                                                                         | USFS: <u>4241494</u>                    |                             |                              |

## SUPPLEMENTAL DATA

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

## 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 <u>33.0</u>          | <u>3.85/3.85</u> |
| ② WS Upstream     | <u>19.0</u>              | <u>3.51</u>      |
| ③ WS Downstream   | <u>9.0</u>               | <u>3.96</u>      |
| SLOPE             | <u>0.45/28.0/ = .016</u> |                  |

SKETCH

TAPE

LEGEND:

Stake ⊗

Station ①

Photo ① →

Direction of Flow →

## AQUATIC SAMPLING SUMMARY

|                                                                                  |                                  |                     |                                                 |   |   |   |   |   |   |    |    |    |    |    |    |     |       |
|----------------------------------------------------------------------------------|----------------------------------|---------------------|-------------------------------------------------|---|---|---|---|---|---|----|----|----|----|----|----|-----|-------|
| STREAM ELECTROFISHED: YES/NO <u>(YES/NO)</u>                                     | DISTANCE ELECTROFISHED: _____ ft | FISH CAUGHT: YES/NO | WATER CHEMISTRY SAMPLED: YES/NO <u>(YES/NO)</u> |   |   |   |   |   |   |    |    |    |    |    |    |     |       |
| 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:            |                                  |                     |                                                 |   |   |   |   |   |   |    |    |    |    |    |    |     |       |
| <u>mayfly, caddisfly, stonefly</u>                                               |                                  |                     |                                                 |   |   |   |   |   |   |    |    |    |    |    |    |     |       |

## COMMENTS

|                    |
|--------------------|
| <u>pH - 7.36</u>   |
| <u>Cond - 21.1</u> |
| <u>Temp - 9.6</u>  |

## DISCHARGE/CROSS SECTION N ES

STREAM NAME:

Van Boxel Creek

CROSS-SECTION NO.:

DATE:

6-7-21

SHEET \_\_\_\_ OF \_\_\_\_

BEGINNING OF MEASUREMENT

EDGE OF WATER LOOKING DOWNSTREAM:  
(0.0 AT STAKE)

LEFT / RIGHT

Gage Reading:

\_\_\_\_ ft

TIME:

4:15 pm

| Features | Stake (S)<br>Grassline (G)<br>Waterline (W)<br>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 <sup>2</sup> ) | Discharge (cfs) |
|----------|---------------------------------------------------------|----------------------------------|------------|------------------------------------------|------------------|---------------------------|-------------|------------|-------------------|------------------|-------------------------|-----------------|
|          |                                                         |                                  |            |                                          |                  |                           |             |            | At Point          | Mean in Vertical |                         |                 |
| RS       |                                                         | 0.0                              |            | 0.60                                     |                  |                           |             |            |                   |                  |                         |                 |
|          |                                                         | 5.0                              |            | 1.14                                     |                  |                           |             |            |                   |                  |                         |                 |
|          |                                                         | 8.0                              |            | 1.66                                     |                  |                           |             |            |                   |                  |                         |                 |
| BF       |                                                         | 9.3                              |            | 2.07                                     |                  |                           |             |            |                   |                  |                         |                 |
|          |                                                         | 9.7                              |            | 2.32                                     |                  |                           |             |            |                   |                  |                         |                 |
|          |                                                         | 9.9                              |            | 3.40                                     |                  |                           |             |            |                   |                  |                         |                 |
|          |                                                         | 17.4                             |            | 3.64                                     |                  |                           |             |            |                   |                  |                         |                 |
| RW       |                                                         | 20.6                             |            | 3.85                                     |                  |                           |             |            |                   |                  |                         |                 |
|          |                                                         |                                  |            |                                          |                  |                           |             |            |                   |                  |                         |                 |
|          |                                                         | 22                               |            | 4.15                                     | 0.3              |                           |             |            | 0.0               |                  |                         |                 |
|          |                                                         | 23                               |            | 4.45                                     | 0.6              |                           |             |            | 0.56              |                  |                         |                 |
|          |                                                         | 23.5                             |            | 4.35                                     | 0.5              |                           |             |            | 1.06              |                  |                         |                 |
|          |                                                         | 24                               |            | 4.50                                     | 0.65             |                           |             |            | 1.16              |                  |                         |                 |
|          |                                                         | 24.2                             |            | 4.60                                     | 0.75             |                           |             |            | 2.12              |                  |                         |                 |
|          |                                                         | 24.6                             |            | 4.75                                     | 0.9              |                           |             |            | 2.63              |                  |                         |                 |
|          |                                                         | 24.9                             |            | 4.75                                     | 0.9              |                           |             |            | 2.58              |                  |                         |                 |
|          |                                                         | 25.2                             |            | 4.75                                     | 0.9              |                           |             |            | 2.41              |                  |                         |                 |
|          |                                                         | 25.5                             |            | 4.7                                      | 0.85             |                           |             |            | 3.53              |                  |                         |                 |
|          |                                                         | 25.8                             |            | 4.75                                     | 0.9              |                           |             |            | 3.23              |                  |                         |                 |
|          |                                                         | 26.1                             |            | 4.6                                      | 0.75             |                           |             |            | 3.12              |                  |                         |                 |
|          |                                                         | 26.4                             |            | 4.6                                      | 0.75             |                           |             |            | 2.68              |                  |                         |                 |
|          |                                                         | 26.7                             |            | 4.65                                     | 0.8              |                           |             |            | 2.18              |                  |                         |                 |
|          |                                                         | 27                               |            | 4.55                                     | 0.7              |                           |             |            | 1.98              |                  |                         |                 |
|          |                                                         | 27.3                             |            | 4.65                                     | 0.8              |                           |             |            | 1.83              |                  |                         |                 |
|          |                                                         | 27.6                             |            | 4.6                                      | 0.75             |                           |             |            | 0.70              |                  |                         |                 |
|          |                                                         | 27.9                             |            | 4.5                                      | 0.65             |                           |             |            | 1.29              |                  |                         |                 |
|          |                                                         | 28.2                             |            | 4.55                                     | 0.7              |                           |             |            | 2.31              |                  |                         |                 |
|          |                                                         | 28.5                             |            | 4.45                                     | 0.6              |                           |             |            | 3.26              |                  |                         |                 |
|          |                                                         | 28.8                             |            | 4.85                                     | 1.0              |                           |             |            | 2.30              |                  |                         |                 |
|          |                                                         | 29.5                             |            | 4.7                                      | 0.85             |                           |             |            | 1.90              |                  |                         |                 |
|          |                                                         | 30                               |            | 4.15                                     | 0.3              |                           |             |            | 0.65              |                  |                         |                 |
|          |                                                         | 30.5                             |            | 4.25                                     | 0.4              |                           |             |            | 0.31              |                  |                         |                 |
|          |                                                         | 31                               |            | 4.15                                     | 0.3              |                           |             |            | 0.37              |                  |                         |                 |
|          |                                                         | 31.5                             |            | 4.0                                      | 0.15             |                           |             |            | 0.94              |                  |                         |                 |
|          |                                                         | 32.5                             |            | 3.75                                     | 0.10             |                           |             |            | 0.38              |                  |                         |                 |
| LW       |                                                         | 37.0                             | 38.0       | 3.70                                     |                  |                           |             |            |                   |                  |                         |                 |
|          |                                                         | 44.0                             | 38.5       | 3.66                                     |                  |                           |             |            |                   |                  |                         |                 |
| BF       |                                                         | 44.6                             |            | 2.16                                     |                  |                           |             |            |                   |                  |                         |                 |
| LS       |                                                         | 45.5                             |            | 1.68                                     |                  |                           |             |            |                   |                  |                         |                 |
|          |                                                         | 47.4                             |            | 3.95                                     |                  |                           |             |            |                   |                  |                         |                 |
|          |                                                         | 52.0                             |            | 4.72                                     |                  |                           |             |            |                   |                  |                         |                 |
|          |                                                         | 59.0                             |            | 4.57                                     |                  |                           |             |            |                   |                  |                         |                 |
| TOTALS:  |                                                         |                                  |            |                                          |                  |                           |             |            |                   |                  |                         |                 |

End of Measurement

Time:

Gage Reading:

\_\_\_\_ ft

CALCULATIONS PERFORMED BY:

CALCULATIONS CHECKED BY:

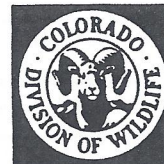
1-7-2

2-2-2



COLORADO WATER  
CONSERVATION BOARD

# FIELD DATA FOR INSTREAM FLOW DETERMINATIONS



## LOCATION INFORMATION

|                                                                         |                                         |                             |                              |
|-------------------------------------------------------------------------|-----------------------------------------|-----------------------------|------------------------------|
| STREAM NAME: <u>Van Boxel Creek</u>                                     |                                         | CROSS-SECTION NO.: <u>2</u> |                              |
| CROSS-SECTION LOCATION: <u>300 ft. downstream from County Road 864A</u> |                                         |                             |                              |
| DATE: <u>6-7-71</u>                                                     | OBSERVERS: <u>R. Smith, A. Breibart</u> |                             |                              |
| LEGAL DESCRIPTION                                                       | 1/4 SECTION: <u>SE</u>                  | SECTION: <u>26</u>          | TOWNSHIP: <u>47N/S</u>       |
|                                                                         |                                         | RANGE: <u>6E/W</u>          | PM: <u>NM</u>                |
| COUNTY: <u>Gunnison</u>                                                 | WATERSHED: <u>Gunnison R</u>            | WATER DIVISION:             | DOW WATER CODE: <u>46599</u> |
| MAP(S):                                                                 | USGS: <u>282408</u>                     |                             |                              |
|                                                                         | USFS: <u>4241494</u>                    |                             |                              |

## SUPPLEMENTAL DATA

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

## 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 <u>33.0</u>          | <u>3.85/3.85</u> |
| ② WS Upstream     | <u>19.0</u>              | <u>3.51</u>      |
| ③ WS Downstream   | <u>9.0</u>               | <u>3.96</u>      |
| SLOPE             | <u>0.45/28.0/ = .016</u> |                  |

SKETCH

TAPE

LEGEND:

Stake ⊗

Station ①

Photo ① →

Direction of Flow →

## AQUATIC SAMPLING SUMMARY

|                                                                                  |                                  |                     |                                                 |   |   |   |   |   |   |    |    |    |    |    |    |     |       |
|----------------------------------------------------------------------------------|----------------------------------|---------------------|-------------------------------------------------|---|---|---|---|---|---|----|----|----|----|----|----|-----|-------|
| STREAM ELECTROFISHED: YES/NO <u>(YES/NO)</u>                                     | DISTANCE ELECTROFISHED: _____ ft | FISH CAUGHT: YES/NO | WATER CHEMISTRY SAMPLED: YES/NO <u>(YES/NO)</u> |   |   |   |   |   |   |    |    |    |    |    |    |     |       |
| 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:            |                                  |                     |                                                 |   |   |   |   |   |   |    |    |    |    |    |    |     |       |
| <u>mayfly, caddisfly, stonefly</u>                                               |                                  |                     |                                                 |   |   |   |   |   |   |    |    |    |    |    |    |     |       |

## COMMENTS

|                    |
|--------------------|
| <u>pH - 7.36</u>   |
| <u>Cond - 21.1</u> |
| <u>Temp - 9.6</u>  |

## DISCHARGE/CROSS SECTION N ES

STREAM NAME:

Van Boxel Creek

CROSS-SECTION NO.:

DATE:

6-7-21

SHEET \_\_\_\_ OF \_\_\_\_

BEGINNING OF MEASUREMENT

EDGE OF WATER LOOKING DOWNSTREAM:  
(0.0 AT STAKE)

LEFT / RIGHT

Gage Reading:

\_\_\_\_ ft

TIME:

4:15 pm

| Features | Stake (S)<br>Grassline (G)<br>Waterline (W)<br>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 <sup>2</sup> ) | Discharge (cfs) |
|----------|---------------------------------------------------------|----------------------------------|------------|------------------------------------------|------------------|---------------------------|-------------|------------|-------------------|------------------|-------------------------|-----------------|
|          |                                                         |                                  |            |                                          |                  |                           |             |            | At Point          | Mean in Vertical |                         |                 |
| RS       |                                                         | 0.0                              |            | 0.60                                     |                  |                           |             |            |                   |                  |                         |                 |
|          |                                                         | 5.0                              |            | 1.14                                     |                  |                           |             |            |                   |                  |                         |                 |
|          |                                                         | 8.0                              |            | 1.66                                     |                  |                           |             |            |                   |                  |                         |                 |
| BF       |                                                         | 9.3                              |            | 2.07                                     |                  |                           |             |            |                   |                  |                         |                 |
|          |                                                         | 9.7                              |            | 2.32                                     |                  |                           |             |            |                   |                  |                         |                 |
|          |                                                         | 9.9                              |            | 3.40                                     |                  |                           |             |            |                   |                  |                         |                 |
|          |                                                         | 17.4                             |            | 3.64                                     |                  |                           |             |            |                   |                  |                         |                 |
| RW       |                                                         | 20.6                             |            | 3.85                                     |                  |                           |             |            |                   |                  |                         |                 |
|          |                                                         |                                  |            |                                          |                  |                           |             |            |                   |                  |                         |                 |
|          |                                                         | 22                               |            | 4.15                                     | 0.3              |                           |             |            | 0.0               |                  |                         |                 |
|          |                                                         | 23                               |            | 4.45                                     | 0.6              |                           |             |            | 0.56              |                  |                         |                 |
|          |                                                         | 23.5                             |            | 4.35                                     | 0.5              |                           |             |            | 1.06              |                  |                         |                 |
|          |                                                         | 24                               |            | 4.50                                     | 0.65             |                           |             |            | 1.16              |                  |                         |                 |
|          |                                                         | 24.3                             |            | 4.60                                     | 0.75             |                           |             |            | 2.12              |                  |                         |                 |
|          |                                                         | 24.6                             |            | 4.75                                     | 0.9              |                           |             |            | 2.63              |                  |                         |                 |
|          |                                                         | 24.9                             |            | 4.75                                     | 0.9              |                           |             |            | 2.58              |                  |                         |                 |
|          |                                                         | 25.2                             |            | 4.75                                     | 0.9              |                           |             |            | 2.41              |                  |                         |                 |
|          |                                                         | 25.5                             |            | 4.7                                      | 0.85             |                           |             |            | 3.53              |                  |                         |                 |
|          |                                                         | 25.8                             |            | 4.75                                     | 0.9              |                           |             |            | 3.23              |                  |                         |                 |
|          |                                                         | 26.1                             |            | 4.6                                      | 0.75             |                           |             |            | 3.12              |                  |                         |                 |
|          |                                                         | 26.4                             |            | 4.6                                      | 0.75             |                           |             |            | 2.68              |                  |                         |                 |
|          |                                                         | 26.7                             |            | 4.65                                     | 0.8              |                           |             |            | 2.18              |                  |                         |                 |
|          |                                                         | 27                               |            | 4.55                                     | 0.7              |                           |             |            | 1.98              |                  |                         |                 |
|          |                                                         | 27.3                             |            | 4.65                                     | 0.8              |                           |             |            | 1.83              |                  |                         |                 |
|          |                                                         | 27.6                             |            | 4.6                                      | 0.75             |                           |             |            | 0.70              |                  |                         |                 |
|          |                                                         | 27.9                             |            | 4.5                                      | 0.65             |                           |             |            | 1.29              |                  |                         |                 |
|          |                                                         | 28.2                             |            | 4.55                                     | 0.7              |                           |             |            | 2.31              |                  |                         |                 |
|          |                                                         | 28.5                             |            | 4.45                                     | 0.6              |                           |             |            | 3.26              |                  |                         |                 |
|          |                                                         | 28.8                             |            | 4.85                                     | 1.0              |                           |             |            | 2.30              |                  |                         |                 |
|          |                                                         | 29.5                             |            | 4.7                                      | 0.85             |                           |             |            | 1.90              |                  |                         |                 |
|          |                                                         | 30                               |            | 4.15                                     | 0.3              |                           |             |            | 0.65              |                  |                         |                 |
|          |                                                         | 30.5                             |            | 4.25                                     | 0.4              |                           |             |            | 0.31              |                  |                         |                 |
|          |                                                         | 31                               |            | 4.15                                     | 0.3              |                           |             |            | 0.37              |                  |                         |                 |
|          |                                                         | 31.5                             |            | 4.0                                      | 0.15             |                           |             |            | 0.94              |                  |                         |                 |
|          |                                                         | 32.5                             |            | 3.75                                     | 0.10             |                           |             |            | 0.38              |                  |                         |                 |
| LW       |                                                         | 37.0                             | 38.0       | 3.70                                     |                  |                           |             |            |                   |                  |                         |                 |
|          |                                                         | 44.0                             | 38.5       | 3.66                                     |                  |                           |             |            |                   |                  |                         |                 |
| BF       |                                                         | 44.6                             |            | 2.16                                     |                  |                           |             |            |                   |                  |                         |                 |
| LS       |                                                         | 45.5                             |            | 1.68                                     |                  |                           |             |            |                   |                  |                         |                 |
|          |                                                         | 47.4                             |            | 3.95                                     |                  |                           |             |            |                   |                  |                         |                 |
|          |                                                         | 52.0                             |            | 4.72                                     |                  |                           |             |            |                   |                  |                         |                 |
|          |                                                         | 59.0                             |            | 4.57                                     |                  |                           |             |            |                   |                  |                         |                 |
| TOTALS:  |                                                         |                                  |            |                                          |                  |                           |             |            |                   |                  |                         |                 |

End of Measurement

Time:

Gage Reading:

\_\_\_\_ ft

CALCULATIONS PERFORMED BY:

CALCULATIONS CHECKED BY:

1-7-2

2-2-2

# R2Cross RESULTS

**Stream Name:** Van Boxel Creek

**Stream Locations:** 200 ft. downstream from County Road 864A

**Fieldwork Date:** 06/07/2021

**Cross-section:** 1

**Observers:** R. Smith, A Breibart

**Coordinate System:** UTM Zone 13

**X (easting):** 282408

**Y (northing):** 4241493

**Date Processed:** 09/27/2022

**Slope:** 0.027

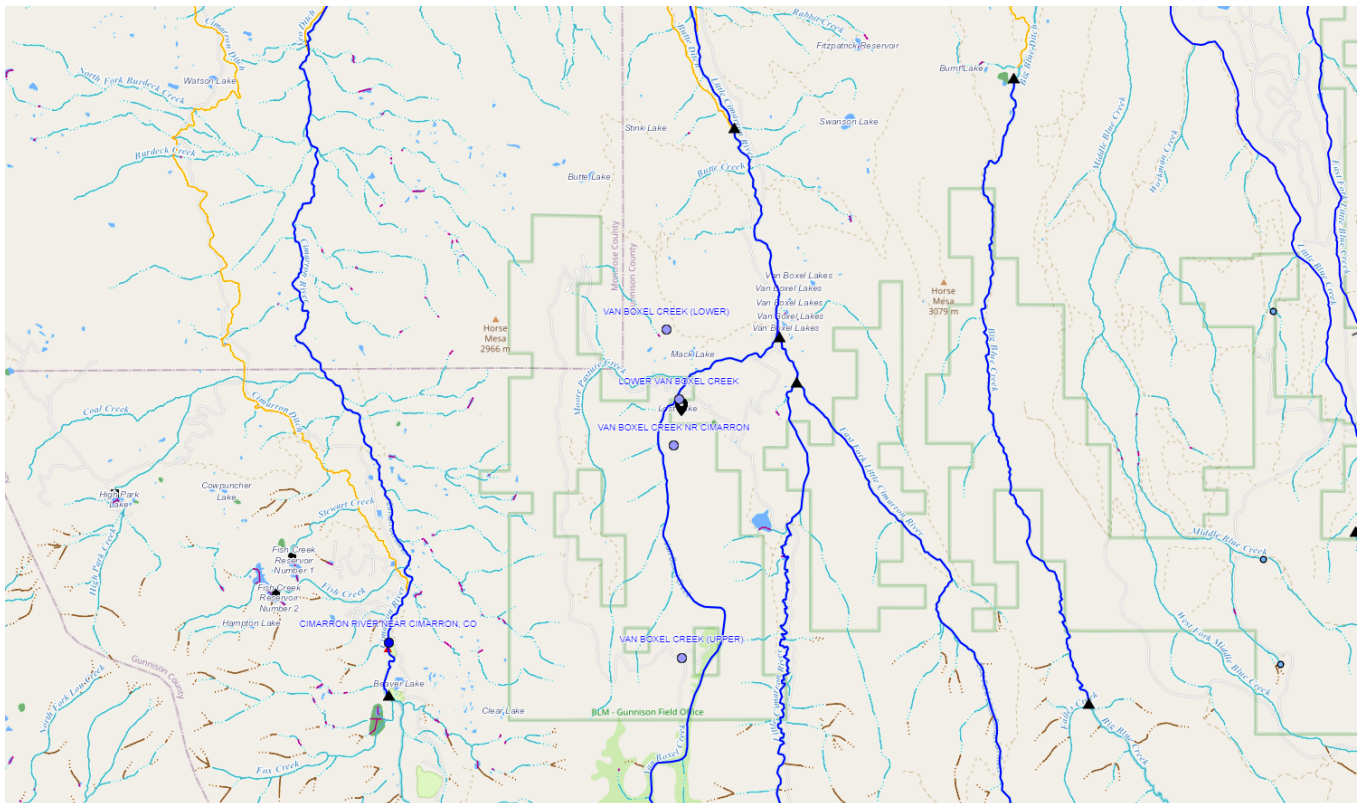
**Discharge:** R2Cross data file: 11.3 (cfs)

**Computation method:** Ferguson VPE

**R2Cross data filename:** Van Boxel Creek 6-7-21 #1.xlsx

**R2Cross version:** 2.0.0

## LOCATION



## ANALYSIS RESULTS

### Habitat Criteria Results

Bankfull top width (ft) = 31.71

|                              | Habitat Criteria | Discharge (cfs) Meeting Criteria |
|------------------------------|------------------|----------------------------------|
| Mean Depth (ft)              | 0.3              | 1.28                             |
| Percent Wetted Perimeter (%) | 50.0             | 8.01                             |
| Mean Velocity (ft/s)         | 1.0              | 7.31                             |

## STAGING TABLE

| Feature  | Distance to Water (ft) | Top Width (ft) | Mean Depth (ft) | Maximum Depth (ft) | Area (sq ft) | Wetted Perimeter (ft) | Percent Wetted Perimeter | Hydraulic Radius (ft) | Manning's n | Mean Velocity (ft/s) | Discharge (cfs) |
|----------|------------------------|----------------|-----------------|--------------------|--------------|-----------------------|--------------------------|-----------------------|-------------|----------------------|-----------------|
| Bankfull | 4.21                   | 31.71          | 1.22            | 2.59               | 38.68        | 32.97                 | 100.0                    | 1.17                  | 0.07        | 3.72                 | 143.82          |
|          | 4.25                   | 31.12          | 1.2             | 2.55               | 37.42        | 32.39                 | 98.22                    | 1.16                  | 0.07        | 3.65                 | 136.49          |
|          | 4.3                    | 30.43          | 1.18            | 2.5                | 35.88        | 31.68                 | 96.08                    | 1.13                  | 0.07        | 3.56                 | 127.57          |
|          | 4.35                   | 29.84          | 1.15            | 2.45               | 34.38        | 31.08                 | 94.26                    | 1.11                  | 0.08        | 3.45                 | 118.52          |
|          | 4.4                    | 29.25          | 1.12            | 2.4                | 32.9         | 30.48                 | 92.44                    | 1.08                  | 0.08        | 3.34                 | 109.89          |
|          | 4.45                   | 28.66          | 1.1             | 2.35               | 31.45        | 29.88                 | 90.63                    | 1.05                  | 0.08        | 3.23                 | 101.67          |
|          | 4.5                    | 28.07          | 1.07            | 2.3                | 30.03        | 29.29                 | 88.81                    | 1.03                  | 0.08        | 3.13                 | 93.86           |
|          | 4.55                   | 27.48          | 1.04            | 2.25               | 28.64        | 28.69                 | 86.99                    | 1.0                   | 0.08        | 3.02                 | 86.43           |
|          | 4.6                    | 26.89          | 1.01            | 2.2                | 27.29        | 28.09                 | 85.17                    | 0.97                  | 0.08        | 2.91                 | 79.4            |
|          | 4.65                   | 24.17          | 1.08            | 2.15               | 26.01        | 25.35                 | 76.87                    | 1.03                  | 0.08        | 3.13                 | 81.34           |
|          | 4.7                    | 21.46          | 1.16            | 2.1                | 24.87        | 22.61                 | 68.56                    | 1.1                   | 0.08        | 3.42                 | 85.14           |
|          | 4.75                   | 19.73          | 1.21            | 2.05               | 23.85        | 20.86                 | 63.25                    | 1.14                  | 0.07        | 3.6                  | 85.87           |
|          | 4.8                    | 19.48          | 1.17            | 2.0                | 22.87        | 20.58                 | 62.41                    | 1.11                  | 0.08        | 3.47                 | 79.36           |
|          | 4.85                   | 19.23          | 1.14            | 1.95               | 21.91        | 20.31                 | 61.58                    | 1.08                  | 0.08        | 3.34                 | 73.13           |
|          | 4.9                    | 18.97          | 1.1             | 1.9                | 20.95        | 20.03                 | 60.75                    | 1.05                  | 0.08        | 3.21                 | 67.18           |
|          | 4.95                   | 18.72          | 1.07            | 1.85               | 20.01        | 19.76                 | 59.91                    | 1.01                  | 0.08        | 3.07                 | 61.51           |
|          | 5.0                    | 18.57          | 1.03            | 1.8                | 19.08        | 19.57                 | 59.36                    | 0.97                  | 0.08        | 2.92                 | 55.75           |
|          | 5.05                   | 18.45          | 0.98            | 1.75               | 18.15        | 19.41                 | 58.87                    | 0.94                  | 0.08        | 2.77                 | 50.2            |
|          | 5.1                    | 18.32          | 0.94            | 1.7                | 17.23        | 19.25                 | 58.38                    | 0.9                   | 0.09        | 2.61                 | 44.95           |
|          | 5.15                   | 18.2           | 0.9             | 1.65               | 16.32        | 19.09                 | 57.9                     | 0.85                  | 0.09        | 2.45                 | 40.01           |
|          | 5.2                    | 18.07          | 0.85            | 1.6                | 15.41        | 18.93                 | 57.41                    | 0.81                  | 0.09        | 2.29                 | 35.37           |
|          | 5.25                   | 17.95          | 0.81            | 1.55               | 14.51        | 18.77                 | 56.92                    | 0.77                  | 0.1         | 2.14                 | 31.03           |
|          | 5.3                    | 17.82          | 0.76            | 1.5                | 13.62        | 18.61                 | 56.44                    | 0.73                  | 0.1         | 1.98                 | 27.0            |
|          | 5.35                   | 17.7           | 0.72            | 1.45               | 12.73        | 18.45                 | 55.95                    | 0.69                  | 0.1         | 1.83                 | 23.26           |
|          | 5.4                    | 17.57          | 0.67            | 1.4                | 11.85        | 18.29                 | 55.47                    | 0.65                  | 0.11        | 1.67                 | 19.83           |

|           |      |       |      |      |       |       |       |      |      |      |       |
|-----------|------|-------|------|------|-------|-------|-------|------|------|------|-------|
|           | 5.45 | 17.45 | 0.63 | 1.35 | 10.97 | 18.13 | 54.98 | 0.61 | 0.11 | 1.52 | 16.69 |
|           | 5.5  | 17.32 | 0.58 | 1.3  | 10.1  | 17.97 | 54.49 | 0.56 | 0.12 | 1.37 | 13.85 |
| Waterline | 5.55 | 17.2  | 0.54 | 1.25 | 9.24  | 17.81 | 54.01 | 0.52 | 0.13 | 1.22 | 11.29 |
|           | 5.6  | 16.51 | 0.51 | 1.2  | 8.4   | 17.12 | 51.9  | 0.49 | 0.13 | 1.13 | 9.47  |
|           | 5.65 | 15.83 | 0.48 | 1.15 | 7.59  | 16.42 | 49.8  | 0.46 | 0.14 | 1.04 | 7.86  |
|           | 5.7  | 15.14 | 0.45 | 1.1  | 6.81  | 15.73 | 47.7  | 0.43 | 0.15 | 0.94 | 6.43  |
|           | 5.75 | 13.96 | 0.44 | 1.05 | 6.07  | 14.54 | 44.08 | 0.42 | 0.15 | 0.9  | 5.44  |
|           | 5.8  | 10.44 | 0.52 | 1.0  | 5.44  | 10.99 | 33.33 | 0.49 | 0.13 | 1.14 | 6.21  |
|           | 5.85 | 10.17 | 0.48 | 0.95 | 4.92  | 10.7  | 32.46 | 0.46 | 0.14 | 1.03 | 5.06  |
|           | 5.9  | 9.91  | 0.45 | 0.9  | 4.42  | 10.42 | 31.59 | 0.42 | 0.15 | 0.92 | 4.05  |
|           | 5.95 | 9.65  | 0.41 | 0.85 | 3.93  | 10.13 | 30.73 | 0.39 | 0.16 | 0.8  | 3.16  |
|           | 6.0  | 9.39  | 0.37 | 0.8  | 3.46  | 9.85  | 29.86 | 0.35 | 0.17 | 0.69 | 2.4   |
|           | 6.05 | 8.86  | 0.34 | 0.75 | 3.0   | 9.27  | 28.12 | 0.32 | 0.19 | 0.62 | 1.85  |
|           | 6.1  | 7.92  | 0.32 | 0.7  | 2.57  | 8.29  | 25.13 | 0.31 | 0.19 | 0.58 | 1.49  |
|           | 6.15 | 6.98  | 0.31 | 0.65 | 2.2   | 7.29  | 22.1  | 0.3  | 0.2  | 0.56 | 1.22  |
|           | 6.2  | 6.27  | 0.3  | 0.6  | 1.86  | 6.54  | 19.85 | 0.28 | 0.21 | 0.51 | 0.95  |
|           | 6.25 | 5.43  | 0.29 | 0.55 | 1.57  | 5.67  | 17.21 | 0.28 | 0.21 | 0.49 | 0.77  |
|           | 6.3  | 5.19  | 0.25 | 0.5  | 1.31  | 5.42  | 16.43 | 0.24 | 0.24 | 0.4  | 0.52  |
|           | 6.35 | 4.96  | 0.21 | 0.45 | 1.05  | 5.16  | 15.65 | 0.2  | 0.27 | 0.31 | 0.33  |
|           | 6.4  | 4.39  | 0.19 | 0.4  | 0.82  | 4.55  | 13.81 | 0.18 | 0.3  | 0.26 | 0.21  |
|           | 6.45 | 3.44  | 0.18 | 0.35 | 0.62  | 3.58  | 10.85 | 0.17 | 0.31 | 0.25 | 0.15  |
|           | 6.5  | 3.25  | 0.14 | 0.3  | 0.46  | 3.36  | 10.18 | 0.14 | 0.38 | 0.17 | 0.08  |
|           | 6.55 | 2.92  | 0.1  | 0.25 | 0.3   | 3.0   | 9.11  | 0.1  | 0.49 | 0.11 | 0.03  |
|           | 6.6  | 1.58  | 0.12 | 0.2  | 0.19  | 1.65  | 5.0   | 0.12 | 0.43 | 0.13 | 0.03  |
|           | 6.65 | 1.37  | 0.08 | 0.15 | 0.12  | 1.42  | 4.29  | 0.08 | 0.58 | 0.08 | 0.01  |
|           | 6.7  | 1.0   | 0.06 | 0.1  | 0.06  | 1.03  | 3.11  | 0.05 | 0.8  | 0.04 | 0.0   |
|           | 6.75 | 0.62  | 0.02 | 0.05 | 0.02  | 0.64  | 1.93  | 0.02 | 1.57 | 0.01 | 0.0   |
|           | 6.79 | 0.19  | 0.01 | 0.01 | 0.0   | 0.19  | 0.58  | 0.01 | 4.28 | 0.0  | 0.0   |

**This Manning's roughness coefficient was calculated based on velocity estimates from the Ferguson VPE method**

## MODEL SUMMARY

|                              |        |        |
|------------------------------|--------|--------|
| Measured Flow (Qm) =         | 11.3   | (cfs)  |
| Calculated Flow (Qc) =       | 11.29  | (cfs)  |
| $(Qm-Qc)/Qm * 100 =$         | 0.00%  |        |
| Measured Waterline (WLm) =   | 5.55   | (ft)   |
| Calculated Waterline (WLc) = | 5.55   | (ft)   |
| $(WLm-WLc)/WLm * 100 =$      | -0.00% |        |
| Max Measured Depth (Dm) =    | 1.25   | (ft)   |
| Max Calculated Depth (Dc) =  | 1.25   | (ft)   |
| $(Dm-Dc)/Dm * 100 =$         | 0.00%  |        |
| Mean Velocity =              | 1.22   | (ft/s) |
| Manning's n =                | 0.129  |        |
| $0.4 * Qm =$                 | 4.52   | (cfs)  |
| $2.5 * Qm =$                 | 28.24  | (cfs)  |

## FIELD DATA

| Feature   | Station<br>(ft) | Rod Height<br>(ft) | Water depth<br>(ft) | Velocity<br>(ft/s) |
|-----------|-----------------|--------------------|---------------------|--------------------|
|           | 0               | 2                  |                     |                    |
|           | 5               | 4.62               |                     |                    |
| Bankfull  | 14.5            | 4.1                |                     |                    |
|           | 15.7            | 4.29               |                     |                    |
|           | 18.1            | 4.96               |                     |                    |
| Waterline | 18.7            | 5.55               | 0                   | 0                  |
|           | 21              | 5.8                | 0.25                | 0.35               |
|           | 22              | 5.8                | 0.25                | 0.73               |
|           | 23              | 5.75               | 0.2                 | 0.89               |
|           | 24              | 5.8                | 0.25                | 0.4                |
|           | 25              | 6.05               | 0.5                 | 0.88               |
|           | 26              | 6.5                | 0.95                | 1.17               |
|           | 26.5            | 6.6                | 1.05                | 1.34               |
|           | 27              | 6.55               | 1                   | 1.1                |
|           | 27.5            | 6.6                | 1.05                | 2.48               |
|           | 28              | 6.8                | 1.25                | 0.06               |
|           | 28.5            | 6.75               | 1.2                 | 1.85               |
|           | 29              | 6.65               | 1.1                 | 0.48               |
|           | 29.5            | 6.35               | 0.8                 | 2.46               |
|           | 30              | 6.45               | 0.9                 | 0.69               |
|           | 30.5            | 6.4                | 0.85                | 1.72               |
|           | 31              | 6.2                | 0.65                | 2.4                |
|           | 31.5            | 6.1                | 0.55                | 2.55               |
|           | 32              | 6.1                | 0.55                | 1.77               |
|           | 32.5            | 6.2                | 0.65                | 1.14               |
|           | 33              | 6.25               | 0.7                 | 1.5                |
|           | 33.5            | 6                  | 0.45                | 0.92               |
|           | 34              | 6.15               | 0.6                 | 1                  |
|           | 34.5            | 5.75               | 0.2                 | 0.34               |
|           | 35              | 5.75               | 0.2                 | 0.14               |

|           |      |      |   |   |
|-----------|------|------|---|---|
| Waterline | 35.9 | 5.55 | 0 | 0 |
|           | 37.3 | 4.6  |   |   |
|           | 41.4 | 4.73 |   |   |
|           | 43.7 | 4.6  |   |   |
| Bankfull  | 46.9 | 4.21 |   |   |
|           | 50   | 3.04 |   |   |
|           | 55   | 2.85 |   |   |
|           | 60.8 | 1.88 |   |   |

## COMPUTED FROM MEASURED FIELD DATA

| Wetted Perimeter<br>(ft) | Water Depth<br>(ft) | Area<br>(ft^2) | Discharge<br>(cfs) | Percent Discharge |
|--------------------------|---------------------|----------------|--------------------|-------------------|
| 0                        | 0                   | 0              | 0                  | 0                 |
| 0                        | 0                   | 0              | 0                  | 0                 |
| 0                        | 0                   | 0              | 0                  | 0                 |
| 0                        | 0                   | 0              | 0                  | 0                 |
| 0                        | 0                   | 0              | 0                  | 0                 |
| 0                        | 0                   | 0              | 0                  | 0                 |
| 2.31                     | 0.25                | 0.41           | 0.14               | 1.28              |
| 1                        | 0.25                | 0.25           | 0.18               | 1.62              |
| 1                        | 0.2                 | 0.2            | 0.18               | 1.58              |
| 1                        | 0.25                | 0.25           | 0.1                | 0.89              |
| 1.03                     | 0.5                 | 0.5            | 0.44               | 3.9               |
| 1.1                      | 0.95                | 0.71           | 0.83               | 7.38              |
| 0.51                     | 1.05                | 0.53           | 0.7                | 6.23              |
| 0.5                      | 1                   | 0.5            | 0.55               | 4.87              |
| 0.5                      | 1.05                | 0.53           | 1.3                | 11.53             |
| 0.54                     | 1.25                | 0.62           | 0.04               | 0.33              |
| 0.5                      | 1.2                 | 0.6            | 1.11               | 9.83              |
| 0.51                     | 1.1                 | 0.55           | 0.26               | 2.34              |
| 0.58                     | 0.8                 | 0.4            | 0.98               | 8.71              |
| 0.51                     | 0.9                 | 0.45           | 0.31               | 2.75              |
| 0.5                      | 0.85                | 0.42           | 0.73               | 6.47              |
| 0.54                     | 0.65                | 0.33           | 0.78               | 6.91              |
| 0.51                     | 0.55                | 0.28           | 0.7                | 6.21              |
| 0.5                      | 0.55                | 0.28           | 0.49               | 4.31              |
| 0.51                     | 0.65                | 0.33           | 0.37               | 3.28              |
| 0.5                      | 0.7                 | 0.35           | 0.53               | 4.65              |
| 0.56                     | 0.45                | 0.23           | 0.21               | 1.83              |
| 0.52                     | 0.6                 | 0.3            | 0.3                | 2.66              |
| 0.64                     | 0.2                 | 0.1            | 0.03               | 0.3               |
| 0.5                      | 0.2                 | 0.14           | 0.02               | 0.17              |

|      |   |   |   |   |
|------|---|---|---|---|
| 0.92 | 0 | 0 | 0 | 0 |
| 0    | 0 | 0 | 0 | 0 |
| 0    | 0 | 0 | 0 | 0 |
| 0    | 0 | 0 | 0 | 0 |
| 0    | 0 | 0 | 0 | 0 |
| 0    | 0 | 0 | 0 | 0 |
| 0    | 0 | 0 | 0 | 0 |
| 0    | 0 | 0 | 0 | 0 |
| 0    | 0 | 0 | 0 | 0 |

## DISCLAIMER

"The Colorado Water Conservation Board makes no representations about the use of the software contained in the R2Cross platform for any purpose besides that for which it was designed. To the maximum extent permitted by applicable law, all information, modeling results, and software are provided "as is" without warranty or condition of any kind, including all implied warranties or conditions of merchantability, or fitness for a particular purpose. The user assumes all responsibility for the accuracy and suitability of this program for a specific application. In no event shall the Colorado Water Conservation Board or any state agency, official or employee be liable for any direct, indirect, punitive, incidental, special, consequential damages or any damages whatsoever including, without limitation, damages for loss of use, data, profits, or savings arising from the implementation, reliance on, or use of or inability to use the R2Cross platform.

# R2Cross RESULTS

**Stream Name:** Van Boxel Creek

**Stream Locations:** 300 ft downstream from County Road 864A

**Fieldwork Date:** 06/07/2021

**Cross-section:** 2

**Observers:** A Breibart, R Smith

**Coordinate System:** UTM Zone 13

**X (easting):** 282408

**Y (northing):** 4241494

**Date Processed:** 09/27/2022

**Slope:** 0.016

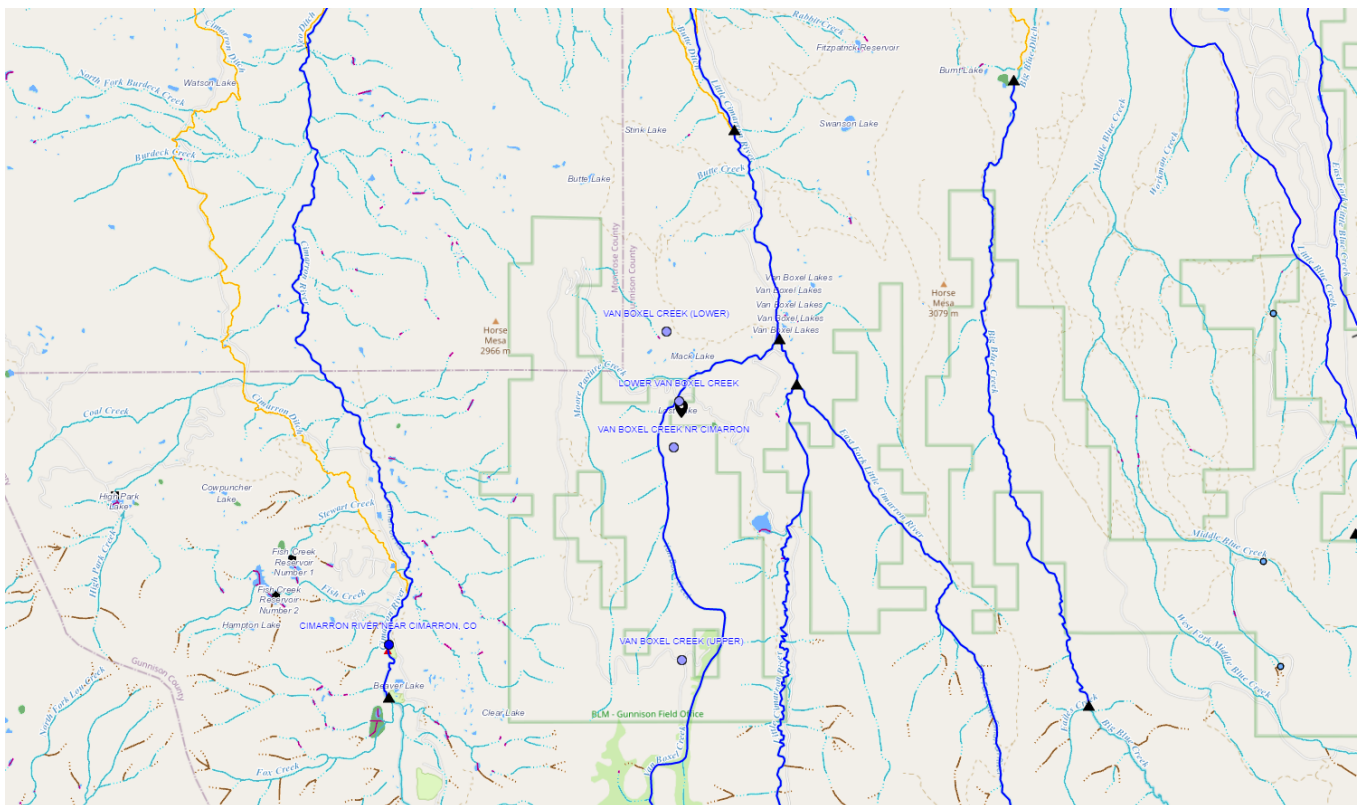
**Discharge:** R2Cross data file: 11.76 (cfs)

**Computation method:** Ferguson VPE

**R2Cross data filename:** Van Boxel Creek 6-7-21 #2.xlsx

**R2Cross version:** 2.0.0

## LOCATION



## ANALYSIS RESULTS

### Habitat Criteria Results

Bankfull top width (ft) = 35.16

|                              | Habitat Criteria | Discharge (cfs) Meeting Criteria |
|------------------------------|------------------|----------------------------------|
| Mean Depth (ft)              | 0.4              | 2.98                             |
| Percent Wetted Perimeter (%) | 50.0             | 11.58                            |
| Mean Velocity (ft/s)         | 1.0              | 2.78                             |

## STAGING TABLE

| Feature  | Distance to Water (ft) | Top Width (ft) | Mean Depth (ft) | Maximum Depth (ft) | Area (sq ft) | Wetted Perimeter (ft) | Percent Wetted Perimeter | Hydraulic Radius (ft) | Manning's n | Mean Velocity (ft/s) | Discharge (cfs) |
|----------|------------------------|----------------|-----------------|--------------------|--------------|-----------------------|--------------------------|-----------------------|-------------|----------------------|-----------------|
| Bankfull | 2.16                   | 35.16          | 1.73            | 2.69               | 60.8         | 37.92                 | 100.0                    | 1.6                   | 0.04        | 6.57                 | 399.6           |
|          | 2.16                   | 35.15          | 1.72            | 2.69               | 60.62        | 37.91                 | 99.96                    | 1.6                   | 0.04        | 6.56                 | 397.55          |
|          | 2.21                   | 35.05          | 1.68            | 2.64               | 58.87        | 37.76                 | 99.57                    | 1.56                  | 0.04        | 6.41                 | 377.16          |
|          | 2.26                   | 34.95          | 1.63            | 2.59               | 57.12        | 37.61                 | 99.18                    | 1.52                  | 0.04        | 6.25                 | 357.21          |
|          | 2.31                   | 34.85          | 1.59            | 2.54               | 55.37        | 37.46                 | 98.79                    | 1.48                  | 0.04        | 6.1                  | 337.69          |
|          | 2.36                   | 34.81          | 1.54            | 2.49               | 53.63        | 37.35                 | 98.5                     | 1.44                  | 0.04        | 5.93                 | 318.28          |
|          | 2.41                   | 34.78          | 1.49            | 2.44               | 51.89        | 37.25                 | 98.22                    | 1.39                  | 0.04        | 5.77                 | 299.28          |
|          | 2.46                   | 34.75          | 1.44            | 2.39               | 50.15        | 37.14                 | 97.95                    | 1.35                  | 0.04        | 5.6                  | 280.74          |
|          | 2.51                   | 34.72          | 1.39            | 2.34               | 48.42        | 37.04                 | 97.67                    | 1.31                  | 0.04        | 5.42                 | 262.65          |
|          | 2.56                   | 34.69          | 1.35            | 2.29               | 46.68        | 36.93                 | 97.4                     | 1.26                  | 0.04        | 5.25                 | 245.04          |
|          | 2.61                   | 34.66          | 1.3             | 2.24               | 44.95        | 36.83                 | 97.12                    | 1.22                  | 0.04        | 5.07                 | 227.91          |
|          | 2.66                   | 34.63          | 1.25            | 2.19               | 43.21        | 36.72                 | 96.84                    | 1.18                  | 0.04        | 4.89                 | 211.27          |
|          | 2.71                   | 34.6           | 1.2             | 2.14               | 41.48        | 36.62                 | 96.57                    | 1.13                  | 0.04        | 4.7                  | 195.15          |
|          | 2.76                   | 34.58          | 1.15            | 2.09               | 39.75        | 36.51                 | 96.29                    | 1.09                  | 0.04        | 4.52                 | 179.54          |
|          | 2.81                   | 34.55          | 1.1             | 2.04               | 38.03        | 36.41                 | 96.02                    | 1.04                  | 0.04        | 4.33                 | 164.47          |
|          | 2.86                   | 34.52          | 1.05            | 1.99               | 36.3         | 36.31                 | 95.74                    | 1.0                   | 0.05        | 4.13                 | 149.95          |
|          | 2.91                   | 34.49          | 1.0             | 1.94               | 34.57        | 36.2                  | 95.46                    | 0.96                  | 0.05        | 3.93                 | 135.99          |
|          | 2.96                   | 34.46          | 0.95            | 1.89               | 32.85        | 36.1                  | 95.19                    | 0.91                  | 0.05        | 3.73                 | 122.61          |
|          | 3.01                   | 34.43          | 0.9             | 1.84               | 31.13        | 35.99                 | 94.91                    | 0.86                  | 0.05        | 3.53                 | 109.83          |
|          | 3.06                   | 34.4           | 0.85            | 1.79               | 29.41        | 35.89                 | 94.64                    | 0.82                  | 0.05        | 3.32                 | 97.66           |
|          | 3.11                   | 34.37          | 0.81            | 1.74               | 27.69        | 35.78                 | 94.36                    | 0.77                  | 0.05        | 3.11                 | 86.13           |
|          | 3.16                   | 34.34          | 0.76            | 1.69               | 25.97        | 35.68                 | 94.08                    | 0.73                  | 0.05        | 2.9                  | 75.25           |
|          | 3.21                   | 34.31          | 0.71            | 1.64               | 24.25        | 35.57                 | 93.81                    | 0.68                  | 0.05        | 2.68                 | 65.05           |
|          | 3.26                   | 34.28          | 0.66            | 1.59               | 22.54        | 35.47                 | 93.53                    | 0.64                  | 0.06        | 2.46                 | 55.54           |
|          | 3.31                   | 34.25          | 0.61            | 1.54               | 20.83        | 35.36                 | 93.26                    | 0.59                  | 0.06        | 2.24                 | 46.74           |

|           |      |       |      |      |       |       |       |      |      |      |       |
|-----------|------|-------|------|------|-------|-------|-------|------|------|------|-------|
|           | 3.36 | 34.22 | 0.56 | 1.49 | 19.11 | 35.26 | 92.98 | 0.54 | 0.06 | 2.02 | 38.68 |
|           | 3.41 | 33.73 | 0.52 | 1.44 | 17.41 | 34.7  | 91.51 | 0.5  | 0.06 | 1.83 | 31.91 |
|           | 3.46 | 32.15 | 0.49 | 1.39 | 15.76 | 33.08 | 87.24 | 0.48 | 0.07 | 1.71 | 27.03 |
|           | 3.51 | 30.56 | 0.46 | 1.34 | 14.19 | 31.47 | 82.98 | 0.45 | 0.07 | 1.6  | 22.66 |
|           | 3.56 | 28.98 | 0.44 | 1.29 | 12.7  | 29.85 | 78.71 | 0.43 | 0.07 | 1.48 | 18.79 |
|           | 3.61 | 27.4  | 0.41 | 1.24 | 11.29 | 28.23 | 74.45 | 0.4  | 0.07 | 1.36 | 15.38 |
|           | 3.66 | 25.87 | 0.38 | 1.19 | 9.96  | 26.67 | 70.33 | 0.37 | 0.08 | 1.24 | 12.36 |
|           | 3.71 | 21.61 | 0.41 | 1.14 | 8.77  | 22.41 | 59.09 | 0.39 | 0.08 | 1.32 | 11.61 |
|           | 3.76 | 17.47 | 0.45 | 1.09 | 7.8   | 18.27 | 48.18 | 0.43 | 0.07 | 1.48 | 11.58 |
|           | 3.81 | 14.49 | 0.48 | 1.04 | 7.0   | 15.28 | 40.31 | 0.46 | 0.07 | 1.63 | 11.4  |
|           | 3.86 | 12.26 | 0.52 | 0.99 | 6.34  | 13.04 | 34.4  | 0.49 | 0.07 | 1.76 | 11.17 |
|           | 3.91 | 11.77 | 0.49 | 0.94 | 5.74  | 12.55 | 33.1  | 0.46 | 0.07 | 1.63 | 9.34  |
|           | 3.96 | 11.06 | 0.47 | 0.89 | 5.17  | 11.83 | 31.21 | 0.44 | 0.07 | 1.53 | 7.91  |
|           | 4.01 | 10.08 | 0.46 | 0.84 | 4.64  | 10.84 | 28.59 | 0.43 | 0.07 | 1.49 | 6.93  |
|           | 4.06 | 9.68  | 0.43 | 0.79 | 4.15  | 10.43 | 27.5  | 0.4  | 0.08 | 1.35 | 5.61  |
|           | 4.11 | 9.28  | 0.4  | 0.74 | 3.68  | 10.02 | 26.41 | 0.37 | 0.08 | 1.21 | 4.46  |
|           | 4.16 | 8.79  | 0.37 | 0.69 | 3.22  | 9.5   | 25.06 | 0.34 | 0.08 | 1.09 | 3.51  |
| Waterline | 4.21 | 8.07  | 0.35 | 0.64 | 2.8   | 8.75  | 23.08 | 0.32 | 0.09 | 1.01 | 2.82  |
|           | 4.26 | 7.51  | 0.32 | 0.59 | 2.41  | 8.15  | 21.5  | 0.3  | 0.09 | 0.9  | 2.18  |
|           | 4.31 | 7.3   | 0.28 | 0.54 | 2.04  | 7.91  | 20.86 | 0.26 | 0.1  | 0.74 | 1.52  |
|           | 4.36 | 6.96  | 0.24 | 0.49 | 1.68  | 7.54  | 19.89 | 0.22 | 0.11 | 0.61 | 1.02  |
|           | 4.41 | 6.33  | 0.21 | 0.44 | 1.35  | 6.87  | 18.12 | 0.2  | 0.13 | 0.51 | 0.68  |
|           | 4.46 | 5.77  | 0.18 | 0.39 | 1.05  | 6.26  | 16.51 | 0.17 | 0.14 | 0.4  | 0.42  |
|           | 4.51 | 5.24  | 0.15 | 0.34 | 0.77  | 5.67  | 14.94 | 0.14 | 0.17 | 0.3  | 0.23  |
|           | 4.56 | 4.46  | 0.12 | 0.29 | 0.53  | 4.8   | 12.66 | 0.11 | 0.2  | 0.22 | 0.12  |
|           | 4.61 | 3.32  | 0.1  | 0.24 | 0.33  | 3.58  | 9.45  | 0.09 | 0.23 | 0.17 | 0.05  |
|           | 4.66 | 2.41  | 0.08 | 0.19 | 0.19  | 2.58  | 6.81  | 0.07 | 0.28 | 0.12 | 0.02  |
|           | 4.71 | 1.89  | 0.04 | 0.14 | 0.08  | 2.0   | 5.26  | 0.04 | 0.46 | 0.05 | 0.0   |
|           | 4.76 | 0.46  | 0.04 | 0.09 | 0.02  | 0.51  | 1.35  | 0.04 | 0.48 | 0.04 | 0.0   |
|           | 4.81 | 0.19  | 0.02 | 0.04 | 0.0   | 0.21  | 0.56  | 0.02 | 1.0  | 0.01 | 0.0   |
|           | 4.83 | 0.08  | 0.01 | 0.01 | 0.0   | 0.09  | 0.24  | 0.01 | 2.02 | 0.0  | 0.0   |

**This Manning's roughness coefficient was calculated based on velocity estimates from the Ferguson VPE method**

## MODEL SUMMARY

|                              |        |        |
|------------------------------|--------|--------|
| Measured Flow (Qm) =         | 11.76  | (cfs)  |
| Calculated Flow (Qc) =       | 3.77   | (cfs)  |
| $(Qm-Qc)/Qm * 100 =$         | 67.92% |        |
| Measured Waterline (WLm) =   | 3.85   | (ft)   |
| Calculated Waterline (WLc) = | 4.21   | (ft)   |
| $(WLm-WLc)/WLm * 100 =$      | -9.48% |        |
| Max Measured Depth (Dm) =    | 1      | (ft)   |
| Max Calculated Depth (Dc) =  | 0.64   | (ft)   |
| $(Dm-Dc)/Dm * 100 =$         | 36.50% |        |
| Mean Velocity =              | 1.35   | (ft/s) |
| Manning's n =                | 0.065  |        |
| $0.4 * Qm =$                 | 4.7    | (cfs)  |
| $2.5 * Qm =$                 | 29.39  | (cfs)  |

## FIELD DATA

| Feature   | Station<br>(ft) | Rod Height<br>(ft) | Water depth<br>(ft) | Velocity<br>(ft/s) |
|-----------|-----------------|--------------------|---------------------|--------------------|
|           | 0               | 0.6                |                     |                    |
|           | 5               | 1.14               |                     |                    |
|           | 8               | 1.66               |                     |                    |
| Bankfull  | 9.3             | 2.07               |                     |                    |
|           | 9.7             | 2.32               |                     |                    |
|           | 9.9             | 3.4                |                     |                    |
|           | 17.4            | 3.64               |                     |                    |
| Waterline | 20.6            | 3.85               | 0                   | 0                  |
|           | 22              | 4.15               | 0.3                 | 0                  |
|           | 23              | 4.45               | 0.6                 | 0.56               |
|           | 23.5            | 4.35               | 0.5                 | 1.06               |
|           | 24              | 4.5                | 0.65                | 1.16               |
|           | 24.3            | 4.6                | 0.75                | 2.12               |
|           | 24.6            | 4.75               | 0.9                 | 2.63               |
|           | 24.9            | 4.75               | 0.9                 | 2.58               |
|           | 25.2            | 4.75               | 0.9                 | 2.41               |
|           | 25.5            | 4.7                | 0.85                | 3.53               |
|           | 25.8            | 4.75               | 0.9                 | 3.23               |
|           | 26.1            | 4.6                | 0.75                | 3.12               |
|           | 26.4            | 4.6                | 0.75                | 2.68               |
|           | 26.7            | 4.65               | 0.8                 | 2.18               |
|           | 27              | 4.55               | 0.7                 | 1.98               |
|           | 27.3            | 4.65               | 0.8                 | 1.83               |
|           | 27.6            | 4.6                | 0.75                | 0.7                |
|           | 27.9            | 4.5                | 0.65                | 1.29               |
|           | 28.2            | 4.55               | 0.7                 | 2.31               |
|           | 28.5            | 4.45               | 0.6                 | 3.26               |
|           | 28.8            | 4.85               | 1                   | 2.3                |
|           | 29.5            | 4.7                | 0.85                | 1.9                |
|           | 30              | 4.15               | 0.3                 | 0.65               |

|           |      |      |      |      |
|-----------|------|------|------|------|
|           | 30.5 | 4.25 | 0.4  | 0.31 |
|           | 31   | 4.15 | 0.3  | 0.37 |
|           | 31.5 | 4    | 0.15 | 0.94 |
|           | 32.5 | 3.95 | 0.1  | 0.38 |
| Waterline | 33   | 3.85 | 0    | 0    |
|           | 37   | 3.76 |      |      |
|           | 44   | 3.66 |      |      |
| Bankfull  | 44.6 | 2.16 |      |      |
|           | 45.5 | 1.68 |      |      |
|           | 47.4 | 3.95 |      |      |
|           | 52   | 4.72 |      |      |
|           | 59   | 4.52 |      |      |
|           | 62.2 | 3.38 |      |      |

## COMPUTED FROM MEASURED FIELD DATA

| Wetted Perimeter<br>(ft) | Water Depth<br>(ft) | Area<br>(ft^2) | Discharge<br>(cfs) | Percent Discharge |
|--------------------------|---------------------|----------------|--------------------|-------------------|
| 0                        | 0                   | 0              | 0                  | 0                 |
| 0                        | 0                   | 0              | 0                  | 0                 |
| 0                        | 0                   | 0              | 0                  | 0                 |
| 0                        | 0                   | 0              | 0                  | 0                 |
| 0                        | 0                   | 0              | 0                  | 0                 |
| 0                        | 0                   | 0              | 0                  | 0                 |
| 0                        | 0                   | 0              | 0                  | 0                 |
| 0                        | 0                   | 0              | 0                  | 0                 |
| 1.43                     | 0.3                 | 0.36           | 0                  | 0                 |
| 1.04                     | 0.6                 | 0.45           | 0.25               | 2.14              |
| 0.51                     | 0.5                 | 0.25           | 0.27               | 2.25              |
| 0.52                     | 0.65                | 0.26           | 0.3                | 2.56              |
| 0.32                     | 0.75                | 0.23           | 0.48               | 4.06              |
| 0.34                     | 0.9                 | 0.27           | 0.71               | 6.04              |
| 0.3                      | 0.9                 | 0.27           | 0.7                | 5.92              |
| 0.3                      | 0.9                 | 0.27           | 0.65               | 5.53              |
| 0.3                      | 0.85                | 0.26           | 0.9                | 7.66              |
| 0.3                      | 0.9                 | 0.27           | 0.87               | 7.42              |
| 0.34                     | 0.75                | 0.22           | 0.7                | 5.97              |
| 0.3                      | 0.75                | 0.22           | 0.6                | 5.13              |
| 0.3                      | 0.8                 | 0.24           | 0.52               | 4.45              |
| 0.32                     | 0.7                 | 0.21           | 0.42               | 3.54              |
| 0.32                     | 0.8                 | 0.24           | 0.44               | 3.73              |
| 0.3                      | 0.75                | 0.22           | 0.16               | 1.34              |
| 0.32                     | 0.65                | 0.19           | 0.25               | 2.14              |
| 0.3                      | 0.7                 | 0.21           | 0.49               | 4.13              |
| 0.32                     | 0.6                 | 0.18           | 0.59               | 4.99              |
| 0.5                      | 1                   | 0.5            | 1.15               | 9.78              |
| 0.72                     | 0.85                | 0.51           | 0.97               | 8.24              |
| 0.74                     | 0.3                 | 0.15           | 0.1                | 0.83              |

|      |      |      |      |      |
|------|------|------|------|------|
| 0.51 | 0.4  | 0.2  | 0.06 | 0.53 |
| 0.51 | 0.3  | 0.15 | 0.06 | 0.47 |
| 0.52 | 0.15 | 0.11 | 0.11 | 0.9  |
| 1    | 0.1  | 0.07 | 0.03 | 0.24 |
| 0.51 | 0    | 0    | 0    | 0    |
| 0    | 0    | 0    | 0    | 0    |
| 0    | 0    | 0    | 0    | 0    |
| 0    | 0    | 0    | 0    | 0    |
| 0    | 0    | 0    | 0    | 0    |
| 0    | 0    | 0    | 0    | 0    |
| 0    | 0    | 0    | 0    | 0    |
| 0    | 0    | 0    | 0    | 0    |
| 0    | 0    | 0    | 0    | 0    |
| 0    | 0    | 0    | 0    | 0    |

## DISCLAIMER

"The Colorado Water Conservation Board makes no representations about the use of the software contained in the R2Cross platform for any purpose besides that for which it was designed. To the maximum extent permitted by applicable law, all information, modeling results, and software are provided "as is" without warranty or condition of any kind, including all implied warranties or conditions of merchantability, or fitness for a particular purpose. The user assumes all responsibility for the accuracy and suitability of this program for a specific application. In no event shall the Colorado Water Conservation Board or any state agency, official or employee be liable for any direct, indirect, punitive, incidental, special, consequential damages or any damages whatsoever including, without limitation, damages for loss of use, data, profits, or savings arising from the implementation, reliance on, or use of or inability to use the R2Cross platform.

# Gunnison Field Office Stream Surveys

## July 2016

### Van Boxel Creek – Stream Code #46599

#### Introduction:

Van Boxel Creek is located to the West of Gunnison, near Cimarron (figure 1). The creek starts at High Mesa and flows down to its confluence with Little Cimarron Creek, part of the Gunnison River drainage. The stream was previously visited in 2014 by BLM biologists to evaluate a potential fish barrier, the culvert at the road crossing.

#### Method:

On July 17, 2016, the stream was surveyed by performing a two-pass depletion over a 400 foot reach of the stream. The reach started at the High Mesa Road crossing culvert and ended at a log jam upstream (figure 1). Only one backpack shocker and netter were utilized during the survey. Personnel present for the survey included Russ Japuntich, Fish Biologist, and Josh Ryan, Fisheries Technician.

#### Results:

Brook trout (*Salvelinus fontinalis*) was the only species captured during the survey. A total of 33 fish were captured during the two passes, with 25 on the first pass and the remaining 8 on the second pass (table 1). A capture probability = 0.63 and a population estimate = 28.82 at a 95% CI ( $\pm 10.20$ ), was calculated for fish age 1 and older ( $>100$  mm) (figure 2). The length frequencies and relative weights for the captured individuals are displayed in figures 3 and 4.

#### Discussion:

Electrofishing efficiency was good, with very few fish missed. The stream was a little tough to survey comprehensively due to split flow paths and semi-braided step pool channel. There was a lot of down large woody debris in the stream that provided some obstacles. The site had been visited earlier in the year to place an in-stream temperature probe and once before during run-off. The snowmelt run-off this stream experiences is very high and very fast. As mentioned before, in 2014 the stream was visited to examine the road culvert as a fish passage barrier. There is a substantial drop-off and deep pool at the downstream end of the culvert, as well as

some openings/cracks beneath the culvert on the upstream side. During our site visit, we sampled the upper reach on BLM. This stretch was almost dry and contained zero fish.



Figure 1. Map displaying the location of the Van Boxel Creek survey site.

Water: Van Boxel Creek

Date: 8/11/2015

Location: At road crossing

Drainage: Cimarron River

Crew: Japuntich, Ryan

Notes: 1 - BPS

Water Code: 0

UTM Zone: 13 S

UTM X: 282383

UTM Y: 4241852

Station Length (ft): 400

Station Width (ft): 0.0

LEVEL 2 - STREAM SURVEY (2 PASS REMOVAL)

SAVE

PRINT

PRINT

DOE

SUMMARY INFORMATION

| Species | # Caught | % Catch | Min Size | Capture P | #/Mile | 95% CI | #/Acre | 95% CI | Lbs/Acre | 95% CI |
|---------|----------|---------|----------|-----------|--------|--------|--------|--------|----------|--------|
| BRK     | 25       | 100     | 100      | 0.83      | 380    | 135    | Inf    | Inf    | Inf      | Inf    |

LENGTH FREQUENCY RECORD (cm)

| Species | 0-2 | 2-4 | 4-6 | 6-8 | 8-10 | 10-12 | 12-14 | 14-16 | 16-18 | 18-20 | 20-22 | 22-24 | 24-26 | 26-28 | 28-30 | 30-32 | 32-34 | 34-36 | 36-38 | 38-40 | 40-42 | 42-44 | 44-46 | 46-48 | 48-50 | 50-52 | 52-54 | 54-56 | 56-58 | 58-60 | +60 |
|---------|-----|-----|-----|-----|------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-----|
| BRK     |     |     |     | 3   | 5    | 9     | 3     | 4     | 5     | 3     | 1     |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |     |

Figure 2. Level 2 output from Jake-O-matic.

A histogram showing the frequency of fish lengths. The x-axis represents length in millimeters, ranging from 0 to 235 with major ticks every 20 units and minor ticks every 5 units. The y-axis represents the number of fish, ranging from 0 to 6 with major ticks every 1 unit and minor ticks every 0.2 units. The bars are blue. The distribution is roughly bell-shaped, peaking at 95 mm with 5 fish.

| Length (mm) | Number of Fish |
|-------------|----------------|
| 65          | 2              |
| 75          | 1              |
| 85          | 2              |
| 95          | 5              |
| 105         | 4              |
| 115         | 3              |
| 125         | 2              |
| 135         | 1              |
| 145         | 1              |
| 155         | 3              |
| 165         | 3              |
| 175         | 2              |
| 185         | 1              |
| 195         | 2              |
| 215         | 1              |

Figure 3. Length frequencies for the captured brook trout.

Figure 4. Calculated relative weights for the captured brook trout.

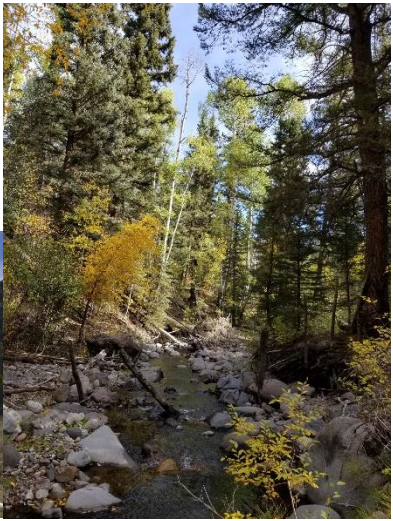
Table 1. Datasheet from the survey with collected information: pass captured, species, length (mm), and weight (g)

| #  | Pass | Species | Length | Weight |
|----|------|---------|--------|--------|
| 1  | 1    | BRK     | 159    | 43     |
| 2  | 1    | BRK     | 111    | 14     |
| 3  | 1    | BRK     | 175    | 57     |
| 4  | 1    | BRK     | 158    | 40     |
| 5  | 1    | BRK     | 188    | 68     |
| 6  | 1    | BRK     | 89     | 7      |
| 7  | 1    | BRK     | 166    | 51     |
| 8  | 1    | BRK     | 175    | 55     |
| 9  | 1    | BRK     | 158    | 43     |
| 10 | 1    | BRK     | 127    | 21     |
| 11 | 1    | BRK     | 100    | 10     |
| 12 | 1    | BRK     | 62     | 1      |
| 13 | 1    | BRK     | 101    | 11     |
| 14 | 1    | BRK     | 134    | 20     |
| 15 | 1    | BRK     | 170    | 51     |
| 16 | 1    | BRK     | 145    | 28     |
| 17 | 1    | BRK     | 93     | 8      |
| 18 | 1    | BRK     | 105    | 13     |
| 19 | 1    | BRK     | 107    | 13     |
| 20 | 1    | BRK     | 67     | 3      |
| 21 | 1    | BRK     | 90     | 6      |
| 22 | 1    | BRK     | 79     | 5      |
| 23 | 1    | BRK     | 92     | 6      |
| 24 | 1    | BRK     | 199    | 79     |
| 25 | 1    | BRK     | 220    | 107    |
| 26 | 2    | BRK     | 96     | 9      |
| 27 | 2    | BRK     | 100    | 13     |
| 28 | 2    | BRK     | 126    | 24     |
| 29 | 2    | BRK     | 114    | 17     |
| 30 | 2    | BRK     | 106    | 12     |
| 31 | 2    | BRK     | 118    | 16     |
| 32 | 2    | BRK     | 165    | 48     |
| 33 | 2    | BRK     | 198    | 76     |















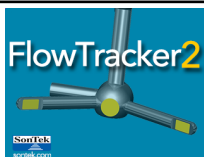






Discharge Measurment Field Visit Data Report (Filters: Name begins with Van Boxel;)

| Div | Name            | CWCB Case Number | Segment ID | Meas. Date | UTM                           | Location        | Flow Amount (cfs) | Meas # | Rating | Station ID |
|-----|-----------------|------------------|------------|------------|-------------------------------|-----------------|-------------------|--------|--------|------------|
| 4   | Van Boxel Creek |                  | 23/4/A-006 | 09/30/2022 | UTMx: 282341<br>UTMy: 4241700 | Van Boxel Creek | 0.49              | 1      | g      |            |
| 4   | Van Boxel Creek |                  | 23/4/A-006 | 09/30/2022 | UTMx: 283936<br>UTMy: 4242434 | Van Boxel Creek | 1                 | 2      | g      |            |



# Discharge Measurement Summary

**Site name** Upper Van Boxel  
**Site number** 929202A  
**Operator(s)** LFS  
**File name** Upper Van Boxel\_20220930-101807.ft  
**Comment**

|                                 |                    |                               |             |
|---------------------------------|--------------------|-------------------------------|-------------|
| <b>Start time</b>               | 9/30/2022 9:46 AM  | <b>Sensor type</b>            | Top Setting |
| <b>End time</b>                 | 9/30/2022 10:11 AM | <b>Handheld serial number</b> | FT2H1747037 |
| <b>Start location latitude</b>  | 38.297             | <b>Probe serial number</b>    | FT2P1747048 |
| <b>Start location longitude</b> | -107.489           | <b>Probe firmware</b>         | 1.30        |
| <b>Calculations engine</b>      | FlowTracker2       | <b>Handheld software</b>      | 1.7         |

|                   |                         |                                           |
|-------------------|-------------------------|-------------------------------------------|
| <b># Stations</b> | <b>Avg interval (s)</b> | <b>Total discharge (ft<sup>3</sup>/s)</b> |
| 21                | 40                      | 0.4909                                    |

|                         |                                    |                              |
|-------------------------|------------------------------------|------------------------------|
| <b>Total width (ft)</b> | <b>Total area (ft<sup>2</sup>)</b> | <b>Wetted Perimeter (ft)</b> |
| 9.100                   | 2.4727                             | 9.495                        |

|                      |                        |                             |
|----------------------|------------------------|-----------------------------|
| <b>Mean SNR (dB)</b> | <b>Mean depth (ft)</b> | <b>Mean velocity (ft/s)</b> |
| 38                   | 0.272                  | 0.1985                      |

|                       |                       |                            |
|-----------------------|-----------------------|----------------------------|
| <b>Mean temp (°F)</b> | <b>Max depth (ft)</b> | <b>Max velocity (ft/s)</b> |
| 43.995                | 0.550                 | 0.7187                     |

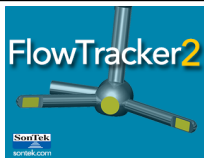
| Discharge Uncertainty |      |       |
|-----------------------|------|-------|
| Category              | ISO  | IVE   |
| Accuracy              | 1.0% | 1.0%  |
| Depth                 | 0.4% | 9.4%  |
| Velocity              | 2.7% | 26.1% |
| Width                 | 0.1% | 0.1%  |
| Method                | 2.2% |       |
| # Stations            | 2.4% |       |
| Overall               | 4.4% | 27.7% |

|                              |             |
|------------------------------|-------------|
| <b>Discharge equation</b>    | Mid Section |
| <b>Discharge uncertainty</b> | IVE         |
| <b>Discharge reference</b>   | Rated       |

| Data Collection Settings   |              |
|----------------------------|--------------|
| <b>Salinity</b>            | 0.000 PSS-78 |
| <b>Temperature</b>         | -            |
| <b>Sound speed</b>         | -            |
| <b>Mounting correction</b> | 0.000 %      |

## Summary overview

No changes were made to this file  
Quality control warnings



# Discharge Measurement Summary

**Site name** Upper Van Boxel  
**Site number** 929202A  
**Operator(s)** LFS  
**File name** Upper Van Boxel\_20220930-101807.ft  
**Comment**

## Station Warning Settings

**Station discharge OK**

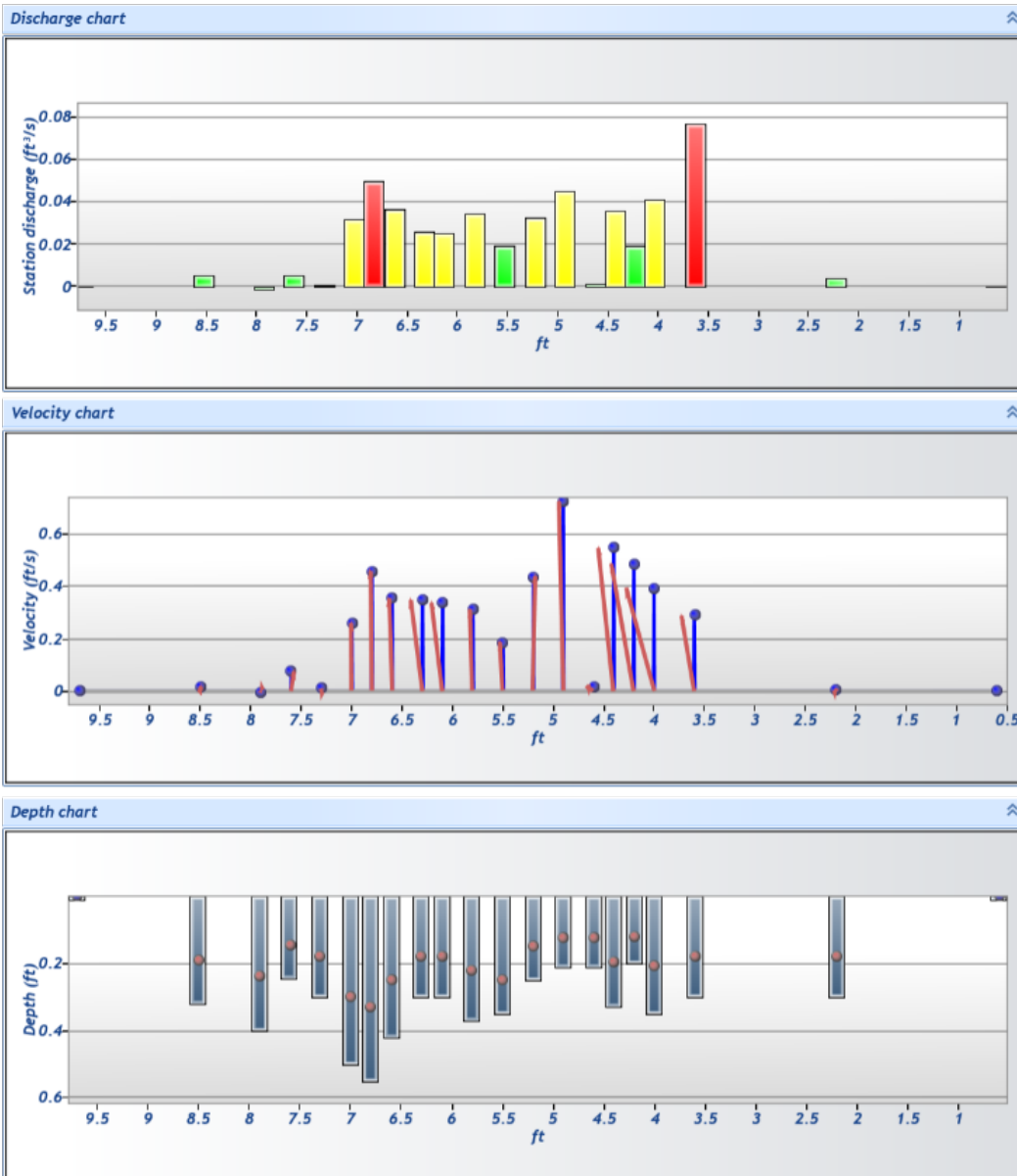
Station discharge < 5.00%

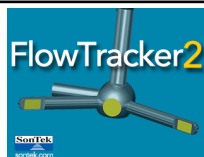
**Station discharge caution**

5.00% >= Station discharge < 10.00%

**Station discharge warning**

Station discharge >= 10.00%

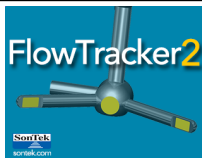




# Discharge Measurement Summary

**Site name** Upper Van Boxel  
**Site number** 929202A  
**Operator(s)** LFS  
**File name** Upper Van Boxel\_20220930-101807.ft  
**Comment**

| Measurement results |          |               |        |            |        |                     |         |                 |            |                      |                         |                           |       |   |
|---------------------|----------|---------------|--------|------------|--------|---------------------|---------|-----------------|------------|----------------------|-------------------------|---------------------------|-------|---|
| St#                 | Time     | Location (ft) | Method | Depth (ft) | %Depth | Measured Depth (ft) | Samples | Velocity (ft/s) | Correction | Mean Velocity (ft/s) | Area (ft <sup>2</sup> ) | Flow (ft <sup>3</sup> /s) | %Q    |   |
| 0                   | 9:46 AM  | 0.600         | None   | 0.010      | 0.0000 | 0.000               | 0       | 0.0000          | 1.0000     | 0.0088               | 0.0080                  | 0.0001                    | 0.01  | ✓ |
| 1                   | 9:46 AM  | 2.200         | 0.6    | 0.300      | 0.6000 | 0.180               | 80      | 0.0088          | 1.0000     | 0.0088               | 0.4500                  | 0.0039                    | 0.80  | ✓ |
| 2                   | 9:48 AM  | 3.600         | 0.6    | 0.300      | 0.6000 | 0.180               | 80      | 0.2863          | 1.0000     | 0.2863               | 0.2700                  | 0.0773                    | 15.74 | ✓ |
| 3                   | 9:49 AM  | 4.000         | 0.6    | 0.350      | 0.6000 | 0.210               | 80      | 0.3918          | 1.0000     | 0.3918               | 0.1050                  | 0.0411                    | 8.38  | ✓ |
| 4                   | 9:51 AM  | 4.200         | 0.6    | 0.200      | 0.6000 | 0.120               | 80      | 0.4826          | 1.0000     | 0.4826               | 0.0400                  | 0.0193                    | 3.93  | ✓ |
| 5                   | 9:53 AM  | 4.400         | 0.6    | 0.330      | 0.6000 | 0.198               | 80      | 0.5424          | 1.0000     | 0.5424               | 0.0660                  | 0.0358                    | 7.29  | ✓ |
| 6                   | 9:54 AM  | 4.600         | 0.6    | 0.210      | 0.6000 | 0.126               | 80      | 0.0185          | 1.0000     | 0.0185               | 0.0525                  | 0.0010                    | 0.20  | ✓ |
| 7                   | 9:55 AM  | 4.900         | 0.6    | 0.210      | 0.6000 | 0.126               | 80      | 0.7187          | 1.0000     | 0.7187               | 0.0630                  | 0.0453                    | 9.22  | ✓ |
| 8                   | 9:56 AM  | 5.200         | 0.6    | 0.250      | 0.6000 | 0.150               | 80      | 0.4350          | 1.0000     | 0.4350               | 0.0750                  | 0.0326                    | 6.65  | ✓ |
| 9                   | 9:57 AM  | 5.500         | 0.6    | 0.350      | 0.6000 | 0.250               | 80      | 0.1850          | 1.0000     | 0.1850               | 0.1050                  | 0.0194                    | 3.96  | ✓ |
| 10                  | 9:58 AM  | 5.800         | 0.6    | 0.370      | 0.6000 | 0.222               | 80      | 0.3084          | 1.0000     | 0.3084               | 0.1110                  | 0.0342                    | 6.97  | ✓ |
| 11                  | 10:00 AM | 6.100         | 0.6    | 0.300      | 0.6000 | 0.180               | 80      | 0.3353          | 1.0000     | 0.3353               | 0.0750                  | 0.0251                    | 5.12  | ✓ |
| 12                  | 10:01 AM | 6.300         | 0.6    | 0.300      | 0.6000 | 0.180               | 80      | 0.3459          | 1.0000     | 0.3459               | 0.0750                  | 0.0259                    | 5.28  | ✓ |
| 13                  | 10:02 AM | 6.600         | 0.6    | 0.420      | 0.6000 | 0.252               | 80      | 0.3509          | 1.0000     | 0.3509               | 0.1050                  | 0.0368                    | 7.51  | ✓ |
| 14                  | 10:04 AM | 6.800         | 0.6    | 0.550      | 0.6000 | 0.330               | 80      | 0.4549          | 1.0000     | 0.4549               | 0.1100                  | 0.0500                    | 10.19 | ✓ |
| 15                  | 10:05 AM | 7.000         | 0.6    | 0.500      | 0.6000 | 0.300               | 80      | 0.2572          | 1.0000     | 0.2572               | 0.1250                  | 0.0321                    | 6.55  | ✓ |
| 16                  | 10:06 AM | 7.300         | 0.6    | 0.300      | 0.6000 | 0.180               | 80      | 0.0094          | 1.0000     | 0.0094               | 0.0900                  | 0.0008                    | 0.17  | ✓ |
| 17                  | 10:07 AM | 7.600         | 0.6    | 0.244      | 0.6000 | 0.146               | 80      | 0.0746          | 1.0000     | 0.0746               | 0.0732                  | 0.0055                    | 1.11  | ✓ |
| 18                  | 10:09 AM | 7.900         | 0.6    | 0.400      | 0.6000 | 0.240               | 80      | -0.0066         | 1.0000     | -0.0066              | 0.1800                  | -0.0012                   | -0.24 | ✓ |
| 19                  | 10:10 AM | 8.500         | 0.6    | 0.320      | 0.6000 | 0.192               | 80      | 0.0191          | 1.0000     | 0.0191               | 0.2880                  | 0.0055                    | 1.12  | ✓ |
| 20                  | 10:11 AM | 9.700         | None   | 0.010      | 0.0000 | 0.000               | 0       | 0.0000          | 1.0000     | 0.0191               | 0.0060                  | 0.0001                    | 0.02  | ✓ |



# Discharge Measurement Summary

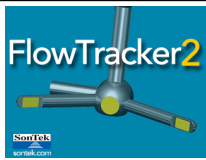
**Site name** Upper Van Boxel  
**Site number** 929202A  
**Operator(s)** LFS  
**File name** Upper Van Boxel\_20220930-101807.ft  
**Comment**

## Quality Control Settings

**Maximum depth change** 50.00%  
**Maximum spacing change** 100.00%  
**SNR threshold** 10 dB  
**Standard error threshold** 0.0328 ft/s  
**Spike threshold** 10.00%  
**Maximum velocity angle** 20.0 deg  
**Maximum tilt angle** 5.0 deg

## Quality control warnings

| St# | Time     | Location (ft) | Method | Depth (ft) | %Depth | Measured Depth (ft) | Warnings                                                          |
|-----|----------|---------------|--------|------------|--------|---------------------|-------------------------------------------------------------------|
| 1   | 9:46 AM  | 2.200         | 0.6    | 0.300      | 0.6000 | 0.180               | Boundary Interference                                             |
| 2   | 9:48 AM  | 3.600         | 0.6    | 0.300      | 0.6000 | 0.180               | Velocity Angle > QC,High Stn % Discharge                          |
| 3   | 9:49 AM  | 4.000         | 0.6    | 0.350      | 0.6000 | 0.210               | Stn Spacing > QC,Velocity Angle > QC                              |
| 4   | 9:51 AM  | 4.200         | 0.6    | 0.200      | 0.6000 | 0.120               | Stn Spacing > QC,Velocity Angle > QC                              |
| 5   | 9:53 AM  | 4.400         | 0.6    | 0.330      | 0.6000 | 0.198               | Boundary Interference                                             |
| 6   | 9:54 AM  | 4.600         | 0.6    | 0.210      | 0.6000 | 0.126               | Boundary Interference                                             |
| 14  | 10:04 AM | 6.800         | 0.6    | 0.550      | 0.6000 | 0.330               | High Stn % Discharge                                              |
| 17  | 10:07 AM | 7.600         | 0.6    | 0.244      | 0.6000 | 0.146               | Velocity Angle > QC                                               |
| 19  | 10:10 AM | 8.500         | 0.6    | 0.320      | 0.6000 | 0.192               | Boundary Interference,SNR Threshold Variation,Standard Error > QC |



# Discharge Measurement Summary

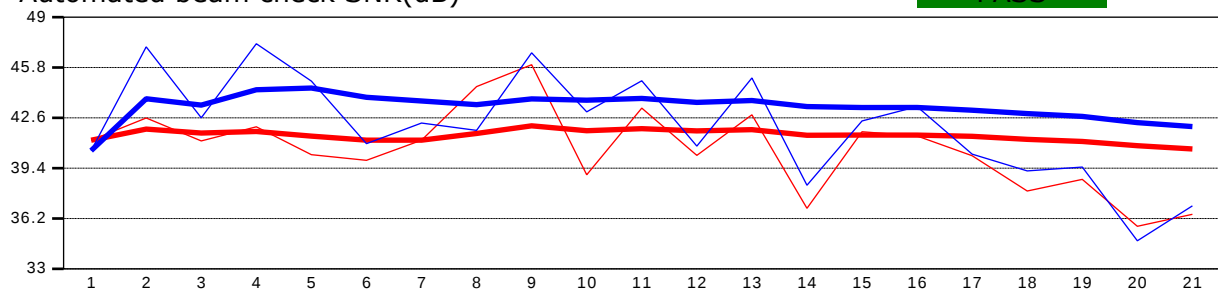
**Site name** Upper Van Boxel  
**Site number** 929202A  
**Operator(s)** LFS  
**File name** Upper Van Boxel\_20220930-101807.ft  
**Comment**

|               |  |
|---------------|--|
| <b>Beam 1</b> |  |
| <b>Beam 2</b> |  |

Automated beam check Start time 9/30/2022 9:46:05 AM

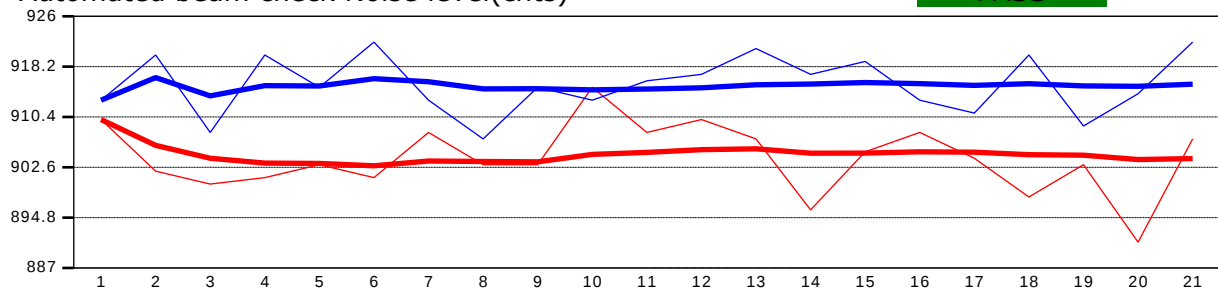
Automated beam check SNR(dB)

PASS



Automated beam check Noise level(cnts)

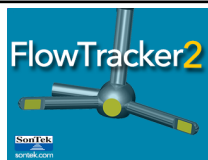
PASS



## Automated beam check Quality control warnings

No quality control warnings

10/4/2022 10:31:13 AM



# Discharge Measurement Summary

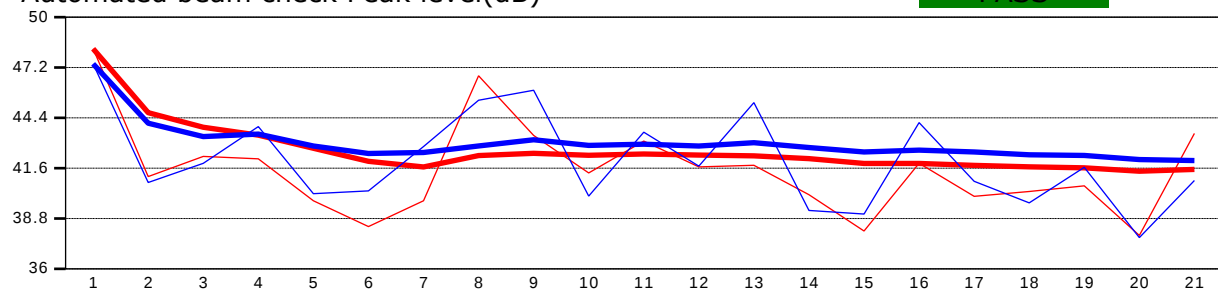
**Site name** Upper Van Boxel  
**Site number** 929202A  
**Operator(s)** LFS  
**File name** Upper Van Boxel\_20220930-101807.ft  
**Comment**

|               |  |
|---------------|--|
| <b>Beam 1</b> |  |
| <b>Beam 2</b> |  |

Automated beam check Start time 9/30/2022 9:46:05 AM

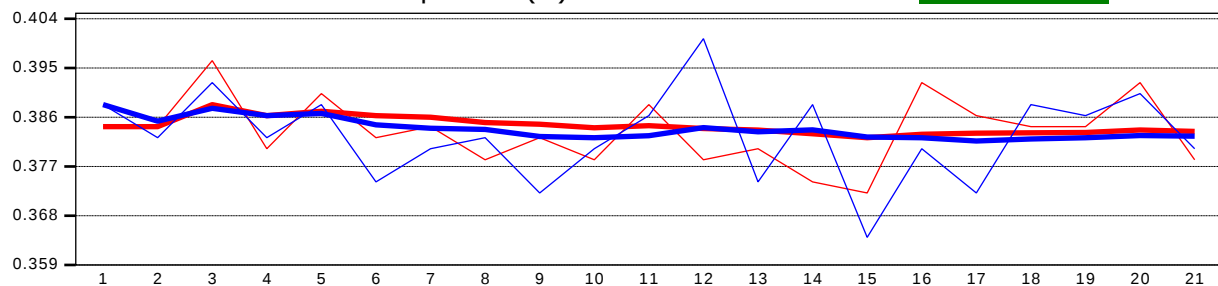
Automated beam check Peak level(dB)

PASS



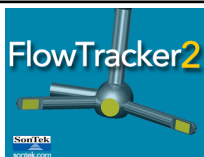
Automated beam check Peak position(ft)

PASS



## Automated beam check Quality control warnings

No quality control warnings



# Discharge Measurement Summary

**Site name** Van boxel dwnstm  
**Site number** 9292022B  
**Operator(s)** Lfs  
**File name** Van boxel dwnstm\_20220930-110350.ft  
**Comment**

|                                 |                    |                               |             |
|---------------------------------|--------------------|-------------------------------|-------------|
| <b>Start time</b>               | 9/30/2022 10:41 AM | <b>Sensor type</b>            | Top Setting |
| <b>End time</b>                 | 9/30/2022 11:02 AM | <b>Handheld serial number</b> | FT2H1747037 |
| <b>Start location latitude</b>  | 38.304             | <b>Probe serial number</b>    | FT2P1747048 |
| <b>Start location longitude</b> | -107.471           | <b>Probe firmware</b>         | 1.30        |
| <b>Calculations engine</b>      | FlowTracker2       | <b>Handheld software</b>      | 1.7         |

|                   |                         |                                           |
|-------------------|-------------------------|-------------------------------------------|
| <b># Stations</b> | <b>Avg interval (s)</b> | <b>Total discharge (ft<sup>3</sup>/s)</b> |
| 18                | 40                      | 1.0047                                    |

|                         |                                    |                              |
|-------------------------|------------------------------------|------------------------------|
| <b>Total width (ft)</b> | <b>Total area (ft<sup>2</sup>)</b> | <b>Wetted Perimeter (ft)</b> |
| 5.500                   | 2.8715                             | 7.538                        |

|                      |                        |                             |
|----------------------|------------------------|-----------------------------|
| <b>Mean SNR (dB)</b> | <b>Mean depth (ft)</b> | <b>Mean velocity (ft/s)</b> |
| 49                   | 0.522                  | 0.3499                      |

|                       |                       |                            |
|-----------------------|-----------------------|----------------------------|
| <b>Mean temp (°F)</b> | <b>Max depth (ft)</b> | <b>Max velocity (ft/s)</b> |
| 47.985                | 1.100                 | 0.9915                     |

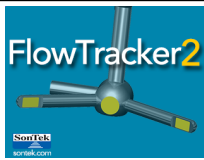
| Discharge Uncertainty |      |       |
|-----------------------|------|-------|
| Category              | ISO  | IVE   |
| Accuracy              | 1.0% | 1.0%  |
| Depth                 | 0.5% | 9.6%  |
| Velocity              | 2.6% | 12.0% |
| Width                 | 0.2% | 0.2%  |
| Method                | 2.5% |       |
| # Stations            | 2.8% |       |
| Overall               | 4.7% | 15.3% |

|                              |             |
|------------------------------|-------------|
| <b>Discharge equation</b>    | Mid Section |
| <b>Discharge uncertainty</b> | IVE         |
| <b>Discharge reference</b>   | Rated       |

| Data Collection Settings   |              |
|----------------------------|--------------|
| <b>Salinity</b>            | 0.000 PSS-78 |
| <b>Temperature</b>         | -            |
| <b>Sound speed</b>         | -            |
| <b>Mounting correction</b> | 0.000 %      |

## Summary overview

No changes were made to this file  
Quality control warnings



# Discharge Measurement Summary

**Site name** Van boxel dwnstm  
**Site number** 9292022B  
**Operator(s)** Lfs  
**File name** Van boxel dwnstm\_20220930-110350.ft  
**Comment**

## Station Warning Settings

**Station discharge OK**

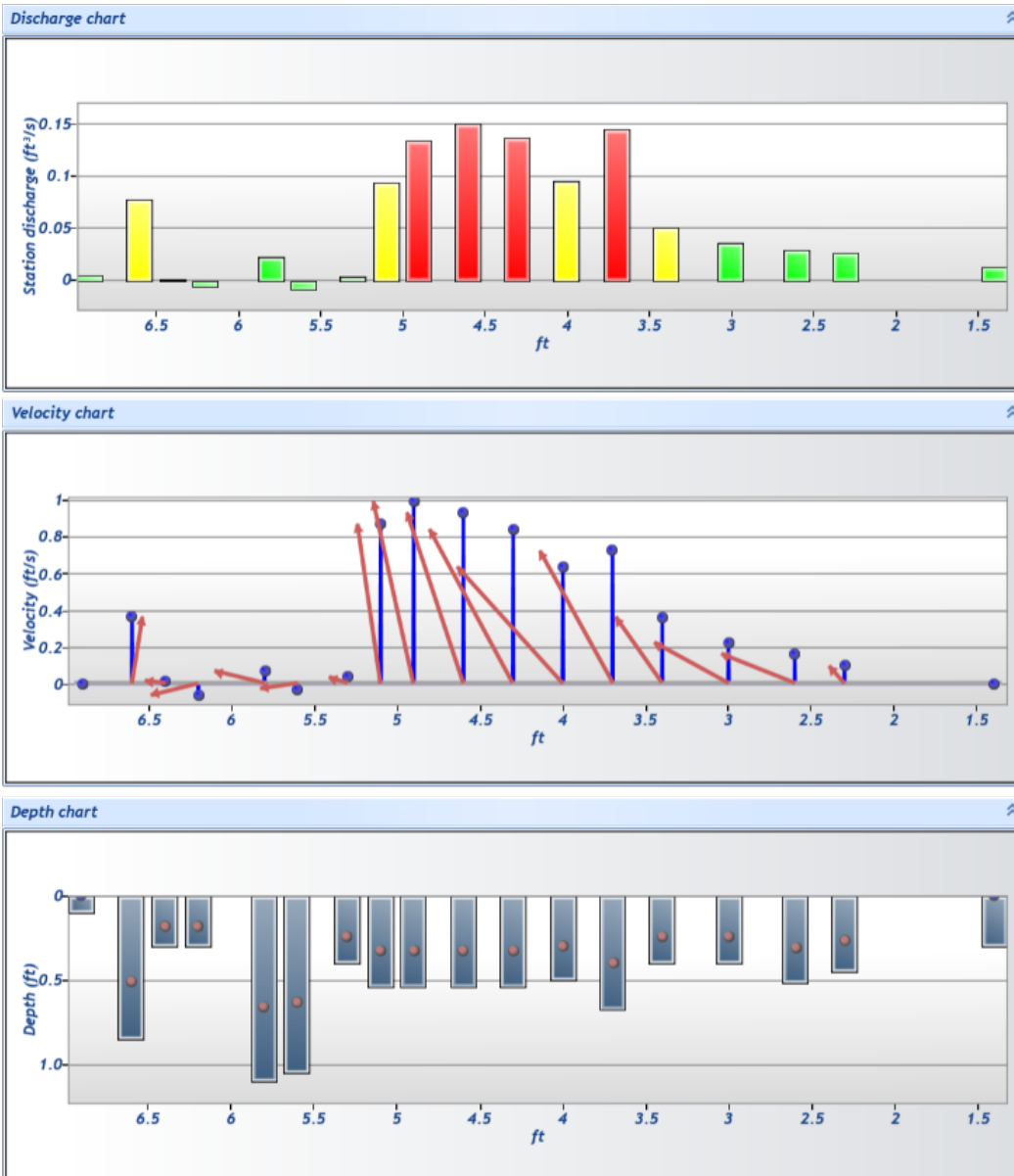
Station discharge < 5.00%

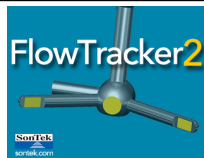
**Station discharge caution**

5.00% >= Station discharge < 10.00%

**Station discharge warning**

Station discharge >= 10.00%

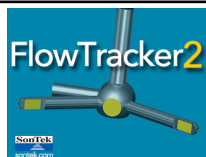




# Discharge Measurement Summary

|                    |                                     |
|--------------------|-------------------------------------|
| <b>Site name</b>   | Van boxel dwnstm                    |
| <b>Site number</b> | 9292022B                            |
| <b>Operator(s)</b> | Lfs                                 |
| <b>File name</b>   | Van boxel dwnstm_20220930-110350.ft |
| <b>Comment</b>     |                                     |

| Measurement results |          |               |        |            |        |                     |         |                 |            |                      |                         |                           |       |   |
|---------------------|----------|---------------|--------|------------|--------|---------------------|---------|-----------------|------------|----------------------|-------------------------|---------------------------|-------|---|
| St#                 | Time     | Location (ft) | Method | Depth (ft) | %Depth | Measured Depth (ft) | Samples | Velocity (ft/s) | Correction | Mean Velocity (ft/s) | Area (ft <sup>2</sup> ) | Flow (ft <sup>3</sup> /s) | %Q    |   |
| 0                   | 10:41 AM | 1.400         | None   | 0.300      | 0.0000 | 0.000               | 0       | 0.0000          | 1.0000     | 0.0970               | 0.1350                  | 0.0131                    | 1.30  | ✓ |
| 1                   | 10:42 AM | 2.300         | 0.6    | 0.450      | 0.6000 | 0.270               | 80      | 0.0970          | 1.0000     | 0.0970               | 0.2700                  | 0.0262                    | 2.61  | ✓ |
| 2                   | 10:43 AM | 2.600         | 0.6    | 0.510      | 0.6000 | 0.306               | 80      | 0.1601          | 1.0000     | 0.1601               | 0.1785                  | 0.0286                    | 2.84  | ✓ |
| 3                   | 10:45 AM | 3.000         | 0.6    | 0.400      | 0.6000 | 0.240               | 80      | 0.2230          | 1.0000     | 0.2230               | 0.1600                  | 0.0357                    | 3.55  | ✓ |
| 4                   | 10:46 AM | 3.400         | 0.6    | 0.400      | 0.6000 | 0.240               | 80      | 0.3613          | 1.0000     | 0.3613               | 0.1400                  | 0.0506                    | 5.03  | ✓ |
| 5                   | 10:47 AM | 3.700         | 0.6    | 0.670      | 0.6000 | 0.402               | 80      | 0.7228          | 1.0000     | 0.7228               | 0.2010                  | 0.1453                    | 14.46 | ✓ |
| 6                   | 10:48 AM | 4.000         | 0.6    | 0.500      | 0.6000 | 0.300               | 80      | 0.6366          | 1.0000     | 0.6366               | 0.1500                  | 0.0955                    | 9.50  | ✓ |
| 7                   | 10:49 AM | 4.300         | 0.6    | 0.540      | 0.6000 | 0.324               | 80      | 0.8414          | 1.0000     | 0.8414               | 0.1620                  | 0.1363                    | 13.57 | ✓ |
| 8                   | 10:50 AM | 4.600         | 0.6    | 0.540      | 0.6000 | 0.324               | 80      | 0.9298          | 1.0000     | 0.9298               | 0.1620                  | 0.1506                    | 14.99 | ✓ |
| 9                   | 10:51 AM | 4.900         | 0.6    | 0.540      | 0.6000 | 0.324               | 80      | 0.9915          | 1.0000     | 0.9915               | 0.1350                  | 0.1339                    | 13.32 | ✓ |
| 10                  | 10:53 AM | 5.100         | 0.6    | 0.540      | 0.6000 | 0.324               | 80      | 0.8692          | 1.0000     | 0.8692               | 0.1080                  | 0.0939                    | 9.34  | ✓ |
| 11                  | 10:54 AM | 5.300         | 0.6    | 0.400      | 0.6000 | 0.240               | 80      | 0.0337          | 1.0000     | 0.0337               | 0.1000                  | 0.0034                    | 0.34  | ✓ |
| 12                  | 10:55 AM | 5.600         | 0.6    | 1.050      | 0.6000 | 0.630               | 80      | -0.0307         | 1.0000     | -0.0307              | 0.2625                  | -0.0081                   | -0.80 | ✓ |
| 13                  | 10:57 AM | 5.800         | 0.6    | 1.100      | 0.6000 | 0.660               | 80      | 0.0666          | 1.0000     | 0.0666               | 0.3300                  | 0.0220                    | 2.19  | ✓ |
| 14                  | 10:58 AM | 6.200         | 0.6    | 0.300      | 0.6000 | 0.180               | 80      | -0.0641         | 1.0000     | -0.0641              | 0.0900                  | -0.0058                   | -0.57 | ✓ |
| 15                  | 11:00 AM | 6.400         | 0.6    | 0.300      | 0.6000 | 0.180               | 80      | 0.0132          | 1.0000     | 0.0132               | 0.0600                  | 0.0008                    | 0.08  | ✓ |
| 16                  | 11:01 AM | 6.600         | 0.6    | 0.850      | 0.6000 | 0.510               | 80      | 0.3640          | 1.0000     | 0.3640               | 0.2125                  | 0.0774                    | 7.70  | ✓ |
| 17                  | 11:02 AM | 6.900         | None   | 0.100      | 0.0000 | 0.000               | 0       | 0.0000          | 1.0000     | 0.3640               | 0.0150                  | 0.0055                    | 0.54  | ✓ |



# Discharge Measurement Summary

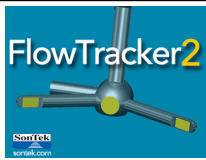
**Site name** Van boxel dwnstm  
**Site number** 9292022B  
**Operator(s)** Lfs  
**File name** Van boxel dwnstm\_20220930-110350.ft  
**Comment**

## Quality Control Settings

**Maximum depth change** 50.00%  
**Maximum spacing change** 100.00%  
**SNR threshold** 10 dB  
**Standard error threshold** 0.0328 ft/s  
**Spike threshold** 10.00%  
**Maximum velocity angle** 20.0 deg  
**Maximum tilt angle** 5.0 deg

## Quality control warnings

| St# | Time     | Location (ft) | Method | Depth (ft) | %Depth | Measured Depth (ft) | Warnings                                                       |
|-----|----------|---------------|--------|------------|--------|---------------------|----------------------------------------------------------------|
| 1   | 10:42 AM | 2.300         | 0.6    | 0.450      | 0.6000 | 0.270               | Velocity Angle > QC                                            |
| 2   | 10:43 AM | 2.600         | 0.6    | 0.510      | 0.6000 | 0.306               | Velocity Angle > QC                                            |
| 3   | 10:45 AM | 3.000         | 0.6    | 0.400      | 0.6000 | 0.240               | Stn Spacing > QC, Velocity Angle > QC                          |
| 4   | 10:46 AM | 3.400         | 0.6    | 0.400      | 0.6000 | 0.240               | Velocity Angle > QC                                            |
| 5   | 10:47 AM | 3.700         | 0.6    | 0.670      | 0.6000 | 0.402               | Standard Error > QC, Velocity Angle > QC, High Stn % Discharge |
| 6   | 10:48 AM | 4.000         | 0.6    | 0.500      | 0.6000 | 0.300               | Standard Error > QC, Velocity Angle > QC                       |
| 7   | 10:49 AM | 4.300         | 0.6    | 0.540      | 0.6000 | 0.324               | Standard Error > QC, Velocity Angle > QC, High Stn % Discharge |
| 8   | 10:50 AM | 4.600         | 0.6    | 0.540      | 0.6000 | 0.324               | Standard Error > QC, Velocity Angle > QC, High Stn % Discharge |
| 9   | 10:51 AM | 4.900         | 0.6    | 0.540      | 0.6000 | 0.324               | Standard Error > QC, High Stn % Discharge                      |
| 10  | 10:53 AM | 5.100         | 0.6    | 0.540      | 0.6000 | 0.324               | Standard Error > QC                                            |
| 13  | 10:57 AM | 5.800         | 0.6    | 1.100      | 0.6000 | 0.660               | Standard Error > QC, Velocity Angle > QC                       |
| 14  | 10:58 AM | 6.200         | 0.6    | 0.300      | 0.6000 | 0.180               | Standard Error > QC                                            |
| 15  | 11:00 AM | 6.400         | 0.6    | 0.300      | 0.6000 | 0.180               | Standard Error > QC                                            |
| 16  | 11:01 AM | 6.600         | 0.6    | 0.850      | 0.6000 | 0.510               | Standard Error > QC                                            |
| 17  | 11:02 AM | 6.900         | None   | 0.100      | 0.0000 | 0.000               | Water Depth > QC                                               |



# Discharge Measurement Summary

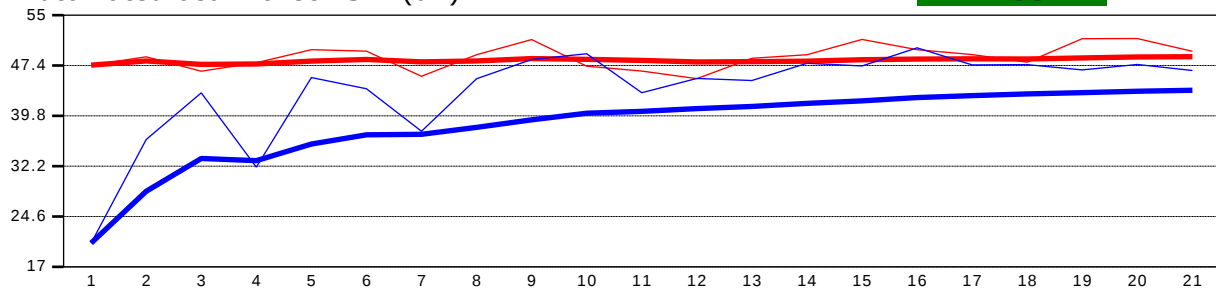
**Site name** Van boxel dwnstm  
**Site number** 9292022B  
**Operator(s)** Lfs  
**File name** Van boxel dwnstm\_20220930-110350.ft  
**Comment**

|               |  |
|---------------|--|
| <b>Beam 1</b> |  |
| <b>Beam 2</b> |  |

Automated beam check Start time 9/30/2022 10:41:17 AM

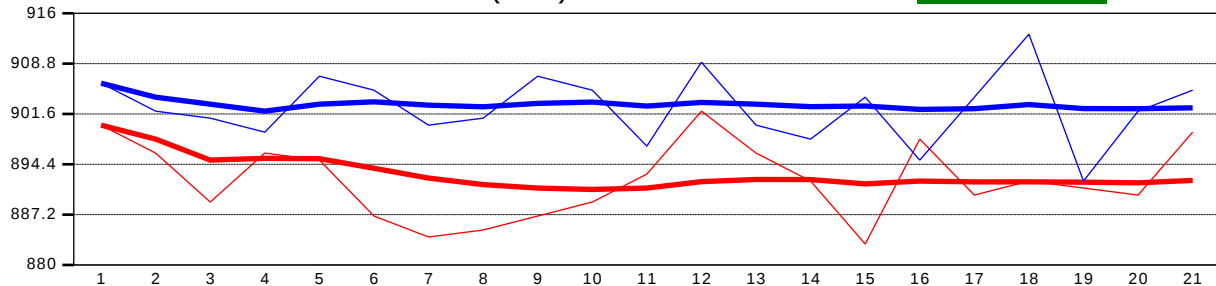
Automated beam check SNR(dB)

PASS



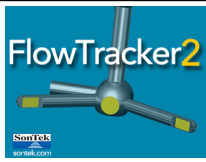
Automated beam check Noise level(cnts)

PASS



## Automated beam check Quality control warnings

No quality control warnings



# Discharge Measurement Summary

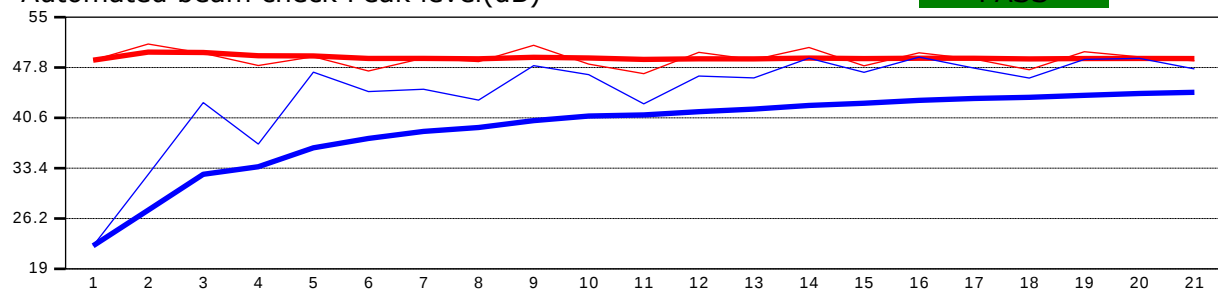
**Site name** Van boxel dwnstm  
**Site number** 9292022B  
**Operator(s)** Lfs  
**File name** Van boxel dwnstm\_20220930-110350.ft  
**Comment**

|               |  |
|---------------|--|
| <b>Beam 1</b> |  |
| <b>Beam 2</b> |  |

Automated beam check Start time 9/30/2022 10:41:17 AM

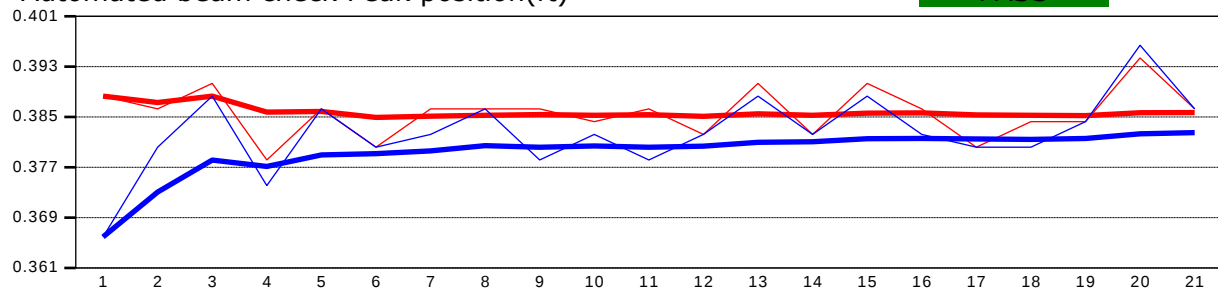
Automated beam check Peak level(dB)

PASS



Automated beam check Peak position(ft)

PASS



## Automated beam check Quality control warnings

No quality control warnings