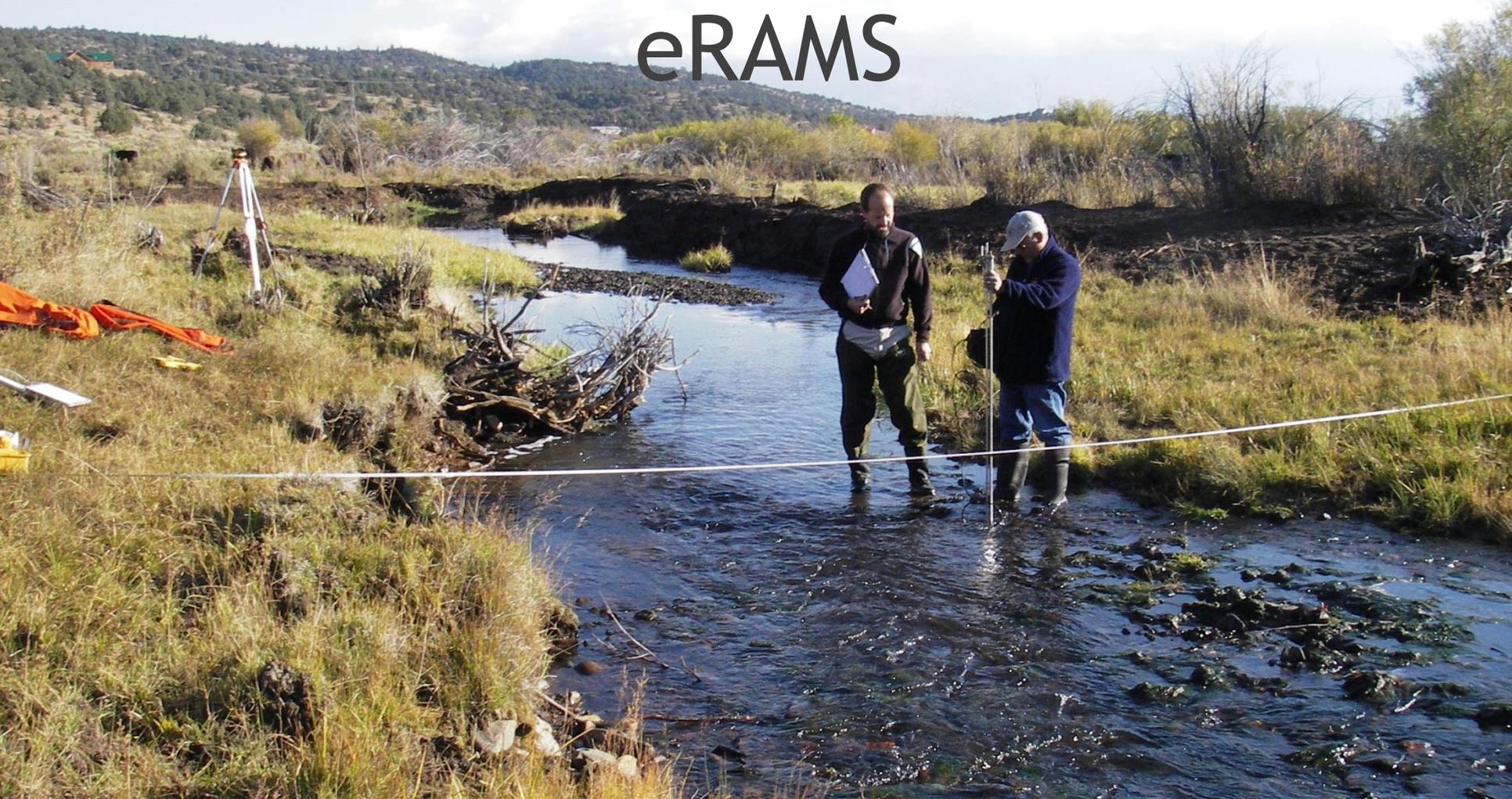


# R2CROSS UPDATE

## eRAMS



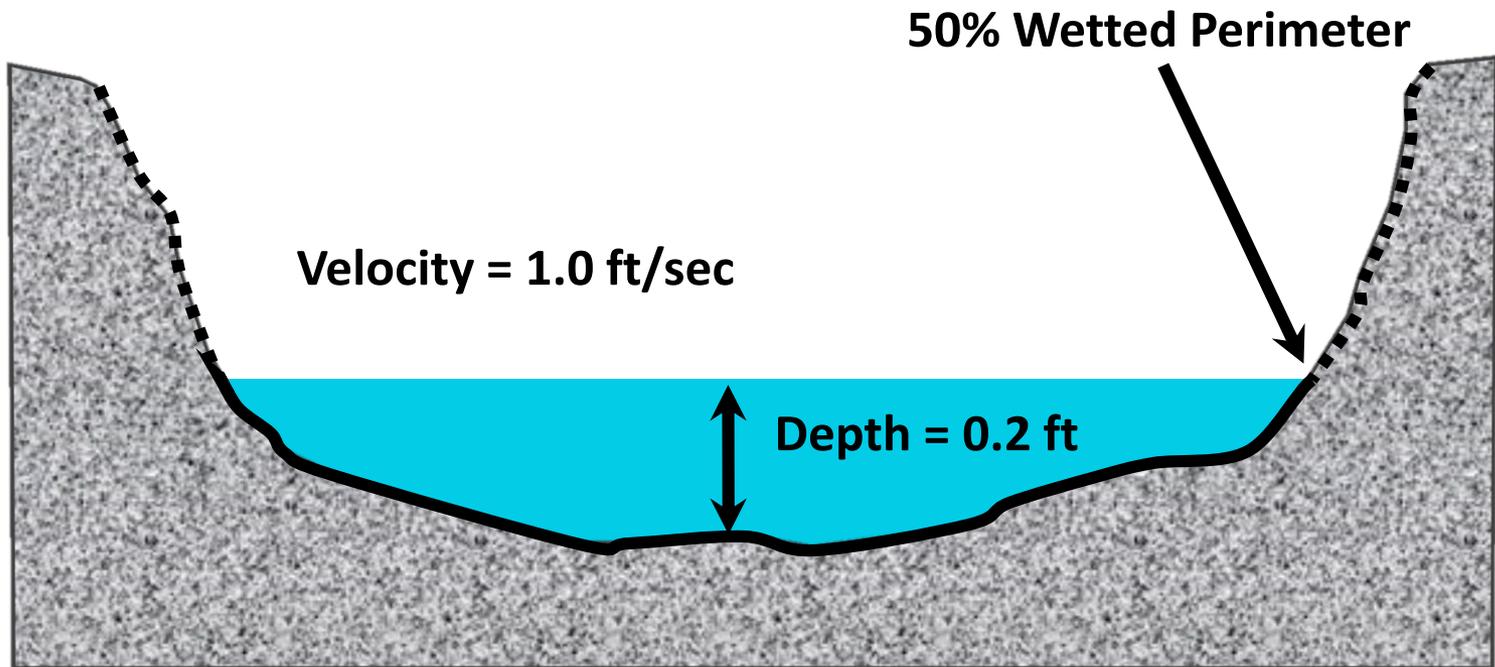
**COLORADO**  
Colorado Water  
Conservation Board

Department of Natural Resources



# R2CROSS

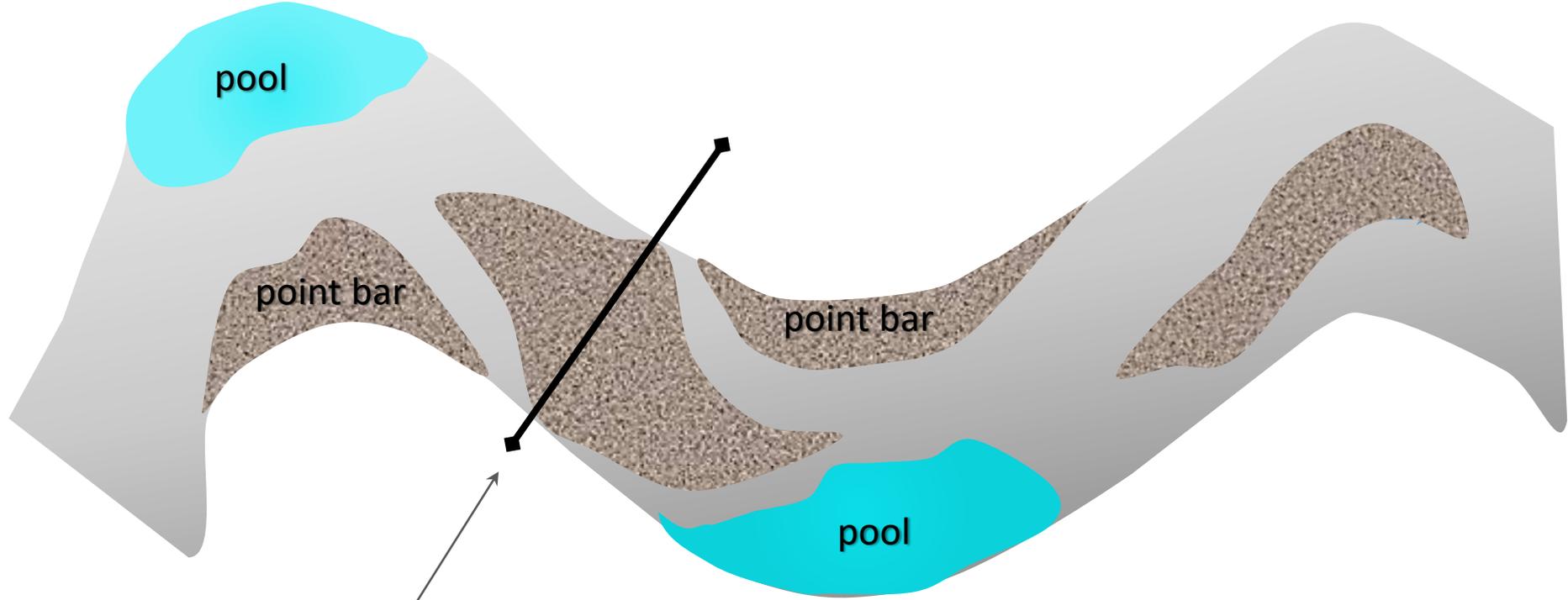
- Primary way flow needs are determined for most ISFs
- Recommended amounts are based on the flows necessary to meet habitat criteria:



*Requirements from Using R2CROSS Transect Method (Nehring 1979)*

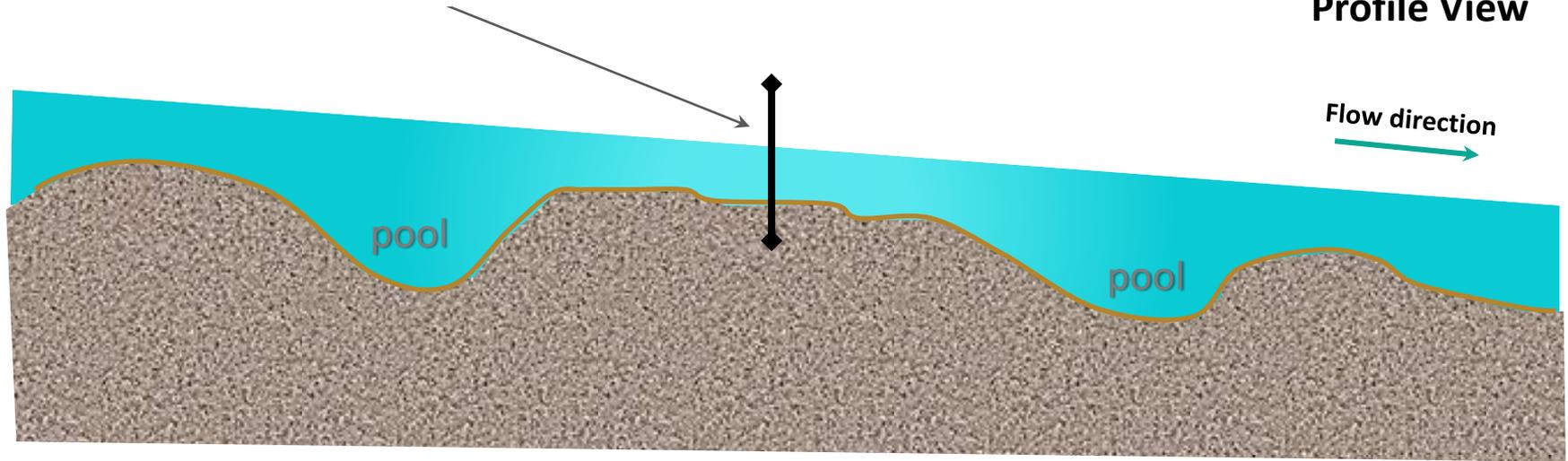
# R2CROSS - RIFFLES

Plan View



Riffle Cross Section

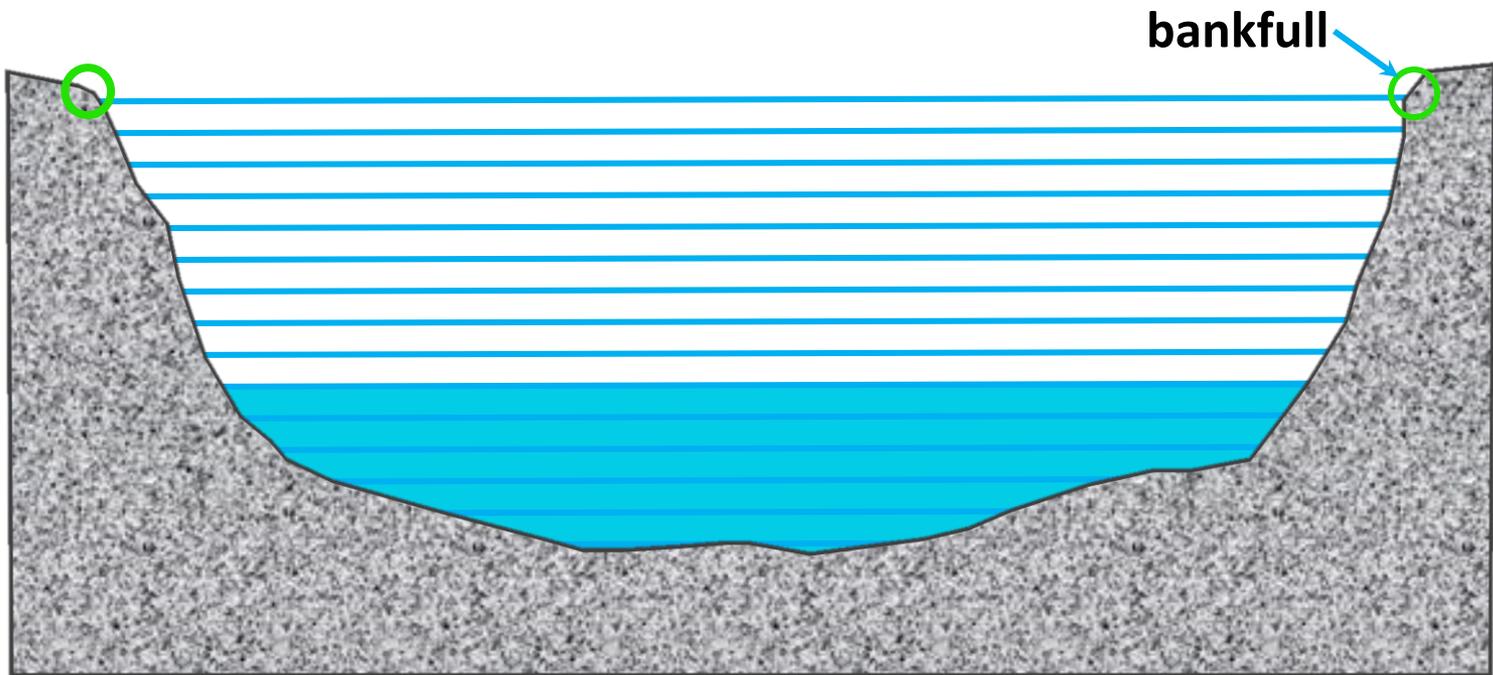
Profile View



# R2CROSS

## Field Data Collection

- Survey the cross-section shape including bankfull indicators
- Measure velocity (discharge) through the cross-section
- Measure the slope

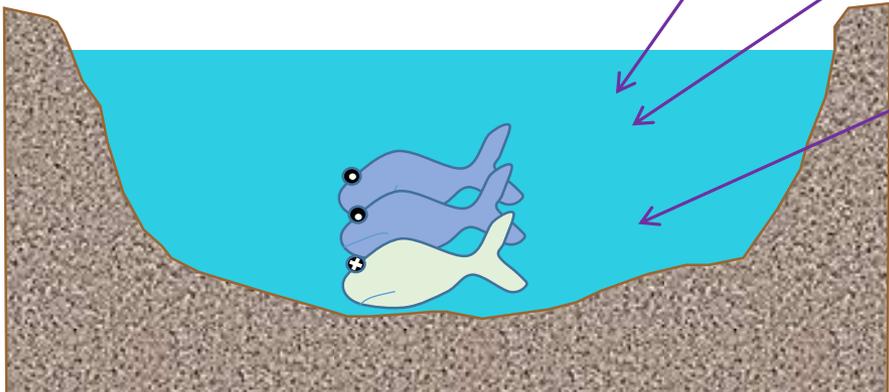


# R2CROSS

## Manning's Equation

$$Q = \frac{1.486 * A * R^{2/3} * S^{1/2}}{n}$$

- Q = discharge (cfs)
- A = cross-sectional area (ft )
- R = hydraulic radius (ft)
- S = slope (ft/ft)
- n = Manning's n, a coefficient of roughness



DIST TO WATER (FT)	TOP WIDTH (FT)	AVG. DEPTH (FT)	MAX DEPTH (FT)	AREA (SQ FT)	WETTED PERIM. (FT)	PERCENT WET PERM (%)	HYDR RADIUS (FT)	FLOW (CFS)	AVG. VELOCITY (FT/SEC)
1.55	37.12	1.21	1.7	44.95	37.97	100.00%	1.18	61.22	1.36
1.56	37.08	1.2	1.69	44.66	37.93	99.90%	1.18	60.6	1.36
1.61	36.88	1.16	1.64	42.81	37.69	99.30%	1.14	56.71	1.32
1.66	36.68	1.12	1.59	40.97	37.45	98.60%	1.09	52.94	1.29
1.71	36.48	1.07	1.54	39.14	37.2	98.00%	1.05	49.27	1.26
1.76	36.28	1.03	1.49	37.32	36.96	97.40%	1.01	45.71	1.22
1.81	36.09	0.98	1.44	35.51	36.72	96.70%	0.97	42.26	1.19
1.86	35.89	0.94	1.39	33.71	36.48	96.10%	0.92	38.93	1.15
1.91	35.69	0.89	1.34	31.92	36.24	95.40%	0.88	35.7	1.12
1.96	35.49	0.85	1.29	30.14	36	94.80%	0.84	32.59	1.08
2.01	35.14	0.81	1.24	28.38	35.61	93.80%	0.8	29.68	1.05
2.06	34.78	0.77	1.19	26.63	35.21	92.70%	0.76	26.9	1.01
2.11	34.42	0.72	1.14	24.9	34.81	91.70%	0.72	24.24	0.97
2.16	34.06	0.68	1.09	23.19	34.41	90.60%	0.67	21.69	0.94
2.21	33.64	0.64	1.04	21.49	33.98	89.50%	0.63	19.28	0.9
2.26	32.76	0.61	0.99	19.83	33.08	87.10%	0.6	17.16	0.87
2.31	31.93	0.57	0.94	18.22	32.23	84.90%	0.57	15.16	0.83
2.36	31.38	0.53	0.89	16.63	31.66	83.40%	0.53	13.18	0.79
2.41	30.83	0.49	0.84	15.08	31.09	81.90%	0.49	11.33	0.75
2.46	30.18	0.45	0.79	13.55	30.43	80.10%	0.45	9.62	0.71
2.51	27.55	0.44	0.74	12.08	27.79	73.20%	0.43	8.44	0.7
2.56	26.42	0.41	0.69	10.73	26.66	70.20%	0.4	7.12	0.66
2.61	25.29	0.37	0.64	9.44	25.52	67.20%	0.37	5.92	0.63
2.66	23.62	0.35	0.59	8.24	23.85	62.80%	0.35	4.94	0.6
2.71	22.86	0.31	0.54	7.07	23.08	60.80%	0.31	3.91	0.55
2.76	21.07	0.28	0.49	5.99	21.28	56.10%	0.28	3.13	0.52
2.81	20.27	0.24	0.44	4.96	20.47	53.90%	0.24	2.35	0.47
2.86	19.52	0.2	0.39	3.96	19.72	51.90%	0.2	1.66	0.42
2.91	18.73	0.16	0.34	3.01	18.92	49.80%	0.16	1.07	0.36
2.96	17.41	0.12	0.29	2.1	17.57	46.30%	0.12	0.62	0.3
3.01	13.93	0.09	0.24	1.28	14.07	37.00%	0.09	0.31	0.25
3.06	10.03	0.07	0.19	0.69	10.13	26.70%	0.07	0.14	0.2
3.11	6.81	0.04	0.14	0.27	6.87	18.10%	0.04	0.04	0.14
3.16	2.11	0.02	0.09	0.05	2.13	5.60%	0.02	0.01	0.1
3.21	0.38	0.02	0.04	0.01	0.39	1.00%	0.02	0	0.09

# UPDATE GOALS

## Improved

User interface

Graphs and tables display

Model access and sharing

Documentation

## New functions

Mapping functionality

Particle size distribution calculator

Discharge calculator

Results interpolation

Output reports and data



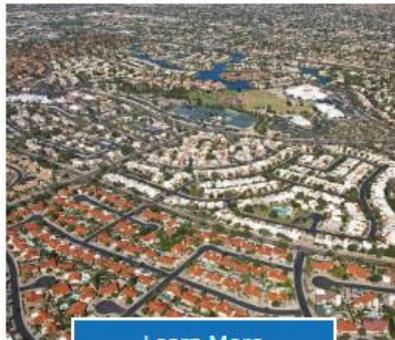
## Environmental Resource Assessment and Management System

### WATER QUALITY ASSESSMENT



[Learn More](#)

### URBAN PLANNING



[Learn More](#)

### NUTRIENT CONTROL



[Learn More](#)

### AGRICULTURAL RESOURCES



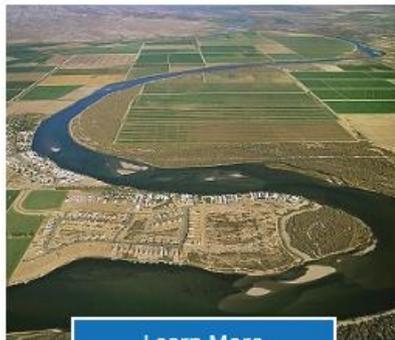
[Learn More](#)

### COLORADO COLLABORATIVE PORTFOLIO



[Learn More](#)

### RIVER BASIN PLANNING & MANAGEMENT



[Learn More](#)

# R2CROSS - eRAMS

R2CROSS v.0.2.7

 Overview

 Purpose

 Getting Started



## R2CROSS

### Purpose

Colorado's Instream Flow Program originated in 1973 with the passage of Senate Bill 97 (SB 97). Under SB 97, the Colorado Water Conservation Board (CWCB) was vested with the authority to appropriate instream flow water rights in the State of Colorado (§37-92-102(3), C.R.S. (2002)). Instream flow water rights are held by the CWCB on behalf of the people of the State of Colorado to "preserve the natural environment to a reasonable degree." Today, the CWCB holds over 1,500 instream flow water rights covering approximately 8,500 miles of Colorado streams.

Determining the quantity of water required to preserve the natural environment to a reasonable degree can be a difficult task. The CWCB, in cooperation with the Colorado Division of Wildlife (DOW), has developed standard field and office procedures to ensure that each instream flow appropriation is necessary and reasonable and that the amount of water recommended is available for appropriation.

This R2CROSS cross program uses hydraulic field data, consisting of stream channel geometry and measured discharge, to estimate hydraulic conditions necessary to make instream flow recommendations. Detailed guidance on how to use the tool can be found in the left sidebar (will be added later).

### Getting Started

The two main steps for using R2CROSS are briefly described below. To begin, click on the  in the left sidebar.

1. Enter Cross-Section Field Data: Begin by locating the geographic position of the field site by either enter latitude/longitude coordinates or clicking on the appropriate location on the map. When the location of the field site has been identified, click the next button 

Next, enter data of channel geometry and velocity using the data collection template found here: [LINK TO TEMPLATE](#). To upload the template, click the  icon. After the cross-section data has been uploaded, the data will be shown in table and graphical format in the main window.

2. Calculating hydraulic parameters for varying water depths using the surveyed channel geometry by clicking the  icon. Results will be available in the various tabs at the top of the screen.

# IMPORT DATA

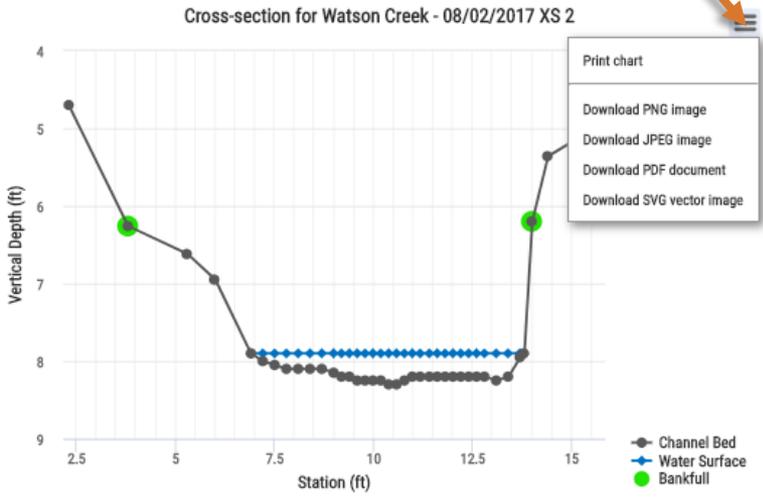
- Upload cross-section  
 watson 2.xlsx uploaded successfully.  
  
[Download the template here](#)  
 NEXT →
- Run the model
- Download Reports

Upload cross section

Stream Name: Watson Creek  
 Stream Location: At BLM-private boundary  
 Cross-section Number: 2  
 Slope: 0.01

Feature	Station (ft)	Vertical Depth (ft)	Water depth (ft)	Velocity (ft/s)
	2.3	4.7		
Bankfull	3.8	6.26		
	5.3	6.62		
	6	6.95		
Waterline	6.9	7.9	0	0
	7.2	8	0.1	0.04
	7.5	8.05	0.15	0.37
	7.8	8.1	0.2	0.56
	8.1	8.1	0.2	0.74
	8.4	8.1	0.2	0.89
	8.7	8.1	0.2	1.26
	9	8.15	0.25	1.44
	9.2	8.2	0.3	1.64
	9.4	8.2	0.3	1.76
	9.6	8.25	0.35	2.05
	9.8	8.25	0.35	2.18
	10	8.25	0.35	2.2
	10.2	8.25	0.35	1.89
	10.4	8.3	0.4	1.93
	10.6	8.3	0.4	2.12
	10.8	8.25	0.35	2.23
	11	8.2	0.3	2.29
	11.2	8.2	0.3	2.22
	11.4	8.2	0.3	2.17
	11.6	8.2	0.3	1.86
	11.8	8.2	0.3	1.53
	12	8.2	0.3	1.15
	12.2	8.2	0.3	0.66
	12.4	8.2	0.3	0.6
	12.6	8.2	0.3	0.7

User can download graphics



# IMPORT FILE

File Home Insert Page Layout Formulas Data Review View Laserfiche ACROBAT Tell me what you want to do...

Clipboard Font Alignment Number Styles

Normal Bad Good Neutral Calculation  
Check Cell Explanatory ... Input Linked Cell Note



**COLORADO**  
Colorado Water Conservation Board  
Department of Natural Resources

**R2CROSS CROSS-SECTION NOTES**

<b>Date</b>	8/2/2017
<b>Observer</b>	R. Smith, E. Scherff
<b>Cross-section#</b>	2

<b>Coordinate System</b>
<b>X (easting)</b>
<b>Y (northing)</b>

Downloadable template provides user with a standardized field form that can easily be used to record cross section data

Stream Name	Stream Location	Slope		
Watson Creek	At BLM-private boundary	0.01		
Feature	Distance From Initial Point (ft)	Vertical Distance (ft)	Water Depth (ft)	Velocity (ft/s)
	2.3	4.7		
Bankfull	3.8	6.26		
	5.3	6.62		
	6	6.95		
Waterline	6.9	7.9	0	0
	7.2	8	0.1	0.04
	7.5	8.05	0.15	0.37
	7.8	8.1	0.2	0.56
	8.1	8.1	0.2	0.74
	8.4	8.1	0.2	0.89
	8.7	8.1	0.2	1.26
	9	8.15	0.25	1.44

# RUN MODEL

R2CROSS v. 0.2.7

## R2CROSS

1 Upload cross-section

2 Run the model

Select a method

- Manning's n
- Jarret
- Thorne-Zevenbergen

← BACK ▶ NEXT →

3 Download Reports

### CROSS-SECTION

### STAGING TABLE

### R2CROSS SUMMARY

### SUPPLEMENTARY RESULTS

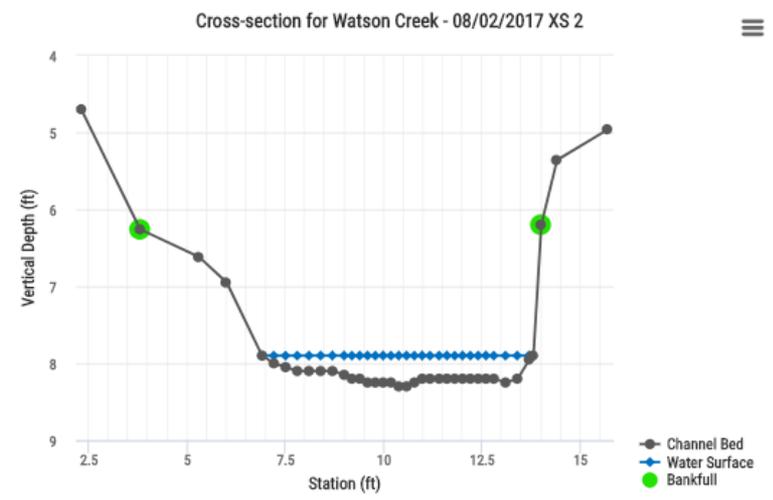
### HABITAT CRITERIA & RESULTS

Zoom to: [Icons]

Stream Name: Watson Creek  
 Stream Location: At BLM-private boundary  
 Cross-section Number: 2  
 Slope: 0.01

Feature	Station (ft)	Vertical Depth (ft)	Water depth (ft)	Velocity (ft/s)
	2.3	4.7		
Bankfull	3.8	6.26		
	5.3	6.62		
	6	6.95		
Waterline	6.9	7.9	0	0
	7.2	8	0.1	0.04
	7.5	8.05	0.15	0.37
	7.8	8.1	0.2	0.56
	8.1	8.1	0.2	0.74
	8.4	8.1	0.2	0.89
	8.7	8.1	0.2	1.26
	9	8.15	0.25	1.44
	9.2	8.2	0.3	1.64
	9.4	8.2	0.3	1.76
	9.6	8.25	0.35	2.05
	9.8	8.25	0.35	2.18
	10	8.25	0.35	2.2
	10.2	8.25	0.35	1.89
	10.4	8.3	0.4	1.93
	10.6	8.3	0.4	2.12
	10.8	8.25	0.35	2.23
	11	8.2	0.3	2.29
	11.2	8.2	0.3	2.22
	11.4	8.2	0.3	2.17
	11.6	8.2	0.3	1.86
	11.8	8.2	0.3	1.53
	12	8.2	0.3	1.15
	12.2	8.2	0.3	0.66
	12.4	8.2	0.3	0.6
	12.6	8.2	0.3	0.7

Once model is run, outputs are displayed at the top of the browser screen



# OUTPUT - STAGING TABLE

R2CROSS v. 0.2.7

R2CROSS

CROSS-SECTION

STAGING TABLE

R2CROSS SUMMARY

SUPPLEMENTARY RESULTS

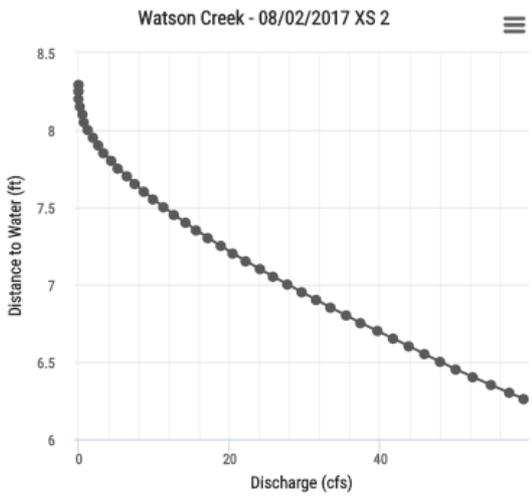
HABITAT CRITERIA & RESULTS

Zoom to: [Icons]

- Upload cross-section
- Run the model
- Download Reports
- Export the PDF Report EXPORT
- Export Data EXPORT
- [← BACK](#)

Stream Name: Watson Creek  
 Stream Location: At BLM-private boundary  
 Cross-section Number: 2  
 Manning's n: 0.043  
 Computation method: Manning's n

Change Y-axis  
 Distance to Water ▾



Calculated 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)	Discharge (cfs)	Mean Velocity (ft/s)
Bankfull	6.26	10.19	1.47	2.04	14.99	12.35	100.00%	1.21	59.07	3.94
	6.3	10.02	1.46	2.0	14.58	12.13	98.28%	1.2	57.09	3.91
	6.35	9.81	1.44	1.95	14.09	11.87	96.14%	1.19	54.69	3.88
	6.4	9.59	1.42	1.9	13.6	11.61	94.00%	1.17	52.37	3.85
	6.45	9.38	1.4	1.85	13.13	11.34	91.85%	1.16	50.12	3.82
	6.5	9.16	1.38	1.8	12.66	11.08	89.71%	1.14	47.96	3.79
	6.55	8.95	1.36	1.75	12.21	10.81	87.57%	1.13	45.87	3.76
	6.6	8.74	1.35	1.7	11.77	10.55	85.42%	1.12	43.85	3.73
	6.65	8.58	1.32	1.65	11.34	10.34	83.75%	1.1	41.74	3.68
	6.7	8.47	1.29	1.6	10.91	10.17	82.40%	1.07	39.59	3.63
	6.75	8.36	1.25	1.55	10.49	10.01	81.04%	1.05	37.49	3.57
	6.8	8.25	1.22	1.5	10.07	9.84	79.68%	1.02	35.45	3.52

# OUTPUT - STAGING TABLE

R2CROSS v. 0.2.7

R2CROSS

CROSS-SECTION

STAGING TABLE

R2CROSS SUMMARY

SUPPLEMENTARY RESULTS

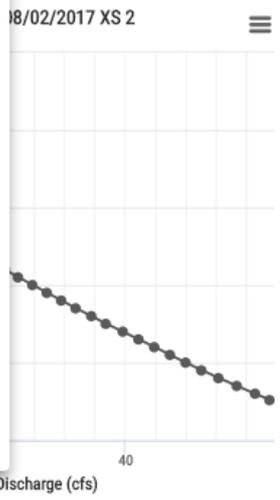
HABITAT CRITERIA & RESULTS

- Upload cross-section
- Run the model
- Download Reports
- Export the PDF Report EXPORT
- Export Data EXPORT
- [← BACK](#)

Stream Name: Watson Creek  
 Stream Location: At BLM-private boundary  
 Cross-section Number: 2  
 Manning's n: 0.043  
 Computation method: Manning's n

- Distance to Water
- Top Width
- Mean Depth
- Maximum Depth
- Area
- Wetted Perimeter
- Percent Wetted Perimeter
- Hydraulic Radius
- Mean Velocity

ability to graph several parameters against discharge (Q)



Calculated 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)	Discharge (cfs)	Mean Velocity (ft/s)
Bankfull	6.26	10.19	1.47	2.04	14.99	12.35	100.00%	1.21	59.07	3.94
	6.3	10.02	1.46	2.0	14.58	12.13	98.28%	1.2	57.09	3.91
	6.35	9.81	1.44	1.95	14.09	11.87	96.14%	1.19	54.69	3.88
	6.4	9.59	1.42	1.9	13.6	11.61	94.00%	1.17	52.37	3.85
	6.45	9.38	1.4	1.85	13.13	11.34	91.85%	1.16	50.12	3.82
	6.5	9.16	1.38	1.8	12.66	11.08	89.71%	1.14	47.96	3.79
	6.55	8.95	1.36	1.75	12.21	10.81	87.57%	1.13	45.87	3.76
	6.6	8.74	1.35	1.7	11.77	10.55	85.42%	1.12	43.85	3.73
	6.65	8.58	1.32	1.65	11.34	10.34	83.75%	1.1	41.74	3.68
	6.7	8.47	1.29	1.6	10.91	10.17	82.40%	1.07	39.59	3.63
	6.75	8.36	1.25	1.55	10.49	10.01	81.04%	1.05	37.49	3.57
	6.8	8.25	1.22	1.5	10.07	9.84	79.68%	1.02	35.45	3.52

# OUTPUT - R2CROSS SUMMARY

R2CROSS v. 0.2.7

R2CROSS

CROSS-SECTION

STAGING TABLE

R2CROSS SUMMARY

SUPPLEMENTARY RESULTS

HABITAT CRITERIA & RESULTS

Zoom to:

- ✓ Upload cross-section
  - ✓ Run the model
  - 3 Download Reports
    - Export the PDF Report
    - Export Data
- ← BACK

EXPORT

EXPORT

Stream Name: Watson Creek  
Stream Location: At BLM-private boundary  
Cross-section Number: 2  
Manning's n: 0.043  
Computation method: Manning's n

Provides summary of model results

## Summary Results

Measured Flow ( $Q_m$ ) = 2.57  
Calculated Flow ( $Q_c$ ) = 2.57  
 $(Q_m - Q_c) / Q_m * 100 = 0.04\%$

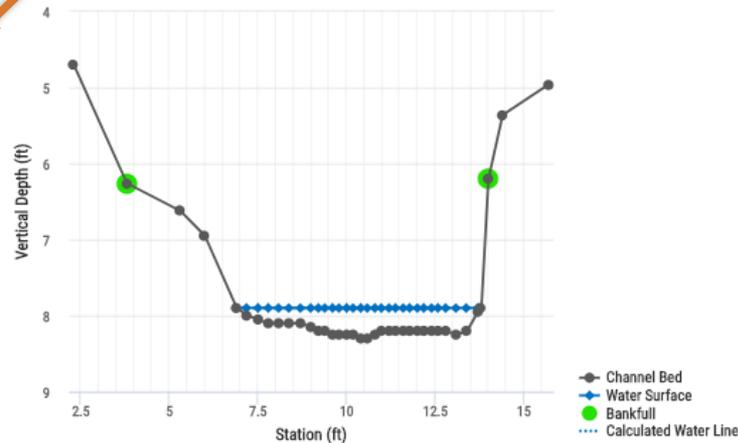
Measured Waterline ( $W_Lm$ ) = 7.9  
Calculated Waterline ( $W_Lc$ ) = 7.9  
 $(W_Lm - W_Lc) / W_Lm * 100 = -0.00\%$

Max Measured Depth ( $D_m$ ) = 0.4  
Max Calculated Depth ( $D_c$ ) = 0.4  
 $(D_m - D_c) / D_m * 100 = 0.02\%$

Mean Velocity = 1.41  
Manning's n = 0.043  
Slope = 0.01

$0.4 * Q_m = 1.03$   
 $2.5 * Q_m = 6.42$

Cross-section for Watson Creek - 08/02/2017 XS 2



# OUTPUT - SUMMARY RESULTS

- Upload cross-section
- Run the model
- Download Reports
- Export the PDF Report EXPORT
- Export Data EXPORT
- [← BACK](#)

Stream Name: Watson Creek  
 Stream Location: At BLM-private boundary  
 Cross-section Number: 2

Supplementary results are used to produce the calculated staging table

**Measured Data**

Feature	Station (ft)	Vertical Depth (ft)	Water depth (ft)	Velocity (ft/s)
	2.3	4.7		
Bankfull	3.8	6.26		
	5.3	6.62		
	6	6.95		
Waterline	6.9	7.9	0	0
	7.2	8	0.1	0.04
	7.5	8.05	0.15	0.37
	7.8	8.1	0.2	0.56
	8.1	8.1	0.2	0.74
	8.4	8.1	0.2	0.89
	8.7	8.1	0.2	1.26
	9	8.15	0.25	1.44
	9.2	8.2	0.3	1.64
	9.4	8.2	0.3	1.76
	9.6	8.25	0.35	2.05
	9.8	8.25	0.35	2.18
	10	8.25	0.35	2.2
	10.2	8.25	0.35	1.89
	10.4	8.3	0.4	1.93
	10.6	8.3	0.4	2.12
	10.8	8.25	0.35	2.23
	11	8.2	0.3	2.29
	11.2	8.2	0.3	2.22
	11.4	8.2	0.3	2.17
	11.6	8.2	0.3	1.86
	11.8	8.2	0.3	1.53
	12	8.2	0.3	1.15
	12.2	8.2	0.3	0.66
	12.4	8.2	0.3	0.6

**Value Computed from Measured Field Data**

Wetted Perimeter (ft)	Water Depth (ft)	Area (SQ ft)	Discharge (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
0.32	0.1	0.03	0	0.05
0.3	0.15	0.04	0.02	0.65
0.3	0.2	0.06	0.03	1.31
0.3	0.2	0.06	0.04	1.73
0.3	0.2	0.06	0.05	2.08
0.3	0.2	0.06	0.08	2.94
0.3	0.25	0.06	0.09	3.5
0.21	0.3	0.06	0.1	3.83
0.2	0.3	0.06	0.11	4.11
0.21	0.35	0.07	0.14	5.59
0.2	0.35	0.07	0.15	5.94
0.2	0.35	0.07	0.15	6
0.2	0.35	0.07	0.13	5.15
0.21	0.4	0.08	0.15	6.01
0.2	0.4	0.08	0.17	6.6
0.21	0.35	0.07	0.16	6.08
0.21	0.3	0.06	0.14	5.35
0.2	0.3	0.06	0.13	5.19
0.2	0.3	0.06	0.13	5.07
0.2	0.3	0.06	0.11	4.35
0.2	0.3	0.06	0.09	3.58
0.2	0.3	0.06	0.07	2.69
0.2	0.3	0.06	0.04	1.54
0.2	0.3	0.06	0.04	1.4

# OUTPUT - HABITAT CRITERIA & RESULTS

R2CROSS v. 0.2.7

**R2CROSS**

- Upload cross-section
- Run the model
- Download Reports
- Export the PDF Report **EXPORT**
- Export Data **EXPORT**
- [← BACK](#)

CROSS-SECTION    STAGING TABLE    R2CROSS SUMMARY    SUPPLEMENTARY RESULTS    **HABITAT CRITERIA & RESULTS**

## Habitat Criteria (Nehring 1979)

Stream Top Width (ft) <sub>1</sub>	Mean Depth (ft)	Percent Wetted Perimeter	Average Velocity (ft/s)
1-20	0.2	50	1.0
21-40	0.2-0.4	50	1.0
41-60	0.4-0.6	50-60	1.0
61-100	0.6-1.0	>70	1.0

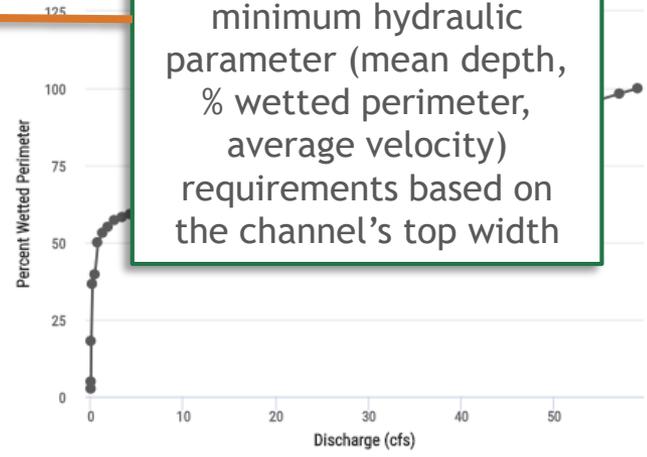
1 At bankfull discharge

## Habitat Criteria Results

Habitat Type	Habitat Criteria	Discharge (cfs) Meeting Criteria
Mean Depth (ft)	0.2	1.54
Mean Velocity (ft/s)	1.0	1.01
Percent Wetted Perimeter (%)	50.0	0.78

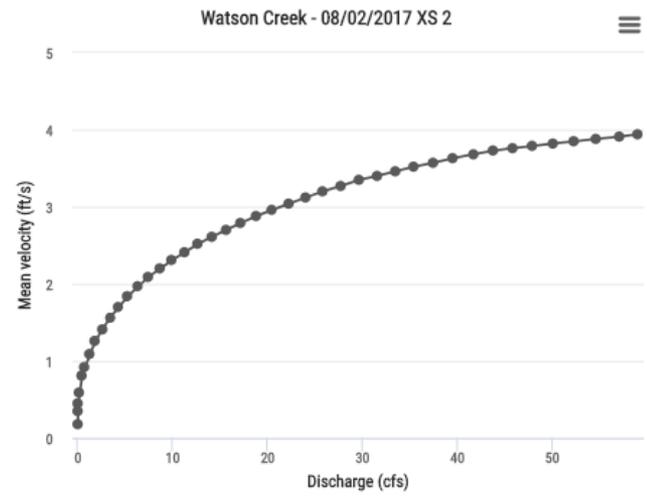
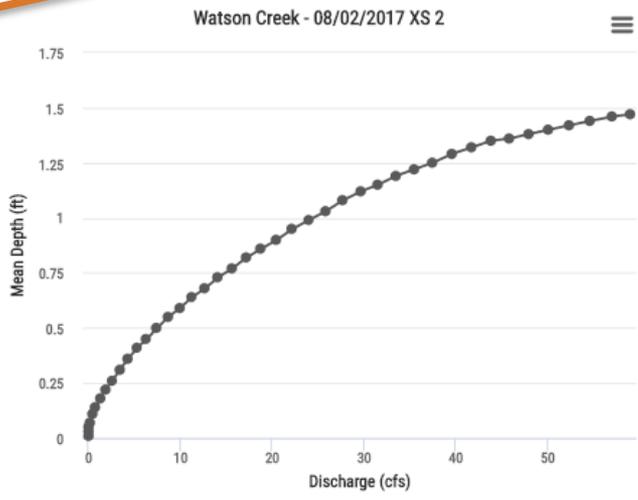
Cross-section top width (ft) = 10.19

Model determines the minimum hydraulic parameter (mean depth, % wetted perimeter, average velocity) requirements based on the channel's top width



Then, discharge values that meet requirements are calculated

These discharges are then used to make the winter flow recommendation (2 of 3) and the summer flow recommendation (3 of 3)



# OUTPUT - HABITAT CRITERIA & RESULTS

R2CROSS v. 0.2.7

R2CROSS

CROSS-SECTION    STAGING TABLE    R2CROSS SUMMARY    SUPPLEMENTARY RESULTS    **HABITAT CRITERIA & RESULTS**

- Upload cross-section
- Run the model
- Download Reports
- Export the PDF Report EXPORT
- Export Data EXPORT
- [← BACK](#)

Reports can then be downloaded to a PDF or excel file

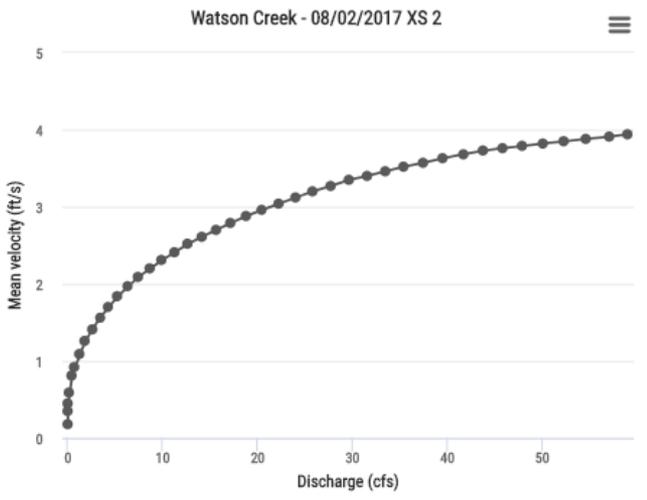
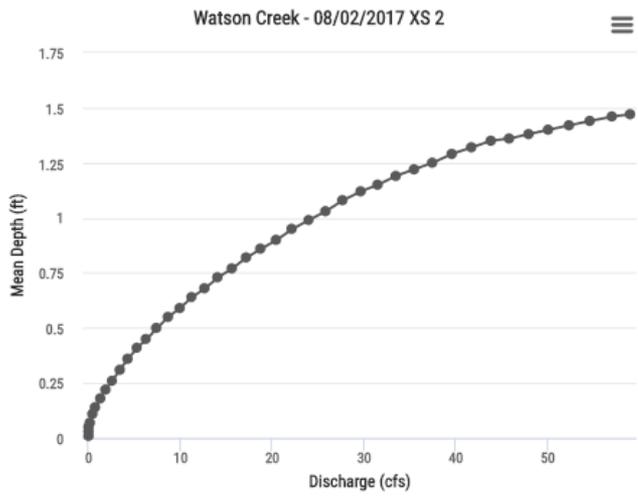
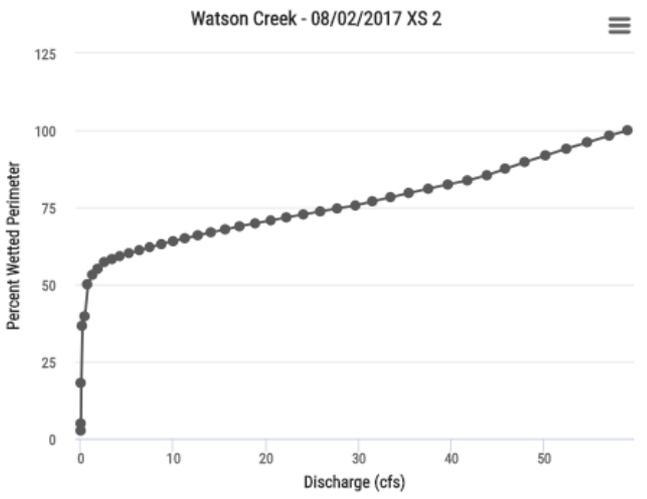
## Habitat Criteria (Nehring 1979)

Stream Top Width (ft) <sub>1</sub>	Mean Depth (ft)	Percent Wetted Perimeter	Average Velocity (ft/s)
1-20	0.2	50	1.0
21-40	0.2-0.4	50	1.0
41-60	0.4-0.6	50-60	1.0
61-100	0.6-1.0	>70	1.0

1 At bankfull discharge

## Habitat Criteria Results

Habitat Type	Habitat Criteria	Discharge (cfs) Meeting Criteria
Mean Depth (ft)	0.2	1.54
Average Velocity (ft/s)	1.0	1.01
Percent Wetted Perimeter	50.0	0.78
Stream Top Width (ft)	10.19	



# SHARE RESULTS

**R2CROSS v.0.2.7**

**EXPORT**

**EXPORT**

**← BACK**

Stream Top Width (ft) <sub>1</sub>	Mean	
1-20	0.2	50
21-40	0.2-0.4	50
41-60	0.4-0.6	50-60
61-100	0.6-1.0	>70

1 At bankfull discharge

Habitat Type	Habitat Criteria	Discharge (Cr
Mean Depth (ft)	0.2	1.54
Mean Velocity (ft/s)	1.0	1.01
Percent Wetted Perimeter (%)	50.0	0.78

width (ft) = 10.19

Watson Creek - 08/02/2017 XS 2

Mean Depth (ft)

1  
0.75  
0.5  
0.25

Copy Ctrl+C

A unique link is assigned to each model run. Model results can easily be shared by copying and pasting the link to someone else

Compose Mail - kara.scheel@state.co.us - State.co.us Executive Branc...

Watson Creek R2Cross Results

Logan - DNR, Brandy (brandy.logan@state.co.us)

Watson Creek R2Cross Results

Brandy,

Here are the R2Cross results for Watson Creek:

Thanks! Kara

--

**Kara Scheel**  
Stream and Lake Protection Section  
 **COLORADO**  
Colorado Water Conservation Board  
Department of Natural Resources

O 303-866-3441 x3202 | F 303-866-4474  
1313 Sherman St., Rm. 721,  
Denver, CO 80203  
[kara.scheel@state.co.us](mailto:kara.scheel@state.co.us) | <http://cwcb.state.co.us>

Sans Serif

Send

Saved

# MAPPING AND DISPLAY

R2CROSS V.0.2.9

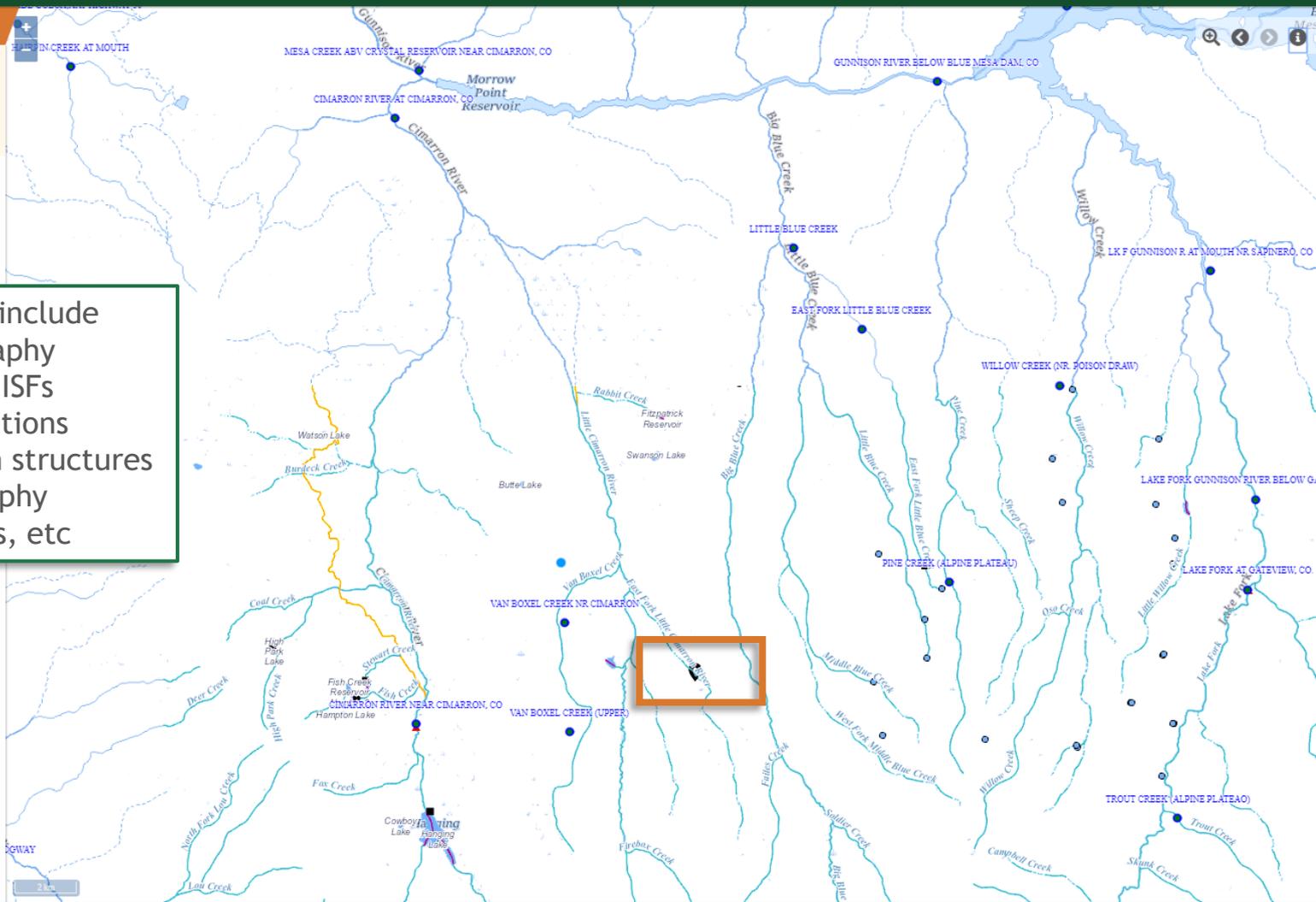
## Data Layers

NHD FLOWLINES

FLOW GAUGES

14020002

Layers will include  
hydrography  
existing ISFs  
gage locations  
water diversion structures  
topography  
air photos, etc



# PARTICLE SIZE CALCULATOR

R2CROSS v. 0.2.7

## Particle Size Calculator

Upload Pebble Count

N fk White Pebble 2.xlsx uploaded successfully.



Download the template [here](#)

## RESULTS

D16	D25	D50	D75	D84	D95	Geometric Mean <sup>Ⓢ</sup>	Geometric Standard Deviation <sup>Ⓢ</sup>	Gradation Coefficient <sup>Ⓢ</sup>
7.831	13.69	30.96	60.17	191.33	402.84	35.93	4.94	5.07

Description	Size (mm)	Count	Percentage	Cumulative Percentage
Sand and Silts	<2	2.0	1.94	0.0
Very Fine Gravel	2 - 4	3.0	2.91	1.94
Fine Gravel	4 - 6	5.0	4.85	4.85
Fine Gravel	6 - 8	7.0	6.8	9.71
Medium Gravel	8 - 11	7.0	6.8	16.5
Medium Gravel	11 - 16	3.0	2.91	23.3
Coarse Gravel	16 - 22	9.0	8.74	26.21
Coarse Gravel	22 - 32	17.0	16.5	34.95
Very Course Gravel	32 - 45	16.0	15.53	51.46
Very Course Gravel	45 - 64	10.0	9.71	66.99
Small Cobble	64 - 90	6.0	5.83	76.7
Small Cobble	90 - 128	1.0	0.97	82.52
Large Cobble	128 - 180	0.0	0.0	83.5
Large Cobble	180 - 256	3.0	2.91	83.5
Small Boulder	256 - 362	7.0	6.8	86.41
Small Boulder	362 - 512	6.0	5.83	93.2
Medium Boulder	512 - 1024	1.0	0.97	99.03
Large Boulder	1024 - 2048	0.0	0.0	100.0
Very Large Boulder	2048 - 4096	0.0	0.0	100.0
Bedrock	>4096	0.0	0.0	100.0

The particle size calculator can also be accessed by the user as a stand alone tool

# DISCHARGE CALCULATOR

Upload cross-section  
 Discharge  
 Do you want to use discharge (63.806 cfs) in R2CROSS?

Stream Name:  
 Disappointment Creek  
 Stream Location: Linden  
 Cross-section Number: 1  
 Q: 63.806 cfs

Measured Data

Feature	Station (ft)	Water depth (ft)	Velocity (ft/s)
	1.9	0	
	2.5	0.3	0
	3	0.8	0.94
	4	0.8	2.08
	5	0.7	2.33
	6	0.7	2.86
	7	0.7	3.27
	8	0.9	3.71
	9	0.8	3.67
	10	0.9	3.55
	11	0.9	3.41
	12	1.1	3.26
	13	1	3.27
	14	1.2	3.5
	15	1	3.48
	16	1.1	3.06
	17	1.1	3.66
	18	1.1	3.06
	19	1.1	2.99
	20	1.2	2.8
	21	1.3	2.85
	22	1.4	2.78
	23	1.4	2.06
	24	1	0.66
	25.1	0	

Value Computed from Measured Field Data

Water Depth (ft)	Area (SQ ft)	Discharge (cfs)	Percent Discharge
0	0	0	0
0.3	0.17	0	0
0.8	0.6	0.56	0.88
0.8	0.8	1.66	2.61
0.7	0.7	1.63	2.56
0.7	0.7	2	3.14
0.7	0.7	2.29	3.59
0.9	0.9	3.34	5.23
0.8	0.8	2.94	4.6
0.9	0.9	3.19	5.01
0.9	0.9	3.07	4.81
1.1	1.1	3.59	5.62
1	1	3.27	5.12
1.2	1.2	4.2	6.58
1	1	3.48	5.45
1.1	1.1	3.37	5.28
1.1	1.1	4.03	6.31
1.1	1.1	3.37	5.28
1.1	1.1	3.29	5.16
1.2	1.2	3.36	5.27
1.3	1.3	3.71	5.81
1.4	1.4	3.89	6.1
1.4	1.4	2.88	4.52
1	1.05	0.69	1.09
0	0	0	0
<b>Total Water Depth</b>	<b>Maximum Area</b>	<b>Total Discharge</b>	<b>Total Percent Discharge</b>
1.4	22.21	63.806	100

Discharge calculator allows user to calculate discharge based on measurements taken in the field

# QUESTIONS?

Brandy Logan

[Brandy.logan@state.co.us](mailto:Brandy.logan@state.co.us)

303.841.3441 ext 3241



**COLORADO**

Colorado Water  
Conservation Board

Department of Natural Resources