COLORADO
Parks and Wildlife
Department of Natural Resources

Water Resources Section
6060 Broadway
Denver, CO 80216

January 16, 2019

Ms. Linda Bassi, Chief
Stream and Lake Protection Section
Colorado Water Conservation Board
1313 Sherman Street, Suite 721
Denver CO 80203

Subject: Instream Flow Recommendations for Streams in Water Division 6, Rio Blanco and Garfield Counties; North Fork White River, Marvine Creek, and West Marvine Creek, to be Presented at the January 28-29, 2019 CWCB Meeting

Dear Ms. Bassi:

The information contained in and referred to in this letter forms the scientific and biological basis for instream flow (ISF) recommendations for Marvine Creek, West Marvine Creek, and three reaches of the North Fork of the White River in Water Division 6. These flow recommendations will be presented for consideration by the Colorado Water Conservation Board (CWCB or Board) at their January 2019 regular meeting. The field investigations relating to these ISF recommendations were conducted by Colorado Parks and Wildlife (CPW) personnel in 2018. These stream reaches were first presented to interested parties at the ISF Workshop in January 2017. It is the CPW staff's opinion that the information contained in this letter is sufficient for the CWCB's staff to recommend ISF appropriations to the Board on the above referenced water bodies and to specifically address the findings required in Rule 5(i) of the Instream Flow Program Rules.

The State of Colorado's Instream Flow (ISF) Program was created in 1973 when the Colorado General Assembly passed Senate Bill 97 which called for the recognition of "the need to correlate the activities of mankind with some reasonable preservation of the natural environment" (see 37-92-102 (3) C.R.S.). This statute vests the Board with the exclusive authority to appropriate and acquire instream flow and natural lake level water rights. In order to encourage other entities to participate in Colorado's ISF Program, the statute directs the Board to request instream flow recommendations from other state and federal agencies. CPW is recommending these segments of the North Fork of the White River, Marvine Creek, and West Marvine Creek to the Board for inclusion into the ISF Program. We believe that these segments should be

considered for inclusion into the ISF Program because they each have a natural environment that can be preserved to a reasonable degree with an instream flow water right.

CPW participates in the ISF Program and develops instream flow recommendations for the Board's consideration in an effort to address CPW's legislative declarations "... that the wildlife and their environment are to be protected, preserved, enhanced, and managed for the use, benefit, and enjoyment of the people of this state and its visitors ... and that, to carry out such program and policy, there shall be a continuous operation of planning, acquisition, and development of wildlife habitats and facilities for wildlife-related opportunities" (See §33-1-101 (1) C.R.S.), and "... that the natural, scenic, scientific, and outdoor recreation areas ... protected, preserved, enhanced and managed for the use, benefit, and enjoyment of the people of this state and (its) visitors ... and that, to carry out such program and policy, there shall be a continuous operation of acquisition, development, and management of ... lands, waters, and facilities." (See §33-10-101 (1) C.R.S.).

In addition to these broad statutory guidelines, CPW's current strategic planning document (CPW Strategic Plan, 2015) explains current agency goals to, "[c]onserve wildlife and habitat to ensure healthy sustainable populations and ecosystems." In order to, "protect and enhance water resources for fish and wildlife populations," by pursuing, "partnerships and agreements to enhance instream flows, protect reservoir levels, and influence water management activities," and to, "[a]dvocate for water quality and quantities to conserve aquatic resources." In addition to the CPW strategic plan, the agency's fish and wildlife conservation activities are also directed by the State Wildlife Action Plan (2002, Revised 2015). The goals and priorities from these documents direct CPW to advocate for the preservation of the state's fish and wildlife resources and natural environment, and therefore link CPW's mission to the goals and priorities of CWCB's ISF/NLL Program.

Recommended Segments

As shown in Figure 1, CPW is proposing ISF recommendations for three reaches of North Fork White River – from the outlet of Trapper's Lake to confluence with Skinny Fish Creek, from the confluence with Skinny Fish Creek to the confluence with Big Fish Creek, and from the confluence with Big Fish Creek to the confluence with Ripple Creek. The North Fork White River below Ripple Creek has an existing decreed ISF water right of 70 cfs year-round (W-3704, 1978).

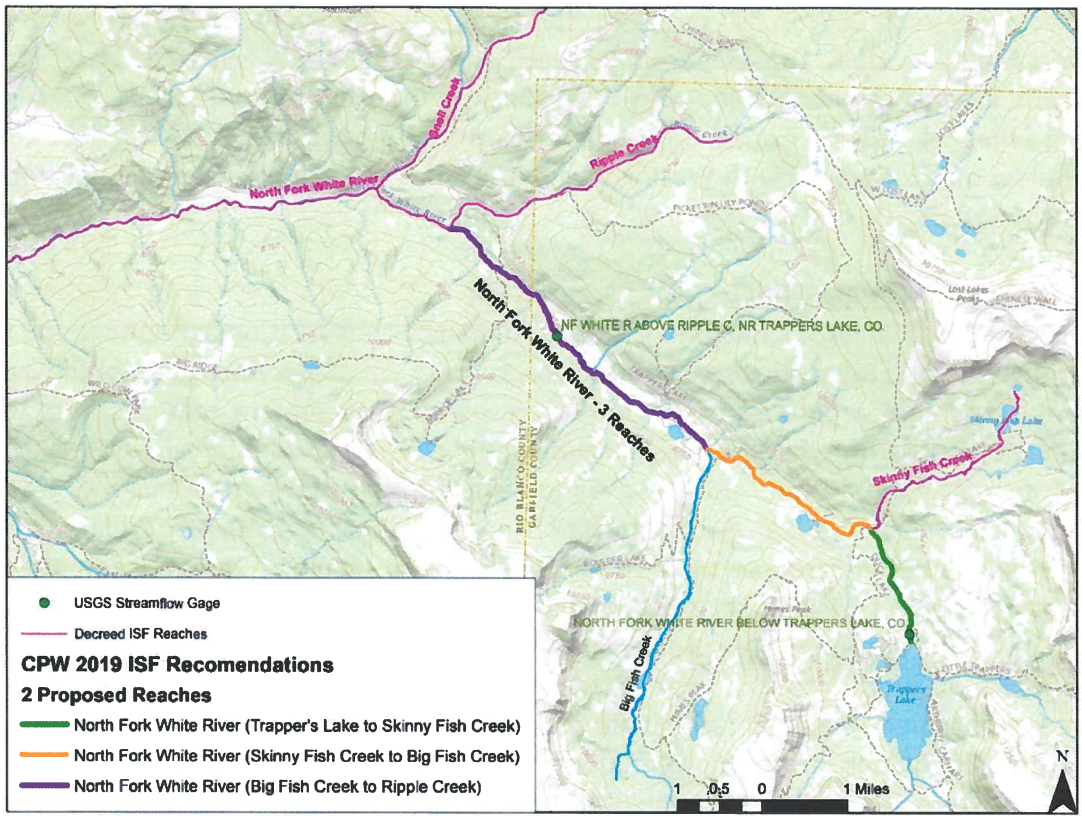


Figure 1. Vicinity map for CPW 2019 ISF Recommendations on North Fork of the White River

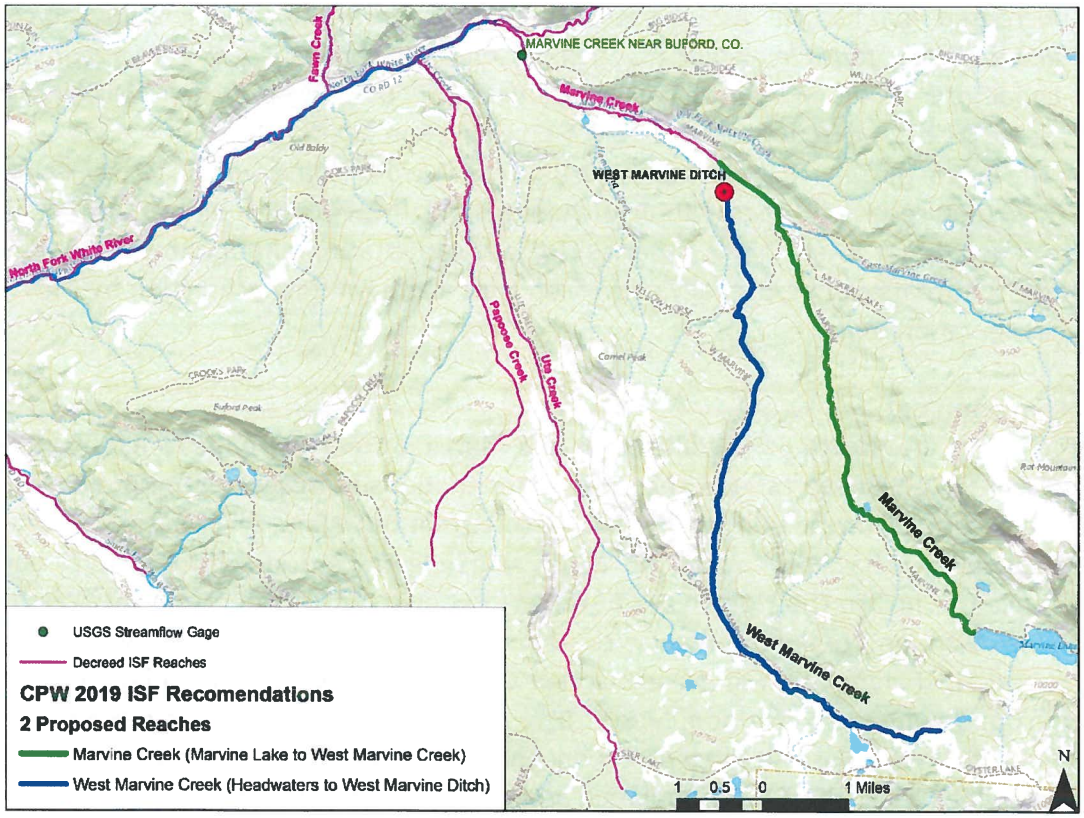


Figure 2. Vicinity map for CPW 2019 ISF Recommendation on in the Marvine Creek Basin

As shown in Figure 2, CPW is also proposing ISF recommendations on reaches of Marvine Creek and West Marvine Creek. The proposed ISF reach on Marvine Creek will extend from the outlet of Marvine Lake to the confluence with West Marvine Creek. The proposed ISF reach on West Marvine Creek will extend from the headwaters to the West Marvine Ditch headgate. Marvine Creek below the confluence with West Marvine Creek has an existing decreed ISF water right of 40 cfs (W-3652,1977).

Colorado Cutthroat Conservation Goals

In 2001, CPW entered into a multi-state and multi-agency conservation agreement and strategy concerning Colorado River cutthroat trout (*Oncorhynchus clarki pleuriticus*). Colorado's partners in this plan and agreement include the natural resource management agencies from Utah and Wyoming, a number of federal agencies including the USFS, USFWS, BLM and NPS, and the Ute Indian Tribe of the Uintah and Ouray Reservation. This conservation agreement and strategy was developed in order to encourage cooperation and collaboration on conservation measures among various natural resource management agencies to minimize threats to Colorado River cutthroat trout (CRCT) that might result in actions under the Endangered Species Act of 1973. Essentially, the parties to the overall plan agreed that in order to prevent listing of the subspecies, and to reach desired recovery goals without hindering further development of our state resources, continued implementation of the conservation strategy was necessary. The stated goal of the conservation strategy is as follows:

> *"To assure the long-term viability of CRCT throughout their historic range, areas that currently support CRCT will be maintained, while other areas will be managed for increased abundance. New populations will be established where ecologically and economically feasible, while the genetic diversity of the species is maintained. The cooperators envision a future where threats to wild CRCT are either eliminated or reduced to the greatest extent possible."* (CRCT Conservation Team 2006)

One of the main threats to Colorado River cutthroat trout conservation is the depletion of streamflow that results in degradation of habitat and the overall health of the subspecies. Another major threat to cutthroat fisheries is the fragmentation of habitat. CPW believes that both of these threats can be partially addressed with instream flow protection by the Colorado Water Conservation Board.

Natural Environment

As stated above, the North Fork White River and Marvine Creek were identified by CPW at the January 2017 CWCB ISF workshop. These recommendations represent a continuation of efforts by CPW to secure ISF protection for important streams in the White River basin. CPW's interest in these segments is based on historic CPW fish sampling and stocking efforts which confirmed the presence of CRCT in the North Fork of the White River, Marvine Creek, and West Marvine Creek. West Marvine Creek in particular contains a population of CRCT that was very recently stocked. The CRCT population in West Marvine Creek is an important population, as they are isolated from downstream fish populations by a physical barrier, the dry stream channel that exists below the West Marvine Ditch diversion, and are limited to the habitat conditions existing in West Marvine Creek. This CRCT population and others in the North Fork White River basin may become more critical to CRCT conservation efforts in the future.

While CRCT is the main species of concern in this basin, other native species, namely mountain whitefish, would benefit from the conservation efforts for the CRCT. In addition to the native species present in the North Fork White River and Marvine Creek, these reaches support a diverse sport fishery of brook and rainbow trout.

A key component to habitat protection is flow protection. Flow reduction can impact habitat availability and quality, can cause water quality and temperature issues, and can reduce overall population and habitat connectivity. The hydrology of the North Fork White River will likely continue to provide a high annual peak flow for spring spawning species (since minimal water uses presently occur in the basins above the potential ISF segments), but protection of baseflows is an important component of ISF protection. Overwintering adult habitat for CRCT is often a limiting factor for these fish populations. These reaches of the North Fork White River, Marvine Creek, and West Marvine Creek provide good habitat for various life stages of fish. In summary, there is a flow-dependent natural environment that can be preserved to a reasonable degree with instream flow water rights on the proposed reaches.

Flows Necessary to Preserve the Natural Environment

In 2016 and 2017, CPW initiated ISF investigation in the White River basin in an effort to fill in protection gaps and address range-wide needs of CRCT in the White River basin. In 2018, CPW and CWCB staff collected stream cross-section data at sites within the identified reaches of the North Fork White River, Marvine Creek, and West Marvine Creek. Initial biological instream flow recommendations were developed utilizing the standard application of the R2CROSS methodology (Espegren 1996). R2CROSS uses field data that has been collected in a riffle stream habitat types; riffles are the limiting habitat type in streams during low flow events. The field data includes a survey of stream channel geometry, a longitudinal slope of the water surface, and a streamflow measurement at the designated cross-section. After processing this data with R2CROSS, winter and summer flow recommendations were developed utilizing the typical R2CROSS criteria described in Nehring (1979) and Espergren (1996); the R2CROSS hydraulic criteria of interest are average depth, average velocity, and wetted perimeter. Maintaining these hydraulic parameters at adequate levels across riffle habitat types will also maintain aquatic habitat in pools and runs for most life stages of fish and aquatic invertebrates (Nehring 1979).

When flows meeting two and three of the hydraulic criteria fall out of the range for accuracy of applying Manning's equation (40 to 250 percent), the Thorne and Zevenbergen (T&Z) subroutine in R2CROSS is relied upon. The Thorne and Zevenbergen method uses several hydraulic equations depending on relative roughness to calculate velocity within the R2CROSS staging table. This subroutine relies on user-supplied D84 particle size from pebble count data collected at each cross-section location.

Two cross-section data sets were collected on each reach identified above. The field data sheets and resulting R2CROSS outputs are attached. The results of the R2CROSS analysis for each of the five reaches are summarized on the attached Fact Sheets.

R2CROSS biological recommendations are further refined with a preliminary water availability analysis. Average daily gage data from the gages in the North Fork White River and Marvine Creek basins confirm that water appears to be available for an ISF appropriation, and water that is available can be used to preserve the natural environment to a reasonable degree on all five reaches. Final detailed water availability analyses will be performed by CWCB staff and presented in the Executive Summaries provided to the Board prior to the January 2019 meeting.

The R2CROSS-generated and water availability-refined flow recommendations for the reaches discussed above are:

- West Marvine Creek:
  - 4.6 cfs (4/1 to 10/31)
  - 2.9 cfs (11/1 to 3/31)
- Marvine Creek:
  - 13.1 cfs (4/1 to 10/31)
  - 5.9 cfs (11/1 to 3/31)
- North Fork White River (outlet of Trapper's Lake to Skinny Fish Creek):
  - 3.5 cfs (4/1 to 10/31)
  - 2.0 cfs (11/1 to 3/31)
- North Fork White River (Skinny Fish Creek to Big Fish Creek)
  - 34 cfs (5/1 to 10/31)
  - 7.8 cfs (11/1 to 4/30)
- North Fork White River (Big Fish Creek to Ripple Creek):
  - 74 cfs (5/1 to 9/15)
  - 60 cfs (9/16 to 11/15)
  - 23 cfs (11/16 to 4/30)

As stated above, the purpose of this letter is to formally transmit these ISF recommendations from CPW to CWCB for the Board's consideration for the 2019 appropriation year. Please refer to the attached Fact Sheets and supporting documentation for additional information. If CWCB staff has any further questions or needs clarification regarding these flow recommendations, please contact us.

CPW personnel will be present at the January 2019 CWCB meeting to answer any questions that the Board might have regarding these flow recommendations. We appreciate your consideration.

Sincerely,

Katie Birch
CPW Instream Flow Program Coordinator

Attachments (as stated)

FACT SHEET

The North Fork of the White River

Three Reaches within Water Division 6, Rio Blanco and Garfield Counties

The North Fork of the White River from the outlet of Trapper's Lake to the confluence with Skinny Fish Creek

Upper Terminus: The outlet of Trapper's Lake located at 13S 309550.88 4429787.37 UTM.

Lower Terminus: The confluence with Skinny Fish Creek located at 13T 308777.90 4431907.38 UTM.

Approximate Length: 1.7 miles

ISF Recommendation: 3.5 (4/1 to 10/31)
2.0 (11/1 to 3/31)

The North Fork of the White River from the confluence with Skinny Fish Creek to the confluence with Big Fish Creek

Upper Terminus: The confluence with Skinny Fish Creek located at 13T 308777.90 4431907.38 UTM.

Lower Terminus: The confluence with Big Fish Creek located at 13T 305702.92 4433402.35 UTM.

Approximate Length: 2.5 miles

ISF Recommendation: 34 cfs (5/1 to 10/31)
7.8 cfs (11/1 to 4/30)

The North Fork of the White River from the confluence with Big Fish Creek to the confluence with Ripple Creek

Upper Terminus: The confluence with Big Fish Creek located at 3T 305702.92 4433402.35 UTM.

Lower Terminus: The confluence with Ripple Creek located at 13T 300814.97 4437555.31 UTM.

Approximate Length: 4.2 miles

ISF Recommendation: 74 cfs (5/1 to 9/15)
60 cfs (9/16 to 11/15)
23 cfs (11/16 to 4/30)

Natural Environment:

The North Fork White River Basin is located in CPW's Northwest Region, Water Division 6, east of Meeker, CO. The headwaters of the North Fork White River are in the Flat Tops Wilderness at an elevation of around 12,000 feet, and the creek's confluence with the South Fork White River is found at an elevation of 7,000 feet approximately 28 miles downstream. Hydrology of the river is primarily snowmelt driven; the average annual precipitation in the basin is approximately 41 inches. The mean basin elevation of this portion of the North Fork White River is approximately 10,300 feet. The total basin area contributing to the recommended segments is 67 square miles. Overall, the North Fork of the White River flows across a mixture of public and private lands; approximately 60% of the reach between Trapper's Lake and Ripple Creek is on public lands managed by the US Forest Service (USFS). The topography of the basin varies from gradual slopes to very steep slopes and high ridges. The physical environment of the basin is predominantly aspen with interspersed stands of lodgepole pine and mixed spruce/fir. Overall, the aquatic environment of the White River's North Fork is quite diverse.

The recommended reaches of the North Fork White River are third order stream segments. The stream channel is primarily a single thread channel flowing through a variety of valley types with some braiding in the upper reaches just below Trapper's Lake. Stream cover includes both forested cover and open lands (meadows and pasture lands). Connection to the floodplain most likely only occurs during spring runoff, which provides lateral connectivity to the terrestrial environment and input of terrestrial organic matter into the stream. Peak runoff likely removes the majority of the smaller sediment, such as sand and silt, from stream substrates. There is a prominent riparian community throughout the reach of willows, alders, and cottonwoods. The riparian zone contributes nutrients and terrestrial insects to the aquatic environment, providing food for aquatic species of invertebrates and fish. Throughout the proposed reaches of the North Fork White River, there is an abundance of pool, riffle, and glide habitats.

Historic CPW fishery surveys indicate presence of Colorado River cutthroat trout (CRCT), mountain whitefish, mottled sculpin, brook trout, and rainbow trout. CRCT is prioritized as a Tier 1 species in the 2015 State Wildlife Action Plan, meaning the species has the highest conservation priority in the state. CRCT is classified as a state "species of special concern" and is considered "sensitive" by the Bureau of Land Management (BLM) and USFS.

R2CROSS Results:

In 2018, CPW and CWCB personnel collected R2CROSS data at 6 sites within the proposed ISF segments – two above Skinny Fish Creek, two above Big Fish Creek, and two above Ripple Creek. Due to the size of the contributing basin of Skinny Fish Creek and Big Fish Creek and differences across R2CROSS results above and below these confluences, reaches were segmented at these two tributaries. The results of R2CROSS modeling are summarized in the following tables:

North Fork White River above Little Fish Creek							
	Entity	**Date Measured**	**Q measured**	**40%-250%**	**Hydraulic Equation**	**Flow Meeting Two Criteria**	**Flow Meeting Three Criteria**
1	CPW	7/10/2018	5.6 cfs	2.3 – 14.1 cfs	T&Z[1]	2.5 cfs	4.2 cfs
2	CPW	7/10/2018	5.6 cfs	2.3 – 14.1 cfs	T&Z[1]	1.5 cfs	2.8 cfs
				Mean		**2.0 cfs**	**3.5 cfs**

1= Flow recommendation falls outside the range of accuracy for R2CROSS's use of the Manning's equation (40%-250%); Thorne and Zevenbergen (T&Z) equations and a user-supplied D84 were then utilized.

North Fork White River above Big Fish Creek							
	Entity	**Date Measured**	**Q measured**	**40%-250%**	**Hydraulic Equation**	**Flow Meeting Two Criteria**	**Flow Meeting Three Criteria**
1	CPW	7/11/2018	42.8 cfs	17-107 cfs	T&Z[1]	2.5 cfs	24.5 cfs
2	CPW	7/11/2018	42.8 cfs	17-107 cfs	T&Z[1]	13.1 cfs	43.5 cfs
				Mean		**7.8 cfs**	**34 cfs**

1= Flow recommendation falls outside the range of accuracy for R2CROSS's use of the Manning's equation (40%-250%); Thorne and Zevenbergen (T&Z) equations and a user-supplied D84 were then utilized.

North Fork White River above Ripple Creek							
	Entity	**Date Measured**	**Q measured**	**40%-250%**	**Hydraulic Equation**	**Flow Meeting Two Criteria**	**Flow Meeting Three Criteria**
1	CPW	9/12/2018	67.7 cfs	27-169 cfs	T&Z[1]	16.9 cfs	77.8 cfs
2	CPW	9/12/2018	55.6 cfs	22-139 cfs	Mannings[2]	28.8 cfs	71.1 cfs
				Mean		**23 cfs**	**74 cfs**

1= Flow recommendation falls outside the range of accuracy for R2CROSS's use of the Manning's equation (40%-250%); Thorne and Zevenbergen (T&Z) equations and a user-supplied D84 were then utilized.
2= Flow recommendations are within the range of accuracy for R2CROSS's use of the Manning's equation (40%-250%).

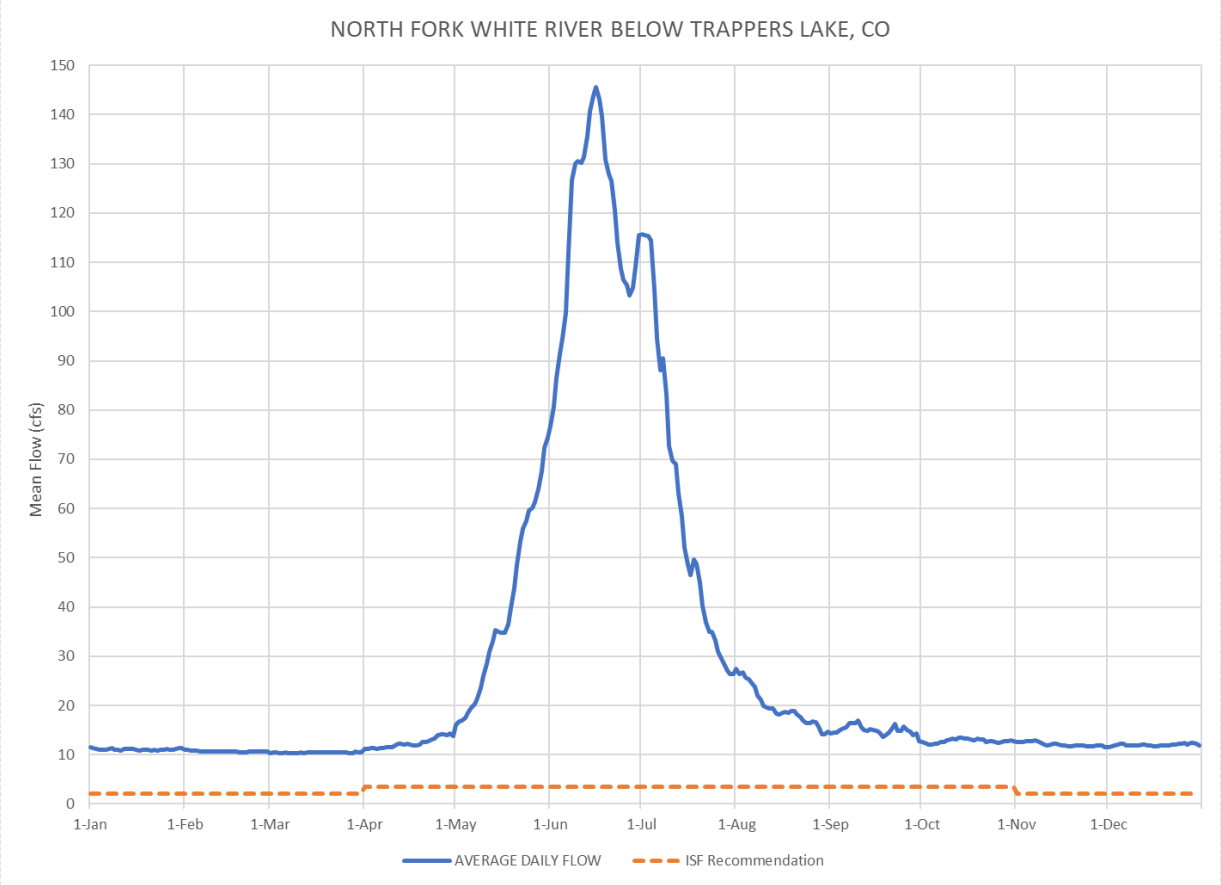
Initial Biological ISF Recommendation:
From the above tables, the R2CROSS-based winter flow recommendations for the three reaches of the North Fork White River are summarized as the averaged results that meet two of the three hydraulic criteria. Similarly, the R2CROSS-based summer flow recommendations are averaged flows that meet all three of the hydraulic criteria.

ISF Reach	Winter Recommendation	Summer Recommendation
NF White River – Trappers Lake to Skinny Fish Creek	2.0 cfs	3.5 cfs
NF White River – Skinny Fish Creek to Big Fish Creek	7.8 cfs	34 cfs
NF White River –Big Fish Creek to Ripple Creek	23 cfs	74 cfs

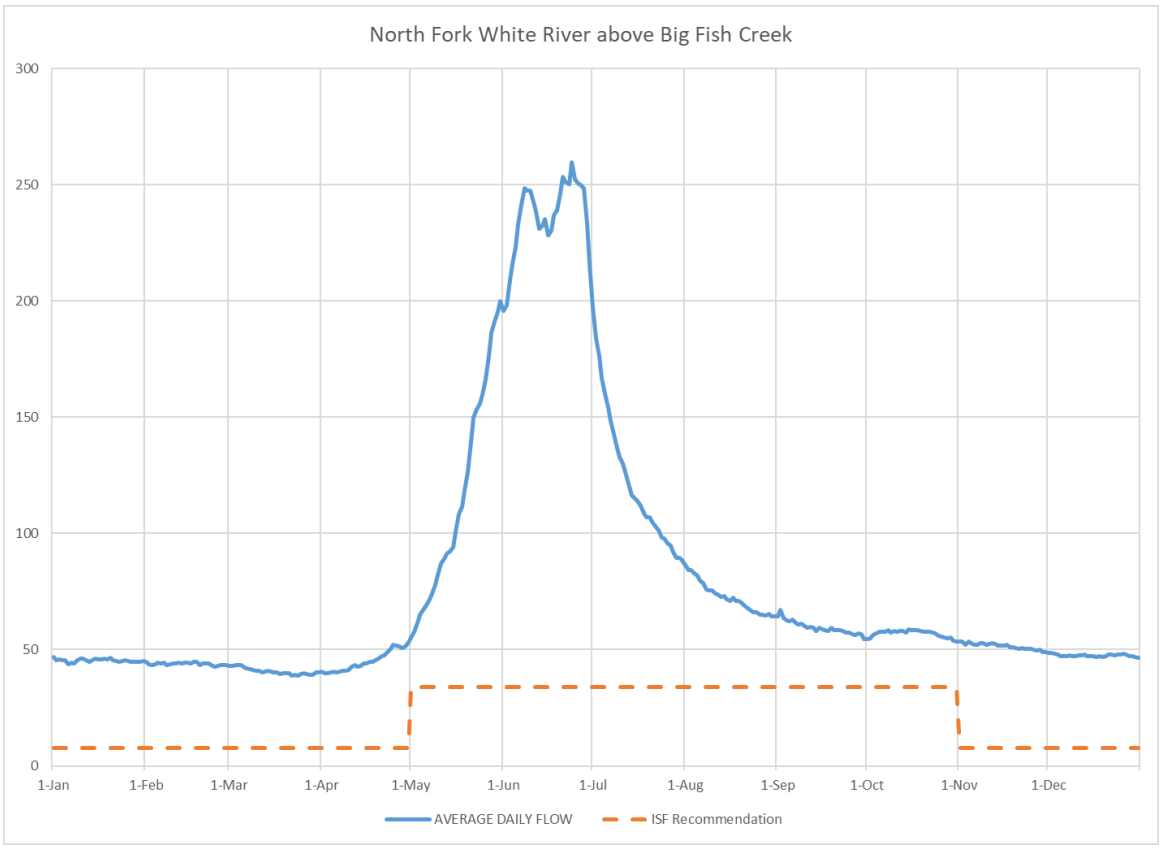
Preliminary Water Availability Analysis:

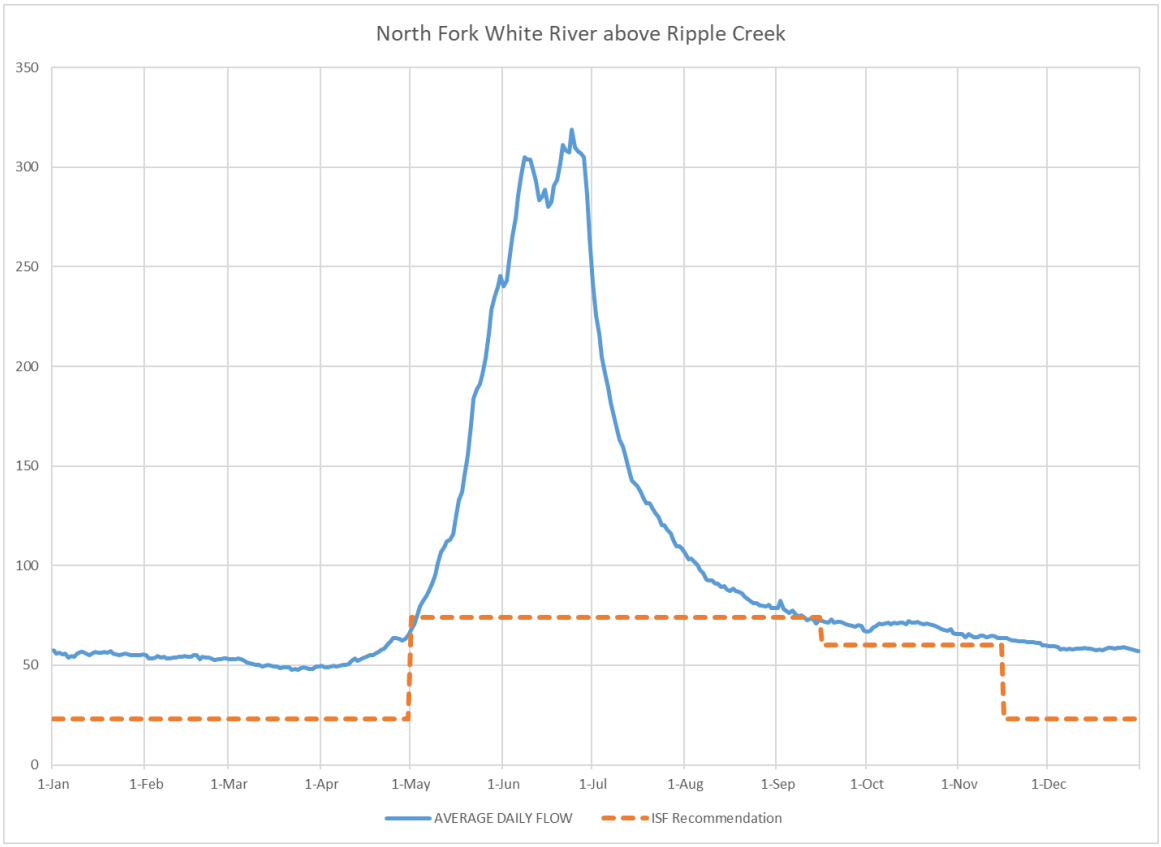
In order to make a preliminary determination whether water is available for the R2CROSS-based flow recommendations and to determine the appropriate seasonal transition dates, CPW examined basic hydrologic data and basic water rights information for the North Fork White River basin.

There were two relevant stream gages in the upper North Fork White River basin, both with limited periods of record. For the upper reach (Trappers Lake to Skinny Fish Creek), there was a gage near the upper terminus, North Fork White River below Trappers Lake (USGS 09302400), that has a period of record between 1956 and 1965. The mean daily flow data from this gage was used to create a representative hydrograph for this segment (shown below). Based on this data, there appears to be ample water available for the proposed ISF recommendations in the upper reach.



In 1965, it appears that this gage was moved to a downstream location just above the confluence with Ripple Creek. This gage, North Fork White River above Ripple Creek, near Trappers Lake, CO (USGS 09302420), was used for the two proposed ISF reaches below Skinny Fish Creek. Mean daily gage data was distributed pro-rata based on contributing drainage basin area and precipitation for these reaches. Mean daily flows were computed for the period of record from 1965 to 1973 to create the hydrographs shown below.


North Fork White River above Big Fish Creek
300
250
200
150
100
50
0
1-Jan
1-Feb
1-Mar
1-Apr
1-May
1-Jun
1-Jul
1-Aug
1-Sep
1-Oct
1-Nov
1-Dec
AVERAGE DAILY FLOW
ISF Recommendation


North Fork White River above Ripple Creek
350
300
250
200
150
100
50
0
1-Jan
1-Feb
1-Mar
1-Apr
1-May
1-Jun
1-Jul
1-Aug
1-Sep
1-Oct
1-Nov
1-Dec
AVERAGE DAILY FLOW
ISF Recommendation

These hydrographs both generally show water available for the proposed ISF recommendations in the lower reaches. The hydrograph for the middle reach (Skinny Fish Creek to Big Fish Creek) shows ample water availability. For the lower reach (Big Fish Creek to Ripple Creek), there is slight water availability reduction where flows are approximately 60 cfs between mid-September and mid-November.

Division of Water Resources data indicates that there are a limited number of active water rights located within the proposed reach. It appears that the only mainstem diversion is the Picket Pin Ditch (structure ID: 4301865), which typically diverts less than 1 cfs between June and October and likely will not limit water availability for the proposed ISF.

Conclusion:

After incorporating the preliminary water availability information, the initial flow recommendation on the lower North Fork White River reach (Big Fish Creek to Ripple Creek) was modified slightly. Water availability in mid-September through mid-November necessitated an intermediate flow recommendation between the summer and winter flow recommendation. This flow recommendation of 60 cfs in the fall will achieve maintenance of at least two of the three hydraulic criteria, and at times, all three. The summer and winter recommendations on the two upper reaches of the North Fork White River were not modified because of water availability. Baseflow recommendations will support fish overwintering while summer, peak flow recommendations will support spawning, development, and rearing. CPW recommends the following reach-specific instream flows; we believe that these flows are sufficient to preserve the natural environment in the North Fork White River:

Above the confluence with Skinny Fish Creek:

- 3.5 (4/1 to 10/31)
- 2.0 cfs (11/1 to 3/31)

Above the confluence with Big Fish Creek:

- 34 cfs (5/1 to 10/31)
- 7.8 cfs (11/1 to 4/30)

Above the confluence with Ripple Creek:

- 74 cfs (5/1 to 9/15)
- 60 cfs (9/16 to 11/15)
- 23 cfs (11/16 to 4/30)

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- 7.8 cfs (11/1 to 4/30)

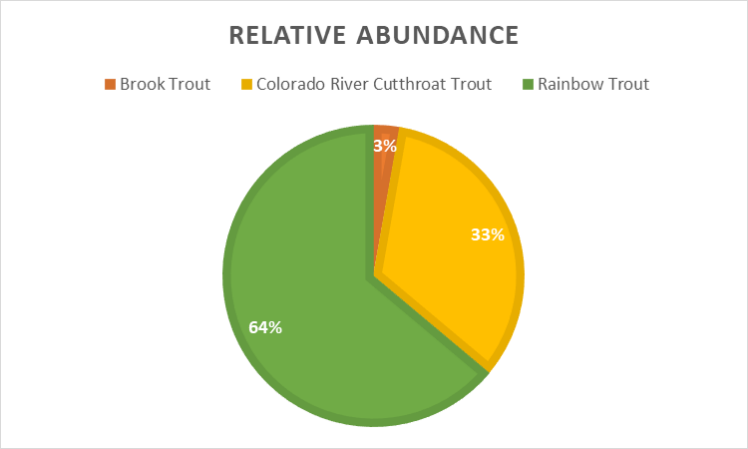
Above the confluence with Ripple Creek:

- 74 cfs (5/1 to 9/15)
- 60 cfs (9/16 to 11/15)
- 23 cfs (11/16 to 4/30)

North Fork White River above Ripple Creek

CPW Historic Sampling at North Fork White River below Skinny Fish Creek Site

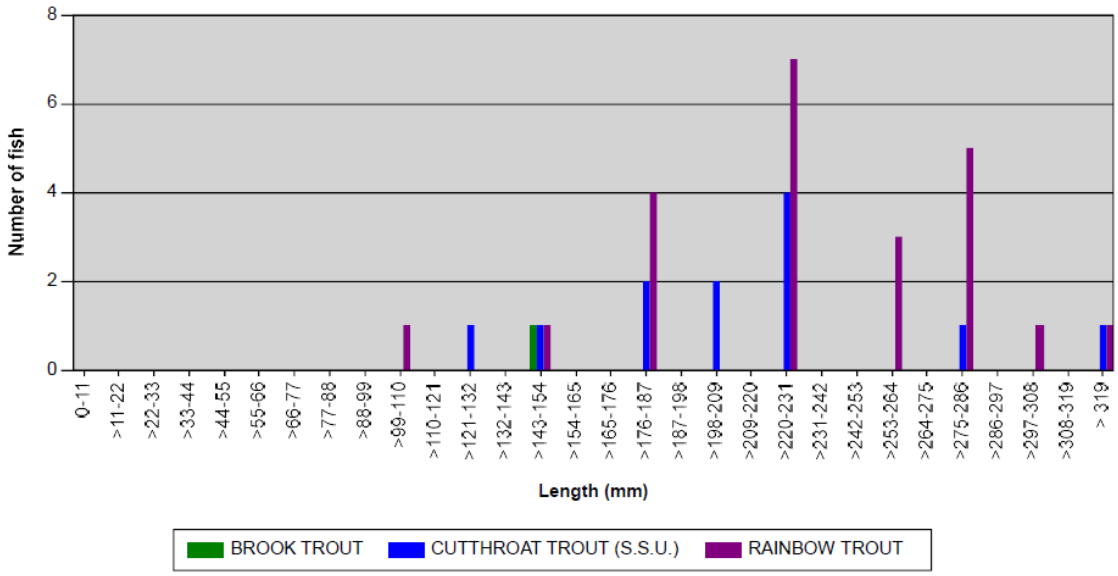
Total of 36 Fish Sampled



Length/Frequency

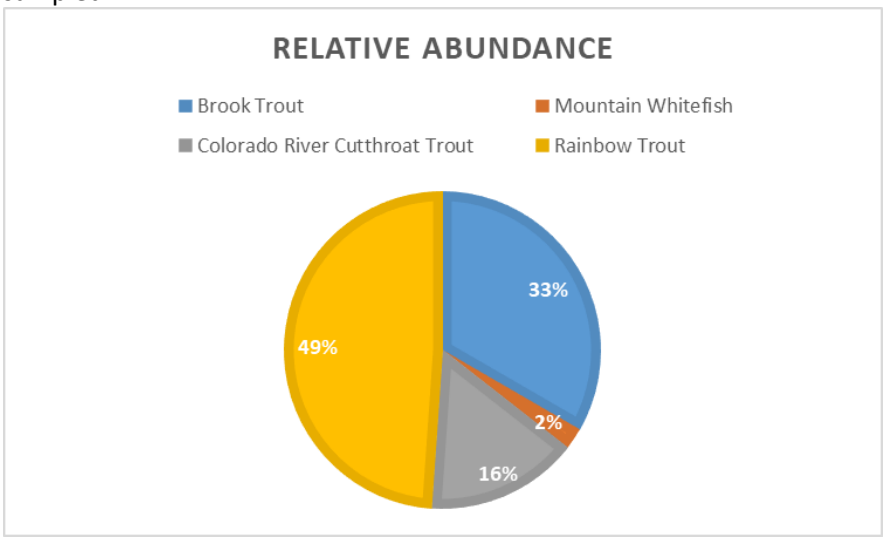
Water **22741** **White River, North Fork**
Station **WR0338** **BLW Skinny Fish Creek**
Date **10/10/1979**

Drainage **White River**
UtmX **274752** UtmY **4427874** Elevation **2805 m**
Length **122 m** Width **16.92 m** Area **0.21 Ha**
Surveyors **BURHART**
Gear **BPEF** Effort **0.00** Metric **PASS** Protocol **PRESENCE/ABSENCE**



CPW Historic Sampling at North Fork White River below Paradise Creek

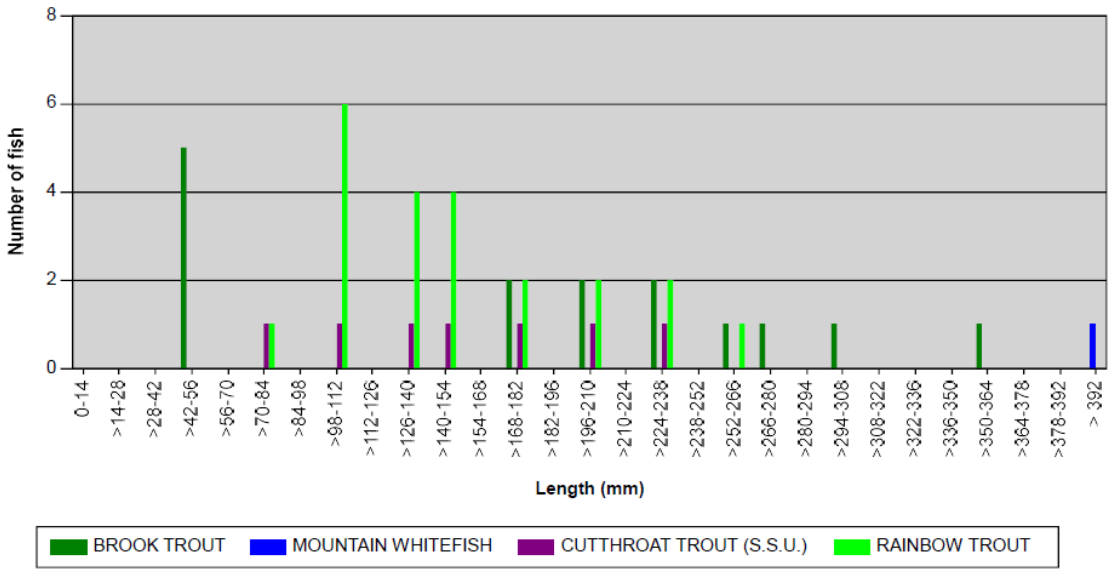
Total of 45 fish sampled.



Length/Frequency

Water 22741 White River, North Fork
Station WR0360 850 M BLW Paradise Creek
Date 8/26/1955

Drainage White River
UtmX 274752 UtmY 4427874 Elevation 2579 m
Length 305 m Width 16.92 m Area 0.52 Ha
Surveyors BURHART
Gear BPEF Effort 0.00 Metric PASS Protocol PRESENCE/ABSENCE



COLORADO WATER CONSERVATION BOARD

FIELD DATA FOR INSTREAM FLOW DETERMINATIONS

COLORADO DIVISION OF WILDLIFE

LOCATION INFORMATION

STREAM NAME: NF White	CROSS-SECTION NO.: 2 Lower 2018
CROSS-SECTION LOCATION: @ Trappers Lake Bridge/ Lodge	
DATE: 7/10/18	OBSERVERS: Birch Skinner

LEGAL DESCRIPTION	¼ SECTION:	SECTION:	TOWNSHIP: N/S	RANGE: E/W	PM:
COUNTY:	WATERSHED:	WATER DIVISION:	DOW WATER CODE:		
MAP(S):	USGS:				
	USFS:				

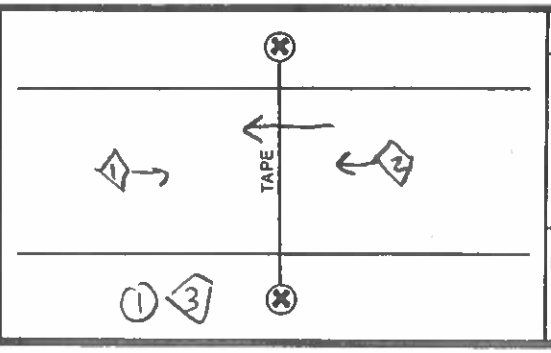
SUPPLEMENTAL DATA

SAG TAPE SECTION SAME AS DISCHARGE SECTION: YES / NO	METER TYPE:			
METER NUMBER:	DATE RATED:	CALIB/SPIN: _____ sec	TAPE WEIGHT: _____ lbs/foot	TAPE TENSION: _____ lbs
CHANNEL BED MATERIAL SIZE RANGE:		PHOTOGRAPHS TAKEN: YES/NO	NUMBER OF PHOTOGRAPHS:	

CHANNEL PROFILE DATA

STATION	DISTANCE FROM TAPE (ft)	ROD READING (ft)
⊗ Tape @ Stake LB	0.0	/
⊗ Tape @ Stake RB	0.0	/
① WS @ Tape LB/RB	0.0	9.50 / 9.50
② WS Upstream	43-15 = 28	9.43
③ WS Downstream	15	9.80
SLOPE		

SKETCH



LEGEND:
Stake ⊗
Station ①
Photo ◇①→
Direction of Flow ← →

AQUATIC SAMPLING SUMMARY

STREAM ELECTROFISHED: YES/NO	DISTANCE ELECTROFISHED: _____ ft	FISH CAUGHT: YES/NO	WATER CHEMISTRY SAMPLED: YES/NO

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

SPECIES (FILL IN)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	>15	TOTAL
Caddis larvae																	
Fish observed																	

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

COMMENTS

DISCHARGE/CROSS SECTION NOTES

STREAM NAME:	CROSS-SECTION NO.:	DATE:	SHEET ___ OF ___

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

Features: Stake (S) Grassline (G) Waterline (W) Rock (R)	Distance From Initial Point (ft)	Width (ft)	Total Vertical Depth From Tape/Inst (ft)	Water Depth (ft)	Depth of Observation (ft)	Revolutions	Time (sec)	Velocity (ft/sec) At Point	Velocity (ft/sec) Mean in Vertical	Area (ft^2)	Discharge (cfs)
S	0		L								
	2.8		8.40								
	3.5		8.05								
GL	4.4		8.30								
	5.8		8.60								
	5.5		8.90					Velocity	from		
WL	6.0		9.5					u/s			
	6.6		9.90	0.35							
	7.2		10.35	0.8							
	7.8		10.2	0.65							
	8.4		10.1	0.6							
	9.0		10.15	0.65							
	9.6		9.95	0.5							
	10.2		10.2	0.7							
	10.8		10.2	0.75							
	11.4		10.15	0.7							
	12.0		10.05	0.5							
	12.6		10.05	0.5							
	13.2		9.9	0.45							
	13.8		10.0	0.5							
	14.4		9.9	0.4							
R	15.6		9.0	0							
	16.6		9.05	0							
	16.9		9.95	0.4							
	17.5		10.0	0.45							
	18.1		9.95	0.4							
WL	19.2		9.5								
	20.3		8.75								
GL/S	22.5		8.1								
TOTALS:											

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

COLORADO WATER CONSERVATION BOARD

FIELD DATA FOR INSTREAM FLOW DETERMINATIONS

COLORADO DIVISION OF WILDLIFE

LOCATION INFORMATION

STREAM NAME: NF White R					CROSS-SECTION NO: 1 upper 1B
CROSS-SECTION LOCATION: @ Trapper's Lake Bridge / Lodge					
DATE: 7/10/18	OBSERVERS: Birch Skinner				
LEGAL DESCRIPTION	¼ SECTION:	SECTION:	TOWNSHIP: N/S	RANGE: E/W	PM:
COUNTY:	WATERSHED:	WATER DIVISION:	DOW WATER CODE:		
MAP(S): USGS:					
USFS:					

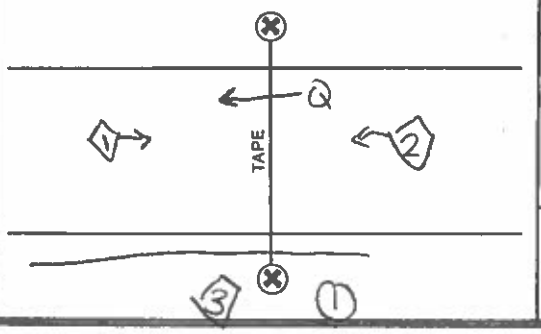
SUPPLEMENTAL DATA

SAG TAPE SECTION SAME AS DISCHARGE SECTION: (YES) NO	METER TYPE: Marsh McB			
METER NUMBER:	DATE RATED:	CALIB/SPIN: _____ sec	TAPE WEIGHT: _____ lbs/foot	TAPE TENSION: _____ lbs
CHANNEL BED MATERIAL SIZE RANGE:	PHOTOGRAPHS TAKEN: YES/NO	NUMBER OF PHOTOGRAPHS:		

CHANNEL PROFILE DATA

STATION	DISTANCE FROM TAPE (ft)	ROD READING (ft)
⊗ Tape @ Stake LB	0.0	/
⊗ Tape @ Stake RB	0.0	/
① WS @ Tape LB/RB	0.0	6.47 / 6.49
② WS Upstream	11'	6.17
③ WS Downstream	14'	7.07
SLOPE	.90 / 25 =	

SKETCH



LEGEND:
- Stake ⊗
- Station ①
- Photo ①→
- Direction of Flow ←→

AQUATIC SAMPLING SUMMARY

STREAM ELECTROFISHED: YES/NO	DISTANCE ELECTROFISHED: _____ ft	FISH CAUGHT: YES/NO	WATER CHEMISTRY SAMPLED: YES/NO

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

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

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

COMMENTS

DISCHARGE/CROSS SECTION NOTES

STREAM NAME:	CROSS-SECTION NO.:	DATE:	SHEET ___ OF ___

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

Features: Stake (S) Grassline (G) Waterline (W) Rock (R)	Distance From Initial Point (ft)	Width (ft)	Total Vertical Depth From Tape/Inst (ft)	Water Depth (ft)	Depth of Observation (ft)	Revolutions	Time (sec)	Velocity (ft/sec) At Point	Velocity (ft/sec) Mean in Vertical	Area (ft^2)	Discharge (cfs)
S	0		4.45								
GL	1.1		4.85								
	2.1		5.45								
WL	3.3		3.47	0							
	4		7.05	0.5				0.20			
	5		6.80	0.3				0.28			
R	6		6.70	0.2				0.00			
	7		6.65	0.2				0.60			
	8		6.75	0.25				0.15			
	9		6.70	0.20				0.19			
	10		6.60	0.20				0.19			
	11		6.70	0.25				0.15			
	12		6.70	0.20				0.27			
	13		6.85	0.35				0.31			
	14		7.10	0.60				0.16			
	15		6.90	0.40				1.30			
	16		6.95	0.60				3.29			
	17		7.05	0.65				1.95			
	18		7.05	0.65				1.18			
R	19		6.90	0.50				0.46			
R	20		7.25	0.80				0.06			
	21		7.20	0.80				0.24			
	22		6.60	0.20				0.40			
WL	22.5		6.49	0							
	23.6		6.10								
GL	25.4		5.85							Q=	5.6A
S	26.6		5.55								
TOTALS:											

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

COLORADO WATER CONSERVATION BOARD

FIELD DATA FOR INSTREAM FLOW DETERMINATIONS

COLORADO DIVISION OF WILDLIFE

LOCATION INFORMATION

STREAM NAME: NF White					CROSS-SECTION NO.: 2-Lwr-18
CROSS-SECTION LOCATION: Abv Big Fish Ck					
DATE: 7/11/18	OBSERVERS: K Birch, J Skinner				
LEGAL DESCRIPTION	¼ SECTION:	SECTION:	TOWNSHIP: N/S	RANGE: E/W	PM:
COUNTY:	WATERSHED:	WATER DIVISION:	DOW WATER CODE:		
MAP(S): USGS:					
USFS:					

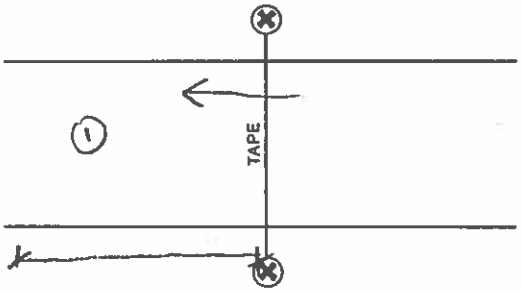
SUPPLEMENTAL DATA

SAG TAPE SECTION SAME AS DISCHARGE SECTION: YES / NO	METER TYPE:			
METER NUMBER:	DATE RATED:	CALIB/SPIN: ____ sec	TAPE WEIGHT: ____ lbs/foot	TAPE TENSION: ____ lbs
CHANNEL BED MATERIAL SIZE RANGE:		PHOTOGRAPHS TAKEN: YES/NO	NUMBER OF PHOTOGRAPHS:	

CHANNEL PROFILE DATA

STATION	DISTANCE FROM TAPE (ft)	ROD READING (ft)
⊗ Tape @ Stake LB	0.0	/
⊗ Tape @ Stake RB	0.0	/
① WS @ Tape LB/RB	0.0	4.16 / 4.16
② WS Upstream	Ø	4.14
③ WS Downstream	18	4.80
SLOPE		

SKETCH



LEGEND:
Stake ⊗
Station ①
Photo ①→
Direction of Flow

4.36 3.91

AQUATIC SAMPLING SUMMARY

STREAM ELECTROFISHED: YES/NO	DISTANCE ELECTROFISHED ____ ft	FISH CAUGHT: YES/NO	WATER CHEMISTRY SAMPLED: YES/NO

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

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

AQUATIC INSECTS IN STREAM SECTION BY COMMON OR SCIENTIFIC ORDER NAME

COMMENTS

DISCHARGE/CROSS SECTION NOTES

STREAM NAME:	CROSS-SECTION NO.:	DATE	SHEET ___ OF ___

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

Features: Stake (S) Grassline (G) Waterline (W) Rock (R)	Distance From Initial Point (ft)	Width (ft)	Total Vertical Depth From Tape/Inst (ft)	Water Depth (ft)	Depth of Observation (ft)	Revolutions	Time (sec)	Velocity (ft/sec)		Area (ft^2)	Discharge (cfs)
								At Point	Mean in Vertical		
S	0		2.7								
	1.9		3.3								
GL	2.5		3.35								
	3.4		3.95								
WL	4.5		4.16								
	6.5		4.45	0.3							
	8.5		4.8	0.7							
	10.5		5.15	1.2							
	12.5		5.05	1.1							
	14.5		5.05	1.0							
	16.5		5.4	0.8							
	18.5		5.06	0.8							
	20.5		5.25	0.95							
	22.5		4.85	0.65							
	24.5		4.85	0.7							
	26.5		4.65	0.4							
	28.5		4.85	0.6							
	30.5		4.7	0.3							
	32.5		4.6	0.2							
	34.5		4.8	0.4							
	36.5		4.95	0.45							
	38.5		5.0	0.5							
	40.5		5.6	1.3							
log	42.3		5.65	1.45							
	44.3		5.9	1.36							
	48.0		4.40	0.15							
	48.5		4.3	0.05							
WS	50.5		4.16								
GL	53.7		3.15								
S	55.5		2.65								
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: NF WHITE UPPER (2018)					CROSS-SECTION NO.: 1 upper
CROSS-SECTION LOCATION: AB BIG FISH CK					
DATE: 7/11/18	OBSERVERS: JWS, KB, Meeker Crew				
LEGAL DESCRIPTION	¼ SECTION:	SECTION:	TOWNSHIP: N/S	RANGE: E/W	PM:
COUNTY:	WATERSHED:	WATER DIVISION:	DOW WATER CODE:		
MAP(S): USGS:					
USFS:					

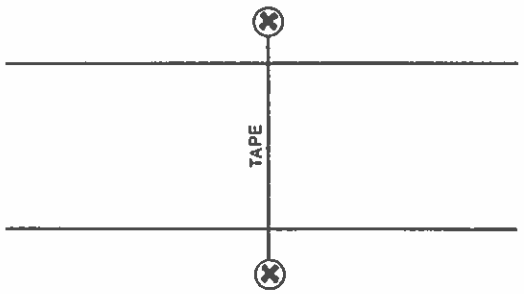
SUPPLEMENTAL DATA

SAG TAPE SECTION SAME AS DISCHARGE SECTION: YES / NO	METER TYPE:			
METER NUMBER:	DATE RATED:	CALIB/SPIN: ____ sec	TAPE WEIGHT: ____ lbs/foot	TAPE TENSION: ____ lbs
CHANNEL BED MATERIAL SIZE RANGE: Pebble Count	PHOTOGRAPHS TAKEN: YES/NO	NUMBER OF PHOTOGRAPHS: 3		

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	5.85 / 5.83
② WS Upstream	13	5.78
③ WS Downstream	19	6.16
SLOPE	/ 32 =	

SKETCH



LEGEND:
- Stake ⊗
- Station ①
- Photo ①→
- Direction of Flow ← →

AQUATIC SAMPLING SUMMARY

STREAM ELECTROFISHED: YES/NO	DISTANCE ELECTROFISHED ____ ft	FISH CAUGHT: YES/NO	WATER CHEMISTRY SAMPLED: YES/NO

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

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

AQUATIC INSECTS IN STREAM SECTION BY COMMON OR SCIENTIFIC ORDER NAME

COMMENTS

DISCHARGE/CROSS SECTION NOTES

STREAM NAME:	CROSS-SECTION NO.:	DATE:	SHEET ___ OF ___

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

Features: Stake (S) Grassline (G) Waterline (W) Rock (R)	Distance From Initial Point (ft)	Width (ft)	Total Vertical Depth From Tape/Inst (ft)	Water Depth (ft)	Depth of Observation (ft)	Revolutions	Time (sec)	Velocity (ft/sec): At Point	Velocity (ft/sec): Mean in Vertical	Area (ft^2)	Discharge (cfs)
S	0.0		5.30								
G	0.0		5.30								
	2		5.60								
	3		5.75								
W	4		5.85								
	4.8		5.90	0.3				0.05			
	5.6		6.40	0.8				0.45			
	6.4		6.90	0.95				0.97			
	7.2		6.20	0.5				0.96			
	8.0		7.45	1.2				1.56			
	8.8		7.85	1.75				2.74			
	9.6		8.00	2.2				3.27			
	10.4		7.95	2.05				3.44			
	11.2		8.05	2.10				3.20			
	12.0		7.85	2.0				2.58			
	12.8		7.80	2.0				2.36			
	13.6		7.75	1.9				2.59			
	14.4		7.45	1.5				0.61			
R	15.2		6.05	0.3				3.87			
R	16.0		6.05	0.3				3.58			
	16.8		6.95	0.9				3.31			
	17.6		6.90	1.1				1.72			
	18.4		6.40	0.7				1.13			
	19.2		6.35	0.5				0.71			
	20.0		6.20	0.3				0.39			
	20.8		6.20	0.2				0.64			
	21.6		6.00	0.15				0.18			
W	22.4		5.85	0							
	24.6		5.20							Q =	42.78
	28		5.15								
	31		5.20								
G/S	33.5		5.30								
TOTALS:											

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

COLORADO WATER CONSERVATION BOARD

FIELD DATA FOR INSTREAM FLOW DETERMINATIONS

COLORADO DIVISION OF WILDLIFE

LOCATION INFORMATION

STREAM NAME: N FK WHITE R					CROSS-SECTION NO: 2 (Lower)
CROSS-SECTION LOCATION: AT MIRROR LAKE TH BRIDGE ~80 FT D/S					
DATE: 12 Sept 19	OBSERVERS: KB JS JL				
LEGAL DESCRIPTION	¼ SECTION:	SECTION:	TOWNSHIP: N/S	RANGE: E/W	PM:
COUNTY:	WATERSHED: White		WATER DIVISION: 5/6		DOW WATER CODE:
MAP(S):	USGS:				
	USFS:				

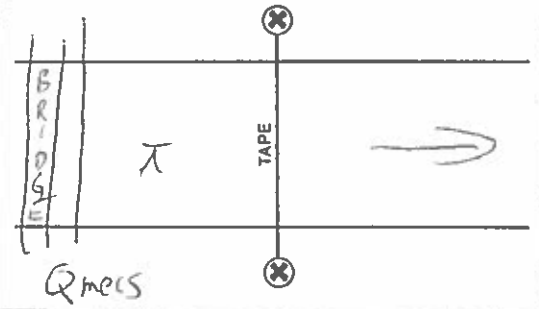
SUPPLEMENTAL DATA

SAG TAPE SECTION SAME AS DISCHARGE SECTION: YES/NO	METER TYPE: FlowTracker 1		
METER NUMBER:	DATE RATED:	CALIB/SPIN: ____ sec	TAPE WEIGHT: ____ lbs/foot	TAPE TENSION: ____ lbs
CHANNEL BED MATERIAL SIZE RANGE: See Pebble Count	PHOTOGRAPHS TAKEN: YES/NO	NUMBER OF PHOTOGRAPHS: 3	

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	4.93 / 4.88
② WS Upstream	0	4.38
③ WS Downstream	48.2	5.10
SLOPE	0.72 / 48.2 =	

SKETCH



LEGEND:
- Stake ⊗
- Station ①
- Photo ◇①→
- Direction of Flow ←→

AQUATIC SAMPLING SUMMARY

STREAM ELECTROFISHED: YES/NO	DISTANCE ELECTROFISHED: ____ ft	FISH CAUGHT: YES/NO	WATER CHEMISTRY SAMPLED: YES/NO

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

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

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

COMMENTS

DISCHARGE/CROSS SECTION NOTES

STREAM NAME:	CROSS-SECTION NO.:	DATE:	SHEET ___ OF ___

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

Features: Stake (S) Grassline (G) Waterline (W) Rock (R)	Distance From Initial Point (ft)	Width (ft)	Total Vertical Depth From Tape/Inst (ft)	Water Depth (ft)	Depth of Observation (ft)	Revolutions	Time (sec)	Velocity (ft/sec) At Point	Velocity (ft/sec) Mean in Vertical	Area (ft^2)	Discharge (cfs)
S/GL	0		4.00								
	0.8		4.20								
WL	0.9		4.93	0							
	3		5.50	0.6							
	5		5.50	0.65							
	7		5.35	0.50							
	9		5.20	0.45							
	11		5.15	0.35							
	3		5.20	0.50							
	5		5.25	0.50							
	7		5.25	0.45							
	9		5.20	0.55							
	21		5.35	0.70							
	3		5.30	0.70							
	5		5.30	0.65							
	7		5.45	0.80							
	9		5.55	0.85							
	31		5.00	0.50							
	3		5.60	1.10							
	5		5.65	1.10							
	7		5.80	1.20							
	9		5.50	0.95							
	41		5.45	0.90							
	3		5.25	0.65							
	5		5.10	0.50							
	7		5.20	0.60							
	9		5.15	0.50							
	51		5.25	0.70							
	3		5.20	0.60							
	5		4.95	0.30							
	7		5.10	0.40							
	9		5.05	0.40							
	61		5.15	0.30							
	3		5.15	0.30							
	5		5.30	0.45							
	7		5.60	0.80							
	9		5.75	0.95							
WL	70.3		4.80	0							
	70.8		4.10								
S/GL	72.3		3.80								
TOTALS:											

Q = 55.25

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

COLORADO WATER CONSERVATION BOARD

FIELD DATA FOR INSTREAM FLOW DETERMINATIONS

COLORADO DIVISION OF WILDLIFE

LOCATION INFORMATION

STREAM NAME: N FK White R					CROSS-SECTION NO.: (1) Upper
CROSS-SECTION LOCATION: (1) Mirror Lake TH Bridge (100 Ft U/S) (NF WHITE 1)					
DATE: 12 Sept 18	OBSERVERS: JS KB JL				
LEGAL DESCRIPTION	¼ SECTION:	SECTION:	TOWNSHIP: N/S	RANGE: E/W	PM:
COUNTY:	WATERSHED: White R		WATER DIVISION: 5/6		DOW WATER CODE:
MAP(S):	USGS:				
	USFS:				

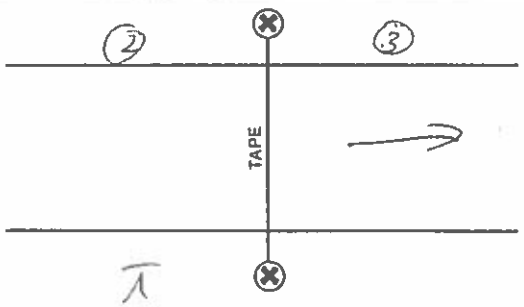
SUPPLEMENTAL DATA

SAG TAPE SECTION SAME AS DISCHARGE SECTION: (YES) / NO	METER TYPE: FlowTracker 1			
METER NUMBER: N/A	DATE RATED:	CALIB/SPIN: ____ sec	TAPE WEIGHT: ____ lbs/foot	TAPE TENSION: ____ lbs
CHANNEL BED MATERIAL SIZE RANGE: Gravel – Bldr (See Pebble Count)	PHOTOGRAPHS TAKEN: (YES)/NO	NUMBER OF PHOTOGRAPHS: 5		

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	7.53 / 7.51
② WS Upstream	0	7.48
③ WS Downstream	30'	7.87
SLOPE	0.39 / 30 =	

SKETCH



LEGEND:
- Stake ⊗
- Station ①
- Photo ①→
- Direction of Flow ←→

AQUATIC SAMPLING SUMMARY

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

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

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

AQUATIC INSECTS IN STREAM SECTION BY COMMON OR SCIENTIFIC ORDER NAME

Ceddis, Mcy

3 Sp.

COMMENTS

Clear Water, No Recent Pre Cip.
Fish Observed

DISCHARGE/CROSS SECTION NOTES

STREAM NAME:	CROSS-SECTION NO:	DATE:	SHEET
N FK White R.	1 Upper	9/12/18	1 OF 1

BEGINNING OF MEASUREMENT	EDGE OF WATER LOOKING DOWNSTREAM: (0.0 AT STAKE) LEFT / RIGHT	Gage Reading: ____ ft	TIME:
			1056

Features: Stake (S) Grassline (G) Waterline (W) Rock (R)	Distance From Initial Point (ft)	Width (ft)	Total Vertical Depth From Tape/Inst (ft)	Water Depth (ft)	Depth of Observation (ft)	Revolutions	Time (sec)	Velocity (ft/sec) At Point	Velocity (ft/sec) Mean in Vertical	Area (ft^2)	Discharge (cfs)
S/GL	0		6.45								
WL	2.6		7.53	0							
R	3		7.35	0.0							
	5		8.50	1.0							
	7		8.60	1.1							
	9		8.60	1.05							
	11		8.70	1.10							
	13		8.55	1.05							
	15		8.40	0.90							
	17		8.15	0.75							
	19		8.45	1.05							
	21		8.15	0.70							
	3		8.15	0.70							
	5		8.35	0.90							
	7		8.10	0.60							
	9		7.85	0.40							
	31		8.30	0.75							
	3		8.65	1.15							
	5		8.50	1.05							
	7		8.45	1.00							
	9		8.35	0.75							
	41		8.50	0.90							
	3		8.75	1.15							
	5		8.50	0.90							
	7		8.30	0.85							
	9		8.00	0.55							
	51		8.25	0.70							
	3		8.10	0.60							
	5		7.90	0.40							
WL	57		7.51	0							
	60		7.30								
	62		7.25								
S/GL	65		6.60								
TOTALS:											

$Q = 67.159$

End of Measurement	Time: 1138	Gage Reading: ____ ft	CALCULATIONS PERFORMED BY:	CALCULATIONS CHECKED BY:

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

LOCATION INFORMATION

STREAM NAME:	NF White River
XS LOCATION:	At Trappers Lake Bridge/Lodge
XS NUMBER:	Upper 2018
DATE:	10-Jul-18
OBSERVERS:	Birch, Skinner
1/4 SEC:	Lat: 40.002754
SECTION:	Long: -107.232903
TWP:	0
RANGE:	0
PM:	0
COUNTY:	Garfield
WATERSHED:	White River
DIVISION:	6
DOW CODE:	22741
USGS MAP:	0
USFS MAP:	0

SUPPLEMENTAL DATA

TAPE WT:	0.0106
TENSION:	99999

*** NOTE ***
Leave TAPE WT and TENSION at defaults for data collected with a survey level and rod

CHANNEL PROFILE DATA

SLOPE:	0.036

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

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

STREAM NAME: NF White River
XS LOCATION: At Trappers Lake Bridge/Lodge
XS NUMBER: Upper 2018

DATA POINTS= 27

VALUES COMPUTED FROM RAW FIELD DATA

	FEATURE	DIST	VERT DEPTH	WATER DEPTH	VEL	WETTED PERIM.	WATER DEPTH	AREA (Am)	Q (Qm)	% Q CELL
	S	0.00	4.45			0.00		0.00	0.00	0.0%
1	GL	1.10	4.85			0.00		0.00	0.00	0.0%
		2.10	5.45			0.00		0.00	0.00	0.0%
	WL	3.30	6.47	0.00	0.00	0.00		0.00	0.00	0.0%
		4.00	7.05	0.50	0.20	0.91	0.50	0.43	0.09	1.5%
		5.00	6.80	0.30	0.28	1.03	0.30	0.30	0.08	1.5%
	Rock	6.00	6.70	0.20	0.00	1.00	0.20	0.20	0.00	0.0%
		7.00	6.65	0.20	0.00	1.00	0.20	0.20	0.00	0.0%
		8.00	6.75	0.25	0.15	1.00	0.25	0.25	0.04	0.7%
		9.00	6.70	0.20	0.19	1.00	0.20	0.20	0.04	0.7%
		10.00	6.60	0.20	0.19	1.00	0.20	0.20	0.04	0.7%
		11.00	6.70	0.25	0.15	1.00	0.25	0.25	0.04	0.7%
		12.00	6.70	0.20	0.27	1.00	0.20	0.20	0.05	1.0%
		13.00	6.85	0.35	0.31	1.01	0.35	0.35	0.11	1.9%
		14.00	7.10	0.60	0.16	1.03	0.60	0.60	0.10	1.7%
		15.00	6.90	0.40	1.30	1.02	0.40	0.40	0.52	9.2%
		16.00	6.95	0.60	3.29	1.00	0.60	0.60	1.97	35.0%
		17.00	7.05	0.65	1.95	1.00	0.65	0.65	1.27	22.5%
		18.00	7.05	0.65	1.18	1.00	0.65	0.65	0.77	13.6%
	Rock	19.00	6.90	0.50	0.46	1.01	0.50	0.50	0.23	4.1%
	Rock	20.00	7.25	0.80	0.06	1.06	0.80	0.80	0.05	0.9%
		21.00	7.20	0.80	0.24	1.00	0.80	0.80	0.19	3.4%
		22.00	6.60	0.20	0.40	1.17	0.20	0.15	0.06	1.1%
	WL	22.50	6.49	0.00	0.00	0.51		0.00	0.00	0.0%
		23.60	6.10			0.00		0.00	0.00	0.0%
1	GL	25.40	5.85			0.00		0.00	0.00	0.0%
	S	26.60	5.55			0.00		0.00	0.00	0.0%
	TOTALS ----------					19.78	0.8 (Max.)	7.73	5.64	100.0%

Manning's n = 0.2064
Hydraulic Radius= 0.3905389

STREAM NAME: NF White River
XS LOCATION: At Trappers Lake Bridge/Lodge
XS NUMBER: Upper 2018

WATER LINE COMPARISON TABLE

WATER LINE	MEAS AREA	COMP AREA	AREA ERROR
	7.73	7.26	-6.0%
6.23	7.73	12.19	57.8%
6.25	7.73	11.79	52.6%
6.27	7.73	11.39	47.4%
6.29	7.73	10.99	42.2%
6.31	7.73	10.59	37.1%
6.33	7.73	10.19	31.9%
6.35	7.73	9.80	26.8%
6.37	7.73	9.40	21.7%
6.39	7.73	9.01	16.6%
6.41	7.73	8.62	11.6%
6.43	7.73	8.23	6.5%
6.44	7.73	8.04	4.0%
6.45	7.73	7.84	1.5%
6.46	7.73	7.65	-1.0%
6.47	7.73	7.46	-3.5%
6.48	7.73	7.26	-6.0%
6.49	7.73	7.07	-8.5%
6.50	7.73	6.88	-10.9%
6.51	7.73	6.69	-13.4%
6.52	7.73	6.50	-15.9%
6.53	7.73	6.31	-18.3%
6.55	7.73	5.93	-23.2%
6.57	7.73	5.56	-28.1%
6.59	7.73	5.18	-32.9%
6.61	7.73	4.81	-37.7%
6.63	7.73	4.45	-42.4%
6.65	7.73	4.10	-46.9%
6.67	7.73	3.76	-51.3%
6.69	7.73	3.45	-55.4%
6.71	7.73	3.16	-59.1%
6.73	7.73	2.90	-62.4%

WATERLINE AT ZERO
AREA ERROR = 6.456

STREAM NAME: NF White River
XS LOCATION: At Trappers Lake Bridge/Lodge
XS NUMBER: Upper 2018

Thorne-Zevenbergen D84 Correction Applied
User Supplied D84 = 0.66

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

Velocity based on test of R/D84>1

	DIST TO WATER (FT)	TOP WIDTH (FT)	AVG. DEPTH (FT)	MAX. DEPTH (FT)	AREA (SQ FT)	WETTED PERIM. (FT)	PERCENT WET PERIM (%)	HYDR RADIUS (FT)	FLOW (CFS)	AVG. VELOCITY (FT/SEC)
GL	5.85	22.83	0.89	1.40	20.30	23.72	100.0%	0.86	82.97	4.09
	5.86	22.78	0.89	1.39	20.16	23.67	99.8%	0.85	81.98	4.07
	5.91	22.36	0.85	1.34	19.03	23.23	97.9%	0.82	74.05	3.89
	5.96	21.94	0.82	1.29	17.93	22.79	96.1%	0.79	66.54	3.71
	6.01	21.52	0.78	1.24	16.84	22.35	94.2%	0.75	59.44	3.53
	6.06	21.10	0.75	1.19	15.77	21.91	92.3%	0.72	52.76	3.34
	6.11	20.71	0.71	1.14	14.73	21.49	90.6%	0.69	46.43	3.15
	6.16	20.51	0.67	1.09	13.70	21.26	89.6%	0.64	49.06	3.58
	6.21	20.31	0.62	1.04	12.68	21.04	88.7%	0.60	40.79	3.22
	6.26	20.11	0.58	0.99	11.67	20.81	87.7%	0.56	33.55	2.88
	6.31	19.91	0.54	0.94	10.67	20.58	86.8%	0.52	27.25	2.55
	6.36	19.71	0.49	0.89	9.68	20.36	85.8%	0.48	21.82	2.26
	6.41	19.51	0.45	0.84	8.70	20.13	84.9%	0.43	17.19	1.98
WL	6.46	19.31	0.40	0.79	7.72	19.90	83.9%	0.39	13.29	1.72
	6.51	19.08	0.35	0.74	6.76	19.65	82.8%	0.34	10.07	1.49
	6.56	18.80	0.31	0.69	5.82	19.34	81.5%	0.30	7.45	1.28
	6.61	18.40	0.27	0.64	4.89	18.92	79.8%	0.26	5.36	1.10
	6.66	17.08	0.23	0.59	3.99	17.56	74.0%	0.23	3.87	0.97
	6.71	13.46	0.24	0.54	3.21	13.89	58.6%	0.23	3.04	0.95
	6.76	11.16	0.23	0.49	2.60	11.56	48.7%	0.23	2.32	0.89
	6.81	10.22	0.20	0.44	2.07	10.58	44.6%	0.20	1.58	0.76
	6.86	9.56	0.16	0.39	1.57	9.88	41.6%	0.16	0.98	0.63
	6.91	8.81	0.13	0.34	1.11	9.08	38.3%	0.12	0.56	0.50
	6.96	6.60	0.11	0.29	0.73	6.80	28.7%	0.11	0.29	0.40
	7.01	4.83	0.09	0.24	0.44	4.97	21.0%	0.09	0.14	0.31
	7.06	2.19	0.11	0.19	0.25	2.27	9.6%	0.11	0.06	0.24
	7.11	1.57	0.10	0.14	0.16	1.62	6.8%	0.10	0.03	0.18
	7.16	1.34	0.06	0.09	0.08	1.37	5.8%	0.06	0.01	0.10
	7.21	1.00	0.02	0.04	0.02	1.01	4.3%	0.02	0.00	0.05

STREAM NAME: NF White River
XS LOCATION: At Trappers Lake Bridge/Lodge
XS NUMBER: Upper 2018

SUMMARY SHEET

MEASURED FLOW (Qm)=	5.64	cfs
CALCULATED FLOW (Qc)=	5.61	cfs
(Qm-Qc)/Qm * 100 =	0.4	%
MEASURED WATERLINE (WLm)=	6.48	ft
CALCULATED WATERLINE (WLc)=	6.46	ft
(WLm-WLc)/WLm * 100 =	0.4	%
MAX MEASURED DEPTH (Dm)=	0.80	ft
MAX CALCULATED DEPTH (Dc)=	0.79	ft
(Dm-Dc)/Dm * 100	0.8	%
MEAN VELOCITY=	0.73	ft/sec
MANNING'S N=	0.206	
SLOPE=	0.036	ft/ft
.4 * Qm =	2.3	cfs
2.5 * Qm=	14.1	cfs

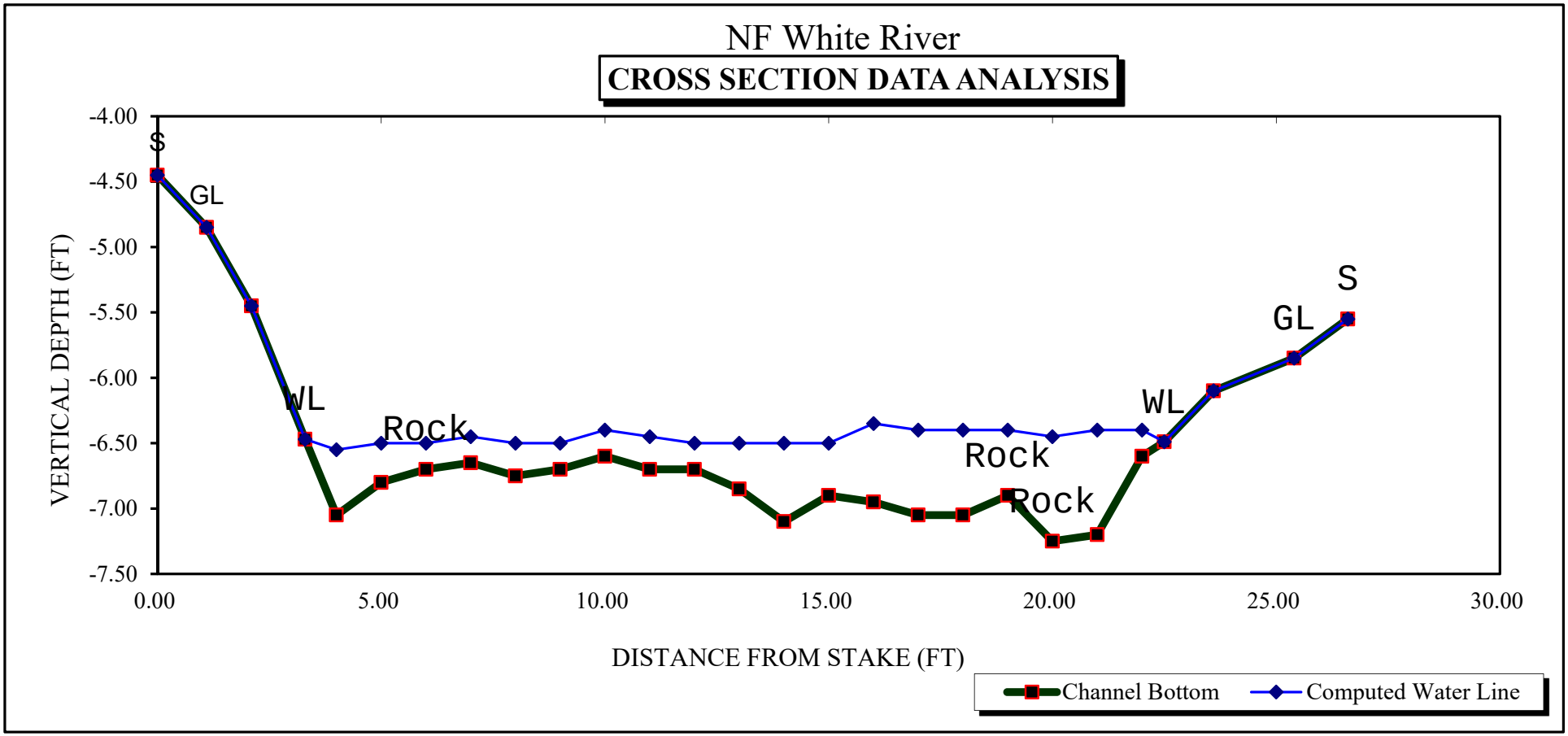
RECOMMENDED INSTREAM FLOW:
============================

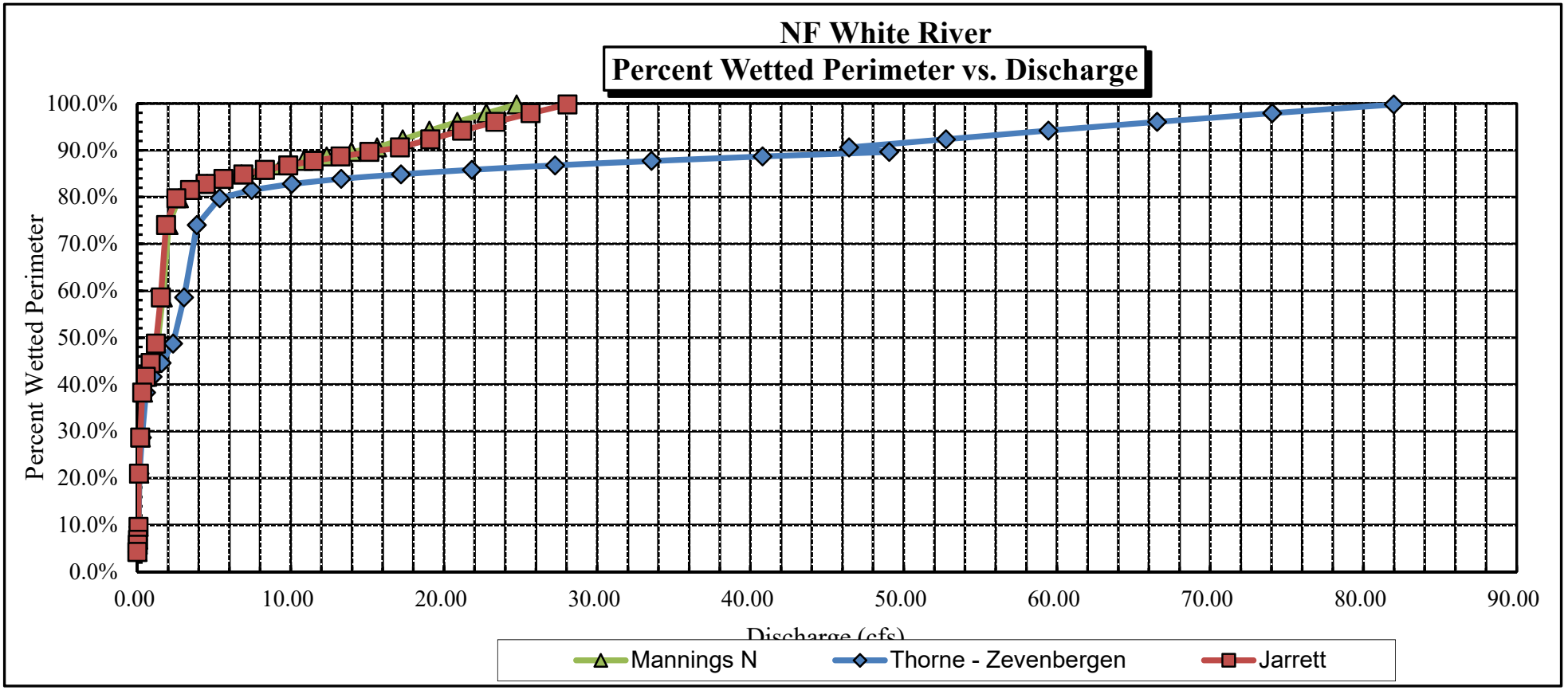
FLOW (CFS)	PERIOD
===========	========
____________________	____________________
____________________	____________________
____________________	____________________
____________________	____________________

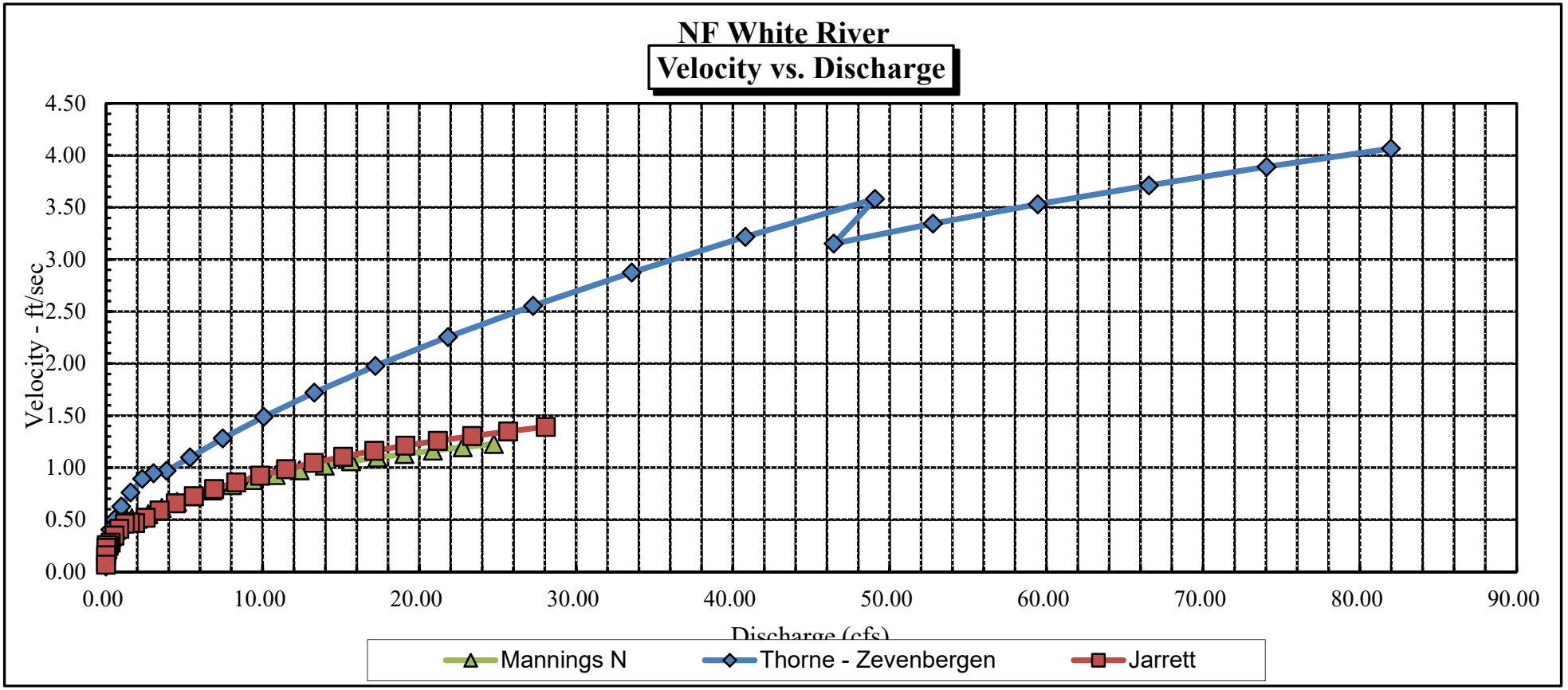
RATIONALE FOR RECOMMENDATION:
============================

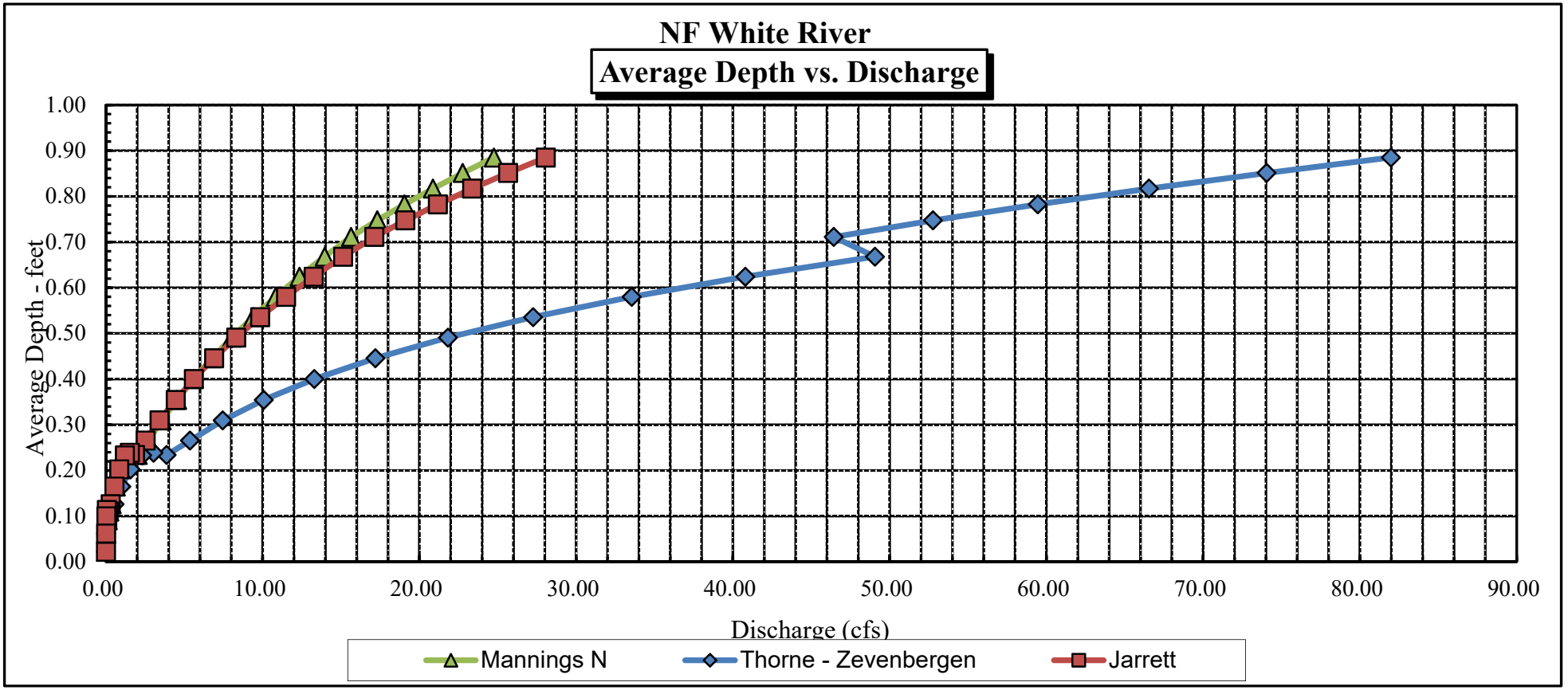
RECOMMENDATION BY: ………………...………...……............................... AGENCY...………………………......……....…....……....... DATE:.......…...….......……………

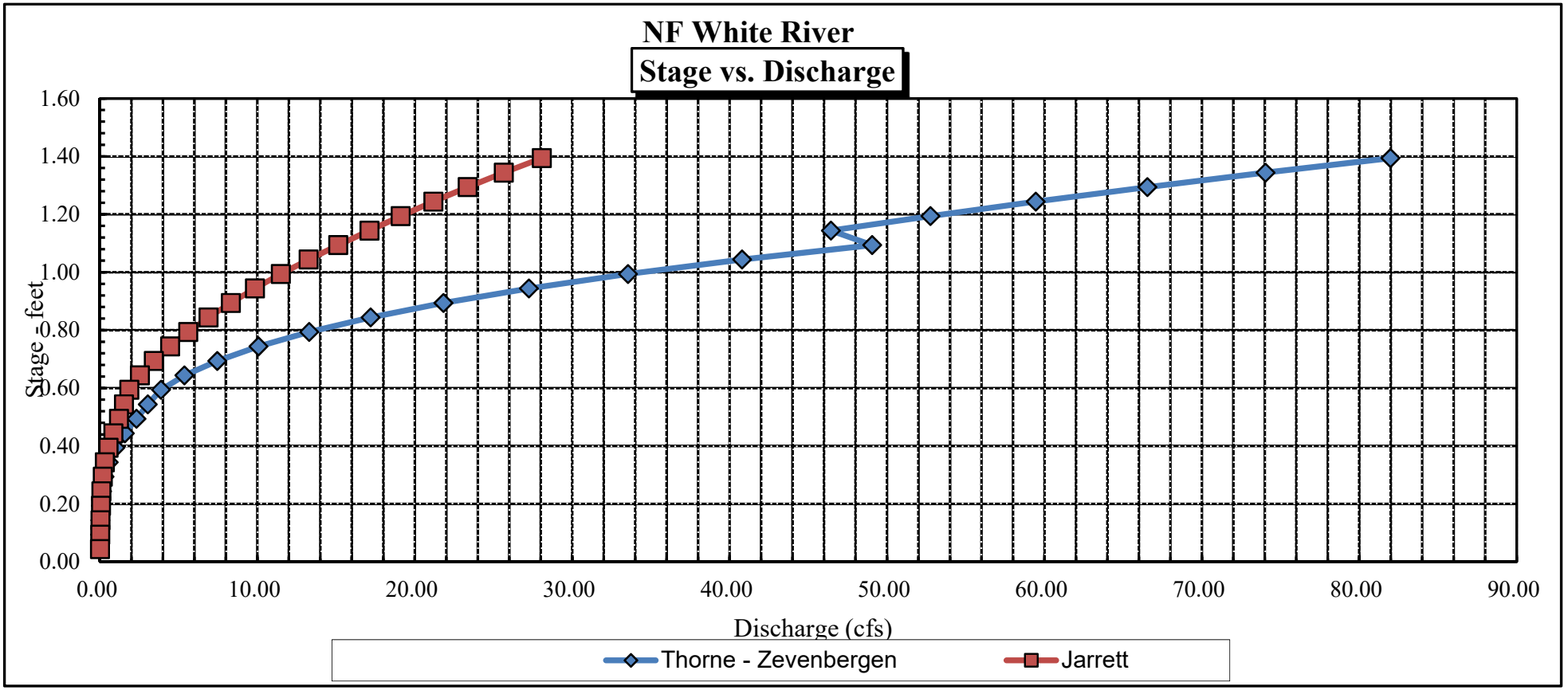
CWCB REVIEW BY: ..…………………………....……………………………………………………...…............... DATE:.................……………...…


NF White River
CROSS SECTION DATA ANALYSIS
VERTICAL DEPTH (FT)
-4.00
-4.50
-5.00
-5.50
-6.00
-6.50
-7.00
-7.50
0.00
5.00
10.00
15.00
20.00
25.00
30.00
DISTANCE FROM STAKE (FT)
S
GL
WL
Rock
Rock
Rock
WL
GL
S
Channel Bottom
Computed Water Line


NF White River
Percent Wetted Perimeter vs. Discharge
Percent Wetted Perimeter
100.0%
90.0%
80.0%
70.0%
60.0%
50.0%
40.0%
30.0%
20.0%
10.0%
0.0%
0.00
10.00
20.00
30.00
40.00
50.00
60.00
70.00
80.00
90.00
Discharge (cfs)
Mannings N
Thorne - Zevenbergen
Jarrett


NF White River
Velocity vs. Discharge
Velocity - ft/sec
4.50
4.00
3.50
3.00
2.50
2.00
1.50
1.00
0.50
0.00
0.00
10.00
20.00
30.00
40.00
50.00
60.00
70.00
80.00
90.00
Discharge (cfs)
Mannings N
Thorne - Zevenbergen
Jarrett


NF White River
Average Depth vs. Discharge
Average Depth - feet
1.00
0.90
0.80
0.70
0.60
0.50
0.40
0.30
0.20
0.10
0.00
0.00
10.00
20.00
30.00
40.00
50.00
60.00
70.00
80.00
90.00
Discharge (cfs)
Mannings N
Thorne - Zevenbergen
Jarrett


NF White River
Stage vs. Discharge
Stage - feet
1.60
1.40
1.20
1.00
0.80
0.60
0.40
0.20
0.00
0.00
10.00
20.00
30.00
40.00
50.00
60.00
70.00
80.00
90.00
Discharge (cfs)
Thorne - Zevenbergen
Jarrett

Data Input & Proofing

STREAM NAME:	NF White River
XS LOCATION:	At Trappers Lake Bridge/Lodge
XS NUMBER:	Upper 2018
DATE:	7/10/2018
OBSERVERS:	Birch, Skinner
1/4 SEC:	Lat: 40.002754
SECTION:	Long: -107.232903
TWP:	
RANGE:	
PM:	
COUNTY:	Garfield
WATERSHED:	White River
DIVISION:	6
DOW CODE:	22741
USGS MAP:	
USFS MAP:	
	Level and Rod Survey
TAPE WT:	0.0106 lbs / ft
TENSION:	99999 lbs
SLOPE:	0.036 ft / ft

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

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

GL=1	FEATURE	DIST	VERT DEPTH	WATER DEPTH	VEL	A	Q	Tape to Water
			Total Data Points = 27					
	S	0.00	4.45			0.00	0.00	0.00
1	GL	1.10	4.85			0.00	0.00	0.00
		2.10	5.45			0.00	0.00	0.00
	WL	3.30	6.47	0.00	0.00	0.00	0.00	0.00
		4.00	7.05	0.50	0.20	0.43	0.09	6.55
		5.00	6.80	0.30	0.28	0.30	0.08	6.50
	Rock	6.00	6.70	0.20	0.00	0.20	0.00	6.50
		7.00	6.65	0.20	0.00	0.20	0.00	6.45
		8.00	6.75	0.25	0.15	0.25	0.04	6.50
		9.00	6.70	0.20	0.19	0.20	0.04	6.50
		10.00	6.60	0.20	0.19	0.20	0.04	6.40
		11.00	6.70	0.25	0.15	0.25	0.04	6.45
		12.00	6.70	0.20	0.27	0.20	0.05	6.50
		13.00	6.85	0.35	0.31	0.35	0.11	6.50
		14.00	7.10	0.60	0.16	0.60	0.10	6.50
		15.00	6.90	0.40	1.30	0.40	0.52	6.50
		16.00	6.95	0.60	3.29	0.60	1.97	6.35
		17.00	7.05	0.65	1.95	0.65	1.27	6.40
		18.00	7.05	0.65	1.18	0.65	0.77	6.40
	Rock	19.00	6.90	0.50	0.46	0.50	0.23	6.40
	Rock	20.00	7.25	0.80	0.06	0.80	0.05	6.45
		21.00	7.20	0.80	0.24	0.80	0.19	6.40
		22.00	6.60	0.20	0.40	0.15	0.06	6.40
	WL	22.50	6.49	0.00	0.00	0.00	0.00	0.00
		23.60	6.10			0.00	0.00	0.00
1	GL	25.40	5.85			0.00	0.00	0.00
	S	26.60	5.55			0.00	0.00	0.00
					Totals	7.73	5.64	

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

LOCATION INFORMATION

STREAM NAME:	NF White River
XS LOCATION:	At Trappers Lake Bridge/Lodge
XS NUMBER:	Lower 2018
DATE:	10-Jul-18
OBSERVERS:	Birch, Skinner
1/4 SEC:	Lat: 40.002754
SECTION:	Long: -107.232903
TWP:	0
RANGE:	0
PM:	0
COUNTY:	Garfield
WATERSHED:	White River
DIVISION:	6
DOW CODE:	22741
USGS MAP:	0
USFS MAP:	0

SUPPLEMENTAL DATA

*** NOTE ***
Leave TAPE WT and TENSION at defaults for data collected with a survey level and rod

TAPE WT:	0.0106
TENSION:	99999

CHANNEL PROFILE DATA

SLOPE:	0.03069767

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

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

STREAM NAME: NF White River
XS LOCATION: At Trappers Lake Bridge/Lodge
XS NUMBER: Lower 2018

DATA POINTS= 28

VALUES COMPUTED FROM RAW FIELD DATA

FEATURE	DIST	VERT DEPTH	WATER DEPTH	VEL	WETTED PERIM.	WATER DEPTH	AREA (Am)	Q (Qm)	% Q CELL
	2.80	8.40			0.00		0.00	0.00	0.0%
	3.50	8.05			0.00		0.00	0.00	0.0%
1 GL	4.40	8.30			0.00		0.00	0.00	0.0%
	5.00	8.60			0.00		0.00	0.00	0.0%
	5.50	8.90			0.00		0.00	0.00	0.0%
WL	6.00	9.50	0.00	0.00	0.00		0.00	0.00	0.0%
	6.60	9.90	0.35	0.98	0.72	0.35	0.21	0.21	3.7%
	7.20	10.35	0.80	0.98	0.75	0.80	0.48	0.47	8.4%
	7.80	10.20	0.65	0.98	0.62	0.65	0.39	0.38	6.8%
	8.40	10.10	0.60	0.98	0.61	0.60	0.36	0.35	6.3%
	9.00	10.15	0.65	0.98	0.60	0.65	0.39	0.38	6.8%
	9.60	9.95	0.50	0.98	0.63	0.50	0.30	0.29	5.2%
	10.20	10.20	0.70	0.98	0.65	0.70	0.42	0.41	7.3%
	10.80	10.20	0.75	0.98	0.60	0.75	0.45	0.44	7.8%
	11.40	10.15	0.70	0.98	0.60	0.70	0.42	0.41	7.3%
	12.00	10.05	0.50	0.98	0.61	0.50	0.30	0.29	5.2%
	12.60	10.05	0.50	0.98	0.60	0.50	0.30	0.29	5.2%
	13.20	9.90	0.45	0.98	0.62	0.45	0.27	0.27	4.7%
	13.80	10.00	0.50	0.98	0.61	0.50	0.30	0.29	5.2%
	14.40	9.90	0.40	0.98	0.61	0.40	0.36	0.35	6.3%
Rock	15.60	9.00	0.00	0.98	1.50		0.00	0.00	0.0%
	16.60	9.05	0.00	0.98	0.00		0.00	0.00	0.0%
	16.90	9.95	0.40	0.98	0.95	0.40	0.18	0.18	3.1%
	17.50	10.00	0.45	0.98	0.60	0.45	0.27	0.27	4.7%
	18.10	9.95	0.40	0.98	0.60	0.40	0.34	0.33	5.9%
WL	19.20	9.50	0.00	0.00	1.19		0.00	0.00	0.0%
	20.30	8.75			0.00		0.00	0.00	0.0%
1 GL/S	22.50	8.10			0.00		0.00	0.00	0.0%
TOTALS ----------					13.67	0.8 (Max.)	5.74	5.64	100.0%

Manning's n = 0.1486
Hydraulic Radius= 0.41992551

STREAM NAME: NF White River
XS LOCATION: At Trappers Lake Bridge/Lodge
XS NUMBER: Lower 2018

WATER LINE COMPARISON TABLE

WATER LINE	MEAS AREA	COMP AREA	AREA ERROR
	5.74	5.70	-0.7%
9.25	5.74	8.67	51.0%
9.27	5.74	8.42	46.7%
9.29	5.74	8.18	42.4%
9.31	5.74	7.93	38.2%
9.33	5.74	7.69	34.0%
9.35	5.74	7.45	29.8%
9.37	5.74	7.21	25.6%
9.39	5.74	6.97	21.5%
9.41	5.74	6.74	17.4%
9.43	5.74	6.50	13.3%
9.45	5.74	6.27	9.3%
9.46	5.74	6.16	7.3%
9.47	5.74	6.04	5.2%
9.48	5.74	5.93	3.2%
9.49	5.74	5.81	1.3%
9.50	5.74	5.70	-0.7%
9.51	5.74	5.58	-2.7%
9.52	5.74	5.47	-4.7%
9.53	5.74	5.36	-6.6%
9.54	5.74	5.25	-8.6%
9.55	5.74	5.14	-10.5%
9.57	5.74	4.91	-14.4%
9.59	5.74	4.70	-18.2%
9.61	5.74	4.48	-22.0%
9.63	5.74	4.27	-25.7%
9.65	5.74	4.05	-29.4%
9.67	5.74	3.84	-33.0%
9.69	5.74	3.64	-36.6%
9.71	5.74	3.43	-40.2%
9.73	5.74	3.23	-43.8%
9.75	5.74	3.03	-47.3%

WATERLINE AT ZERO
AREA ERROR = 9.496

STREAM NAME: NF White River
XS LOCATION: At Trappers Lake Bridge/Lodge
XS NUMBER: Lower 2018

Thorne-Zevenbergen D84 Correction Applied
User Supplied D84 = 0.66

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

Velocity based on test of R/D84>1

	DIST TO WATER (FT)	TOP WIDTH (FT)	AVG. DEPTH (FT)	MAX. DEPTH (FT)	AREA (SQ FT)	WETTED PERIM. (FT)	PERCENT WET PERIM (%)	HYDR RADIUS (FT)	FLOW (CFS)	AVG. VELOCITY (FT/SEC)
GL	8.30	17.42	1.31	2.05	22.89	19.62	100.0%	1.17	123.41	5.39
	8.50	16.37	1.20	1.85	19.56	18.49	94.2%	1.06	95.22	4.87
	8.55	16.10	1.16	1.80	18.75	18.20	92.8%	1.03	88.71	4.73
	8.60	15.83	1.13	1.75	17.95	17.92	91.3%	1.00	82.46	4.59
	8.65	15.57	1.10	1.70	17.17	17.64	89.9%	0.97	76.41	4.45
	8.70	15.32	1.07	1.65	16.39	17.37	88.5%	0.94	70.60	4.31
	8.75	15.07	1.04	1.60	15.63	17.09	87.1%	0.91	65.04	4.16
	8.80	14.90	1.00	1.55	14.89	16.90	86.1%	0.88	59.44	3.99
	8.85	14.75	0.96	1.50	14.14	16.72	85.2%	0.85	54.07	3.82
	8.90	14.59	0.92	1.45	13.41	16.53	84.2%	0.81	48.94	3.65
	8.95	14.47	0.88	1.40	12.68	16.37	83.4%	0.77	43.98	3.47
	9.00	14.36	0.83	1.35	11.96	16.22	82.7%	0.74	39.25	3.28
	9.05	13.26	0.85	1.30	11.27	15.06	76.7%	0.75	37.20	3.30
	9.10	12.98	0.82	1.25	10.62	14.70	74.9%	0.72	33.55	3.16
	9.15	12.79	0.78	1.20	9.97	14.41	73.4%	0.69	29.93	3.00
	9.20	12.59	0.74	1.15	9.34	14.12	72.0%	0.66	38.28	4.10
	9.25	12.39	0.70	1.10	8.71	13.83	70.5%	0.63	32.66	3.75
	9.30	12.19	0.66	1.05	8.10	13.54	69.0%	0.60	27.62	3.41
	9.35	11.99	0.62	1.00	7.49	13.25	67.5%	0.57	23.12	3.09
	9.40	11.79	0.58	0.95	6.90	12.96	66.1%	0.53	19.15	2.78
	9.45	11.60	0.54	0.90	6.31	12.67	64.6%	0.50	15.66	2.48
WL	9.50	11.40	0.50	0.85	5.74	12.38	63.1%	0.46	12.62	2.20
	9.55	11.12	0.47	0.80	5.18	12.03	61.3%	0.43	10.11	1.95
	9.60	10.84	0.43	0.75	4.63	11.67	59.5%	0.40	7.96	1.72
	9.65	10.56	0.39	0.70	4.09	11.31	57.6%	0.36	6.14	1.50
	9.70	10.28	0.35	0.65	3.57	10.95	55.8%	0.33	4.61	1.29
	9.75	10.00	0.31	0.60	3.06	10.60	54.0%	0.29	3.36	1.10
	9.80	9.72	0.26	0.55	2.57	10.24	52.2%	0.25	2.36	0.92
	9.85	9.44	0.22	0.50	2.09	9.88	50.3%	0.21	1.58	0.76
	9.90	9.16	0.18	0.45	1.63	9.52	48.5%	0.17	0.99	0.61
	9.95	8.21	0.15	0.40	1.19	8.49	43.3%	0.14	0.60	0.50
	10.00	5.97	0.14	0.35	0.84	6.20	31.6%	0.13	0.36	0.43
	10.05	5.30	0.11	0.30	0.56	5.49	28.0%	0.10	0.18	0.33
	10.10	4.07	0.08	0.25	0.33	4.22	21.5%	0.08	0.08	0.24
	10.15	2.60	0.06	0.20	0.17	2.70	13.8%	0.06	0.03	0.15
	10.20	1.48	0.04	0.15	0.07	1.55	7.9%	0.04	0.01	0.08
	10.25	0.55	0.05	0.10	0.03	0.60	3.1%	0.05	0.00	0.04
	10.30	0.29	0.03	0.05	0.01	0.31	1.6%	0.02	0.00	0.01
	10.35	0.02	0.00	0.00	0.00	0.02	0.1%	0.00	0.00	0.00

STREAM NAME: NF White River
XS LOCATION: At Trappers Lake Bridge/Lodge
XS NUMBER: Lower 2018

SUMMARY SHEET

MEASURED FLOW (Qm)=	5.64	cfs
CALCULATED FLOW (Qc)=	6.02	cfs
(Qm-Qc)/Qm * 100 =	-6.8	%
MEASURED WATERLINE (WLm)=	9.50	ft
CALCULATED WATERLINE (WLc)=	9.50	ft
(WLm-WLc)/WLm * 100 =	0.0	%
MAX MEASURED DEPTH (Dm)=	0.80	ft
MAX CALCULATED DEPTH (Dc)=	0.85	ft
(Dm-Dc)/Dm * 100	-6.7	%
MEAN VELOCITY=	1.05	ft/sec
MANNING'S N=	0.149	
SLOPE=	0.03069767	ft/ft
.4 * Qm =	2.3	cfs
2.5 * Qm=	14.1	cfs

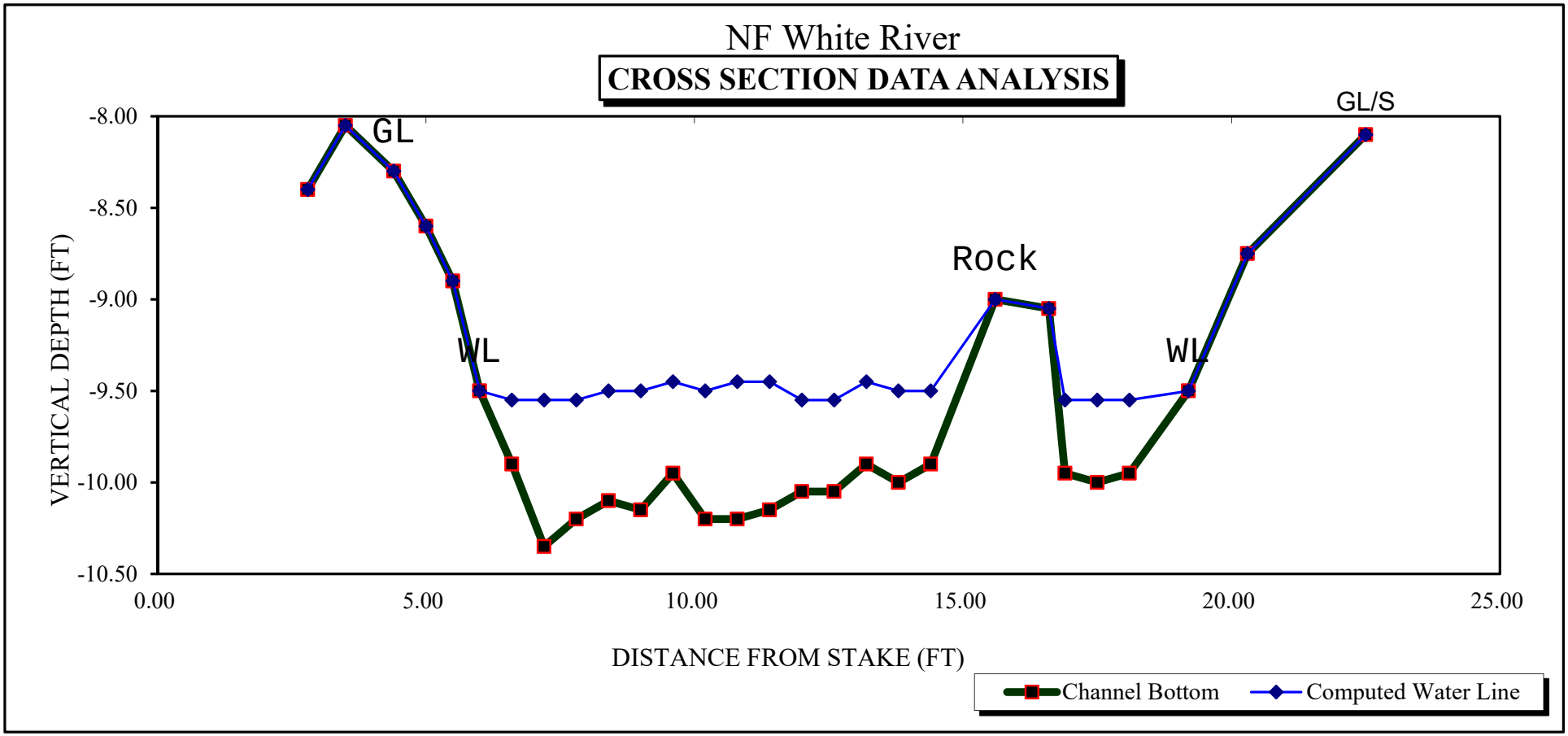
RECOMMENDED INSTREAM FLOW:
==========

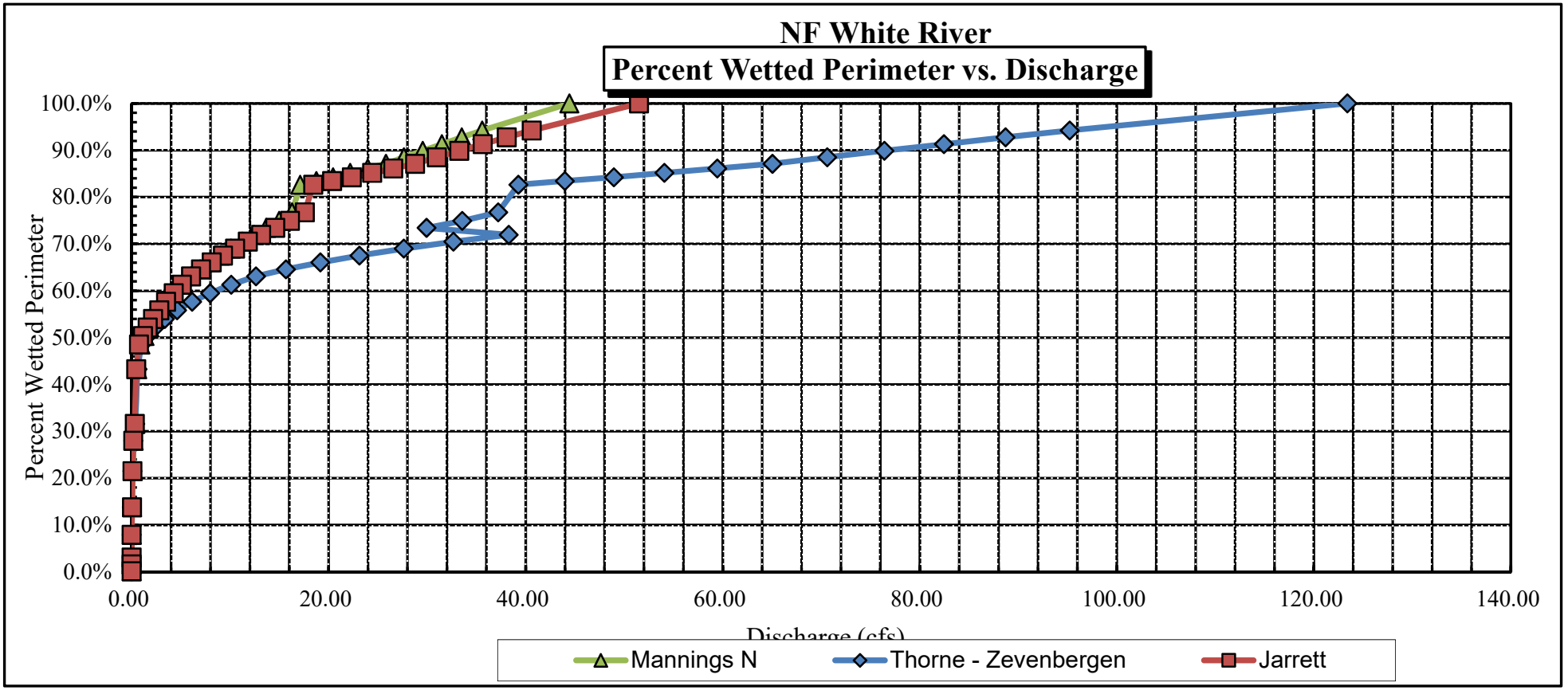
FLOW (CFS)	PERIOD
==========	========
_____	_____
_____	_____
_____	_____
_____	_____

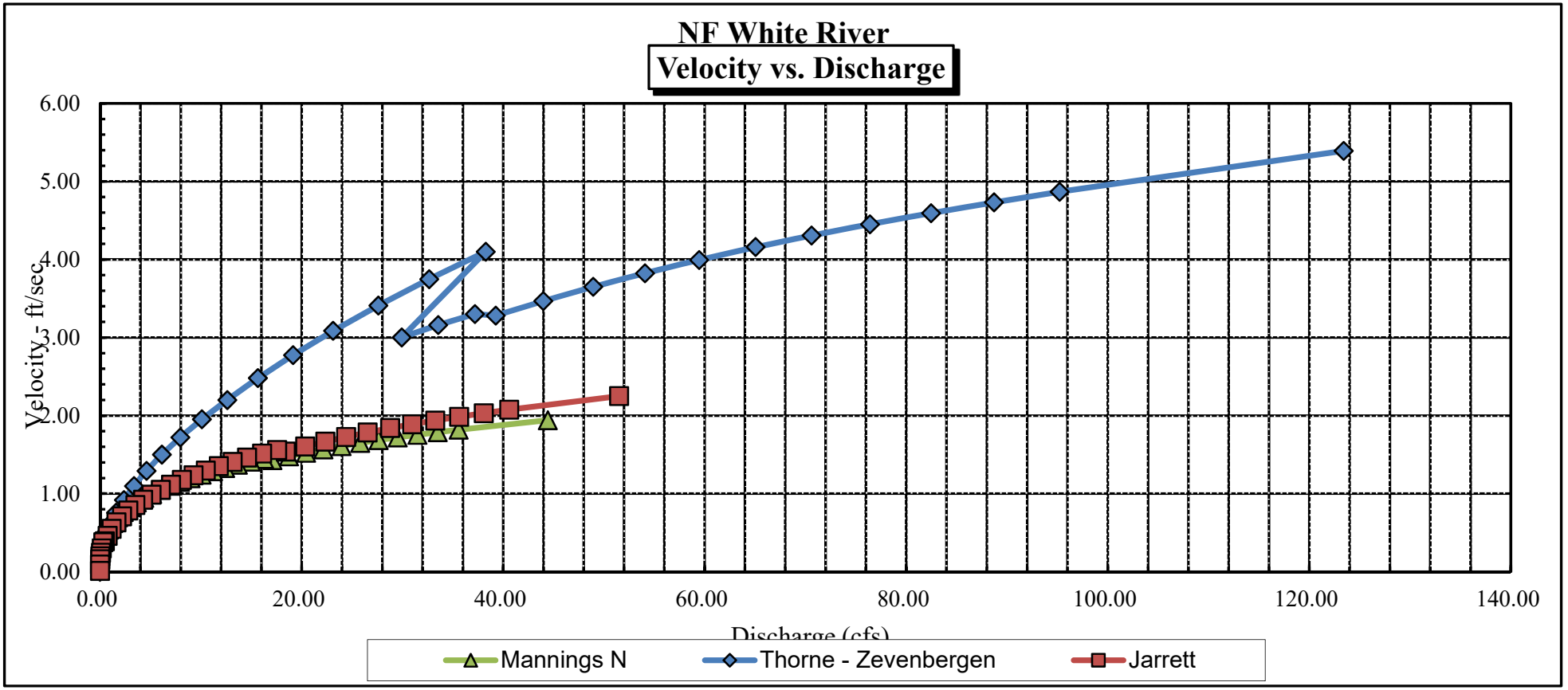
RATIONALE FOR RECOMMENDATION:
==========

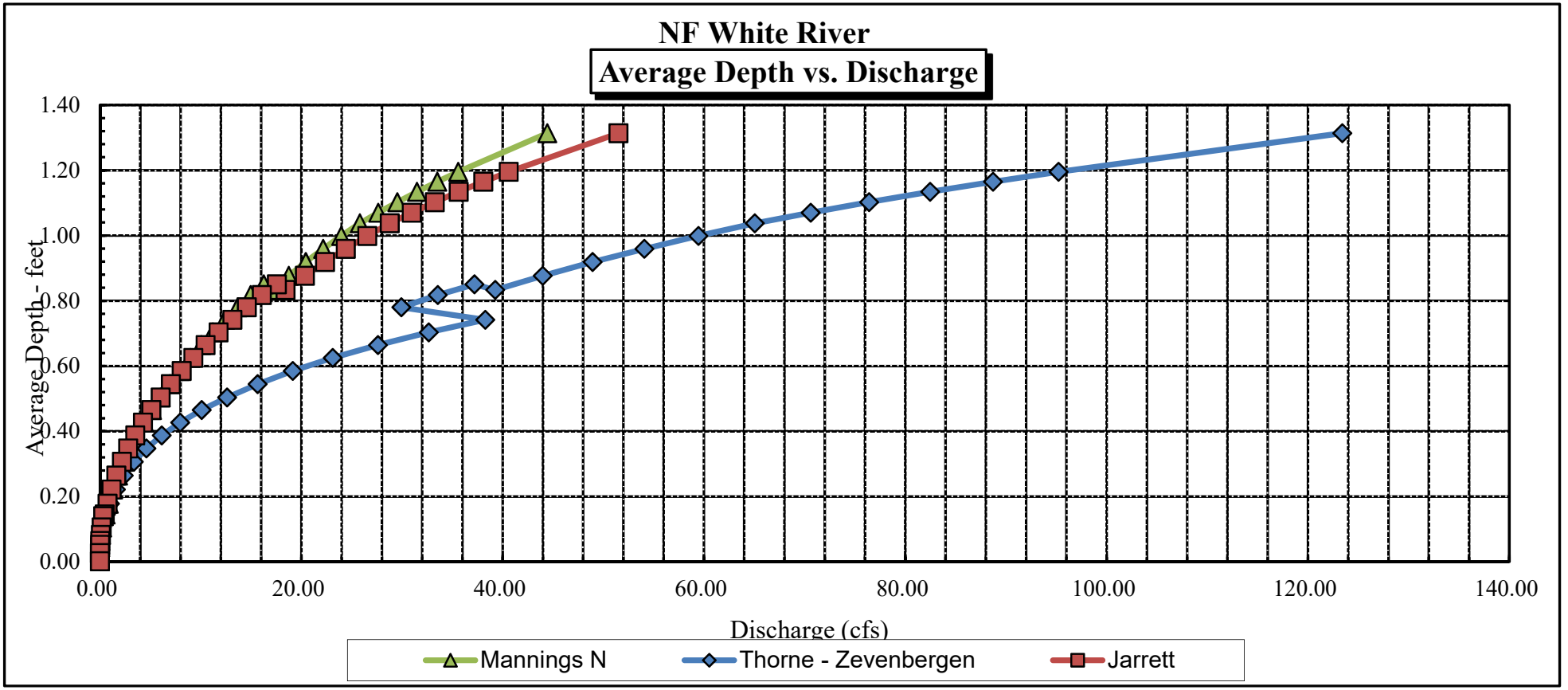
RECOMMENDATION BY: …….. AGENCY…….. DATE:……

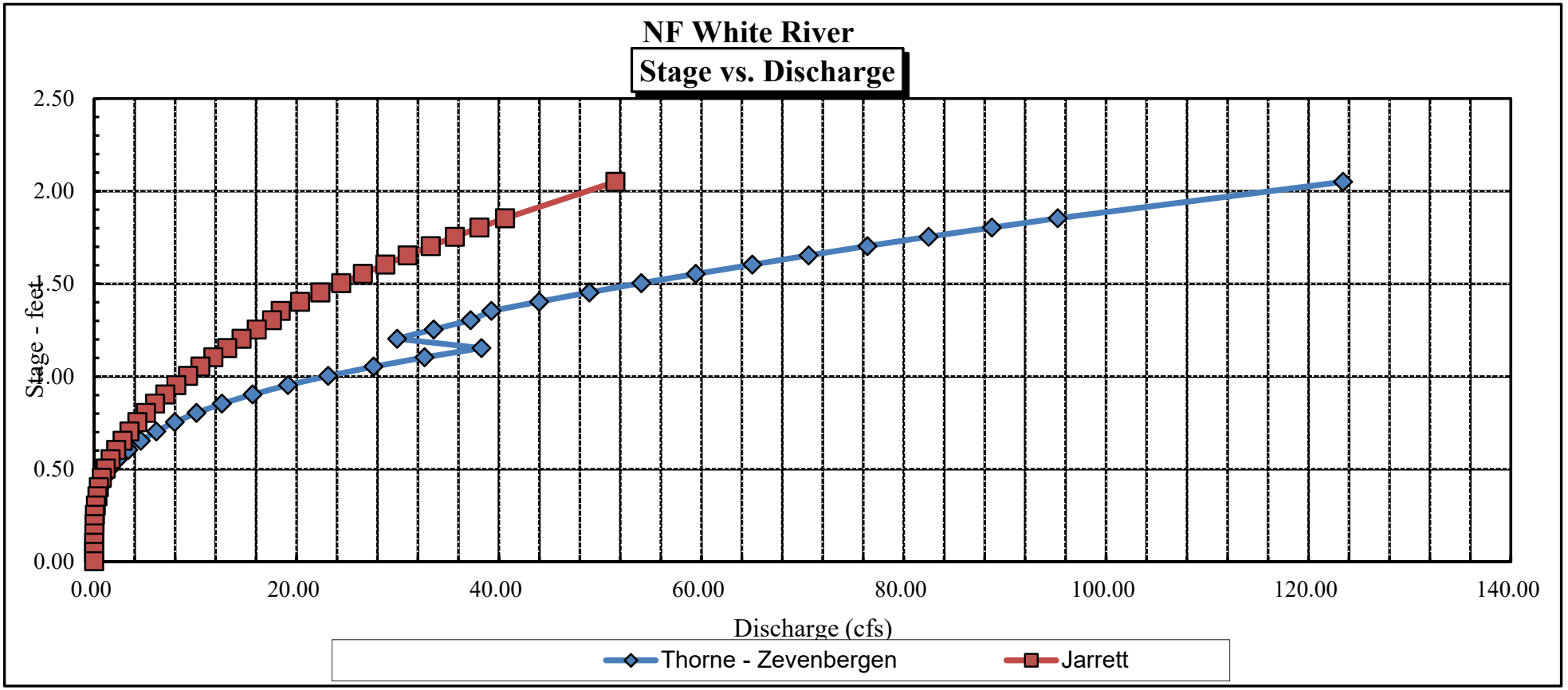
CWCB REVIEW BY: …….. DATE:……


NF White River
CROSS SECTION DATA ANALYSIS
GL
GL/S
WL
Rock
WL
-8.00
-8.50
-9.00
-9.50
-10.00
-10.50
VERTICAL DEPTH (FT)
0.00
5.00
10.00
15.00
20.00
25.00
DISTANCE FROM STAKE (FT)
Channel Bottom
Computed Water Line


NF White River
Percent Wetted Perimeter vs. Discharge
Percent Wetted Perimeter
100.0%
90.0%
80.0%
70.0%
60.0%
50.0%
40.0%
30.0%
20.0%
10.0%
0.0%
0.00
20.00
40.00
60.00
80.00
100.00
120.00
140.00
Discharge (cfs)
Mannings N
Thorne - Zevenbergen
Jarrett


NF White River
Velocity vs. Discharge
Velocity - ft/sec
6.00
5.00
4.00
3.00
2.00
1.00
0.00
0.00
20.00
40.00
60.00
80.00
100.00
120.00
140.00
Discharge (cfs)
Mannings N
Thorne - Zevenbergen
Jarrett


NF White River
Average Depth vs. Discharge
Average Depth - feet
1.40
1.20
1.00
0.80
0.60
0.40
0.20
0.00
0.00
20.00
40.00
60.00
80.00
100.00
120.00
140.00
Discharge (cfs)
Mannings N
Thorne - Zevenbergen
Jarrett


NF White River
Stage vs. Discharge
Stage - feet
2.50
2.00
1.50
1.00
0.50
0.00
0.00
20.00
40.00
60.00
80.00
100.00
120.00
140.00
Discharge (cfs)
Thorne - Zevenbergen
Jarrett

Data Input & Proofing

STREAM NAME:	NF White River
XS LOCATION:	At Trappers Lake Bridge/Lodge
XS NUMBER:	Lower 2018
DATE:	7/10/2018
OBSERVERS:	Birch, Skinner
1/4 SEC:	Lat: 40.002754
SECTION:	Long: -107.232903
TWP:	
RANGE:	
PM:	
COUNTY:	Garfield
WATERSHED:	White River
DIVISION:	6
DOW CODE:	22741
USGS MAP:	
USFS MAP:	
	Level and Rod Survey
TAPE WT:	0.0106 lbs / ft
TENSION:	99999 lbs
SLOPE:	0.030697674 ft / ft

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

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

GL=1	FEATURE	DIST	VERT DEPTH	WATER DEPTH	VEL	A	Q	Tape to Water
			Total Data Points = 28					
		2.80	8.40			0.00	0.00	0.00
		3.50	8.05			0.00	0.00	0.00
1	GL	4.40	8.30			0.00	0.00	0.00
		5.00	8.60			0.00	0.00	0.00
		5.50	8.90			0.00	0.00	0.00
	WL	6.00	9.50	0.00	0.00	0.00	0.00	0.00
		6.60	9.90	0.35	0.98	0.21	0.21	9.55
		7.20	10.35	0.80	0.98	0.48	0.47	9.55
		7.80	10.20	0.65	0.98	0.39	0.38	9.55
		8.40	10.10	0.60	0.98	0.36	0.35	9.50
		9.00	10.15	0.65	0.98	0.39	0.38	9.50
		9.60	9.95	0.50	0.98	0.30	0.29	9.45
		10.20	10.20	0.70	0.98	0.42	0.41	9.50
		10.80	10.20	0.75	0.98	0.45	0.44	9.45
		11.40	10.15	0.70	0.98	0.42	0.41	9.45
		12.00	10.05	0.50	0.98	0.30	0.29	9.55
		12.60	10.05	0.50	0.98	0.30	0.29	9.55
		13.20	9.90	0.45	0.98	0.27	0.27	9.45
		13.80	10.00	0.50	0.98	0.30	0.29	9.50
		14.40	9.90	0.40	0.98	0.36	0.35	9.50
	Rock	15.60	9.00	0.00	0.98	0.00	0.00	0.00
		16.60	9.05	0.00	0.98	0.00	0.00	0.00
		16.90	9.95	0.40	0.98	0.18	0.18	9.55
		17.50	10.00	0.45	0.98	0.27	0.27	9.55
		18.10	9.95	0.40	0.98	0.34	0.33	9.55
	WL	19.20	9.50	0.00	0.00	0.00	0.00	0.00
		20.30	8.75			0.00	0.00	0.00
1	GL/S	22.50	8.10			0.00	0.00	0.00
					Totals	5.74	5.64	

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

LOCATION INFORMATION

STREAM NAME:	North Fork White River
XS LOCATION:	Abv Big Fish Creek Conf
XS NUMBER:	1 Upper (2018)
DATE:	11-Jul-18
OBSERVERS:	Skinner, Birch, Meeker Crew
1/4 SEC:	Lat: 40.027183
SECTION:	Long: -107.273791
TWP:	0
RANGE:	0
PM:	0
COUNTY:	Garfield
WATERSHED:	White River
DIVISION:	6
DOW CODE:	22741
USGS MAP:	0
USFS MAP:	0

SUPPLEMENTAL DATA

TAPE WT:	0.0106
TENSION:	99999

*** NOTE ***
Leave TAPE WT and TENSION at defaults for data collected with a survey level and rod

CHANNEL PROFILE DATA

SLOPE:	0.011875

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

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

STREAM NAME: North Fork White River
XS LOCATION: Abv Big Fish Creek Conf
XS NUMBER: 1 Upper (2018)

DATA POINTS= 32

VALUES COMPUTED FROM RAW FIELD DATA

FEATURE	DIST	VERT DEPTH	WATER DEPTH	VEL	WETTED PERIM.	WATER DEPTH	AREA (Am)	Q (Qm)	% Q CELL
S	0.00	5.30			0.00		0.00	0.00	0.0%
1 GL	0.00	5.30			0.00		0.00	0.00	0.0%
	2.00	5.60			0.00		0.00	0.00	0.0%
	3.00	5.75			0.00		0.00	0.00	0.0%
WL	4.00	5.85			0.00		0.00	0.00	0.0%
	4.80	5.90	0.30	0.05	0.80	0.30	0.24	0.01	0.0%
	5.60	6.40	0.80	0.45	0.94	0.80	0.64	0.29	0.7%
	6.40	6.98	0.95	0.97	0.99	0.95	0.76	0.74	1.7%
	7.20	6.20	0.50	0.96	1.12	0.50	0.40	0.38	0.9%
	8.00	7.45	1.20	1.56	1.48	1.20	0.96	1.50	3.5%
	8.80	7.85	1.75	2.74	0.89	1.75	1.40	3.84	9.0%
	9.60	8.00	2.20	3.27	0.81	2.20	1.76	5.76	13.5%
	10.40	7.95	2.05	3.44	0.80	2.05	1.64	5.64	13.2%
	11.20	8.05	2.10	3.20	0.81	2.10	1.68	5.38	12.6%
	12.00	7.85	2.00	2.58	0.82	2.00	1.60	4.13	9.6%
	12.80	7.80	2.00	2.36	0.80	2.00	1.60	3.78	8.8%
	13.60	7.75	1.90	2.50	0.80	1.90	1.52	3.80	8.9%
	14.40	7.45	1.50	0.61	0.85	1.50	1.20	0.73	1.7%
Rock	15.20	6.05	0.30	3.87	1.61	0.30	0.24	0.93	2.2%
Rock	16.00	6.05	0.30	3.58	0.80	0.30	0.24	0.86	2.0%
	16.80	6.95	0.90	3.31	1.20	0.90	0.72	2.38	5.6%
	17.60	6.90	1.10	1.72	0.80	1.10	0.88	1.51	3.5%
	18.40	6.40	0.70	1.13	0.94	0.70	0.56	0.63	1.5%
	19.20	6.35	0.50	0.71	0.80	0.50	0.40	0.28	0.7%
	20.00	6.20	0.30	0.39	0.81	0.30	0.24	0.09	0.2%
	20.80	6.20	0.20	0.64	0.80	0.20	0.16	0.10	0.2%
	21.60	6.00	0.15	0.18	0.82	0.15	0.12	0.02	0.1%
WL	22.40	5.85	0.00		0.81		0.00	0.00	0.0%
	24.60	5.20			0.00		0.00	0.00	0.0%
	28.00	5.15			0.00		0.00	0.00	0.0%
	31.00	5.20			0.00		0.00	0.00	0.0%
1 GL/S	33.50	5.30			0.00		0.00	0.00	0.0%
TOTALS ----------					21.35	2.2 (Max.)	18.96	42.78	100.0%

Manning's n = 0.0663
Hydraulic Radius= 0.88812186

STREAM NAME: North Fork White River
XS LOCATION: Abv Big Fish Creek Conf
XS NUMBER: 1 Upper (2018)

WATER LINE COMPARISON TABLE

WATER LINE	MEAS AREA	COMP AREA	AREA ERROR
	18.96	19.22	1.4%
5.60	18.96	24.20	27.7%
5.62	18.96	23.78	25.4%
5.64	18.96	23.36	23.2%
5.66	18.96	22.95	21.0%
5.68	18.96	22.54	18.9%
5.70	18.96	22.13	16.7%
5.72	18.96	21.73	14.6%
5.74	18.96	21.33	12.5%
5.76	18.96	20.93	10.4%
5.78	18.96	20.54	8.4%
5.80	18.96	20.16	6.3%
5.81	18.96	19.97	5.3%
5.82	18.96	19.78	4.3%
5.83	18.96	19.59	3.3%
5.84	18.96	19.41	2.4%
5.85	18.96	19.22	1.4%
5.86	18.96	19.04	0.4%
5.87	18.96	18.86	-0.5%
5.88	18.96	18.68	-1.5%
5.89	18.96	18.51	-2.4%
5.90	18.96	18.33	-3.3%
5.92	18.96	17.99	-5.1%
5.94	18.96	17.64	-6.9%
5.96	18.96	17.30	-8.7%
5.98	18.96	16.97	-10.5%
6.00	18.96	16.63	-12.3%
6.02	18.96	16.30	-14.0%
6.04	18.96	15.97	-15.8%
6.06	18.96	15.65	-17.4%
6.08	18.96	15.34	-19.1%
6.10	18.96	15.04	-20.7%

WATERLINE AT ZERO
AREA ERROR = 5.864

STREAM NAME: North Fork White River
XS LOCATION: Abv Big Fish Creek Conf
XS NUMBER: 1 Upper (2018)

Thorne-Zevenbergen D84 Correction Applied
User Supplied D84 = 0.63

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

Velocity based on test of R/D84>1

	DIST TO WATER (FT)	TOP WIDTH (FT)	AVG. DEPTH (FT)	MAX. DEPTH (FT)	AREA (SQ FT)	WETTED PERIM. (FT)	PERCENT WET PERIM (%)	HYDR RADIUS (FT)	FLOW (CFS)	AVG. VELOCITY (FT/SEC)
GL	5.30	24.26	1.28	2.75	31.03	27.33	100.0%	1.14	99.86	3.22
	5.31	24.12	1.27	2.74	30.68	27.18	99.5%	1.13	98.16	3.20
	5.36	23.61	1.25	2.69	29.49	26.67	97.6%	1.11	92.45	3.14
	5.41	23.11	1.23	2.64	28.32	26.15	95.7%	1.08	86.97	3.07
	5.46	22.61	1.20	2.59	27.18	25.64	93.8%	1.06	81.70	3.01
	5.51	22.11	1.18	2.54	26.06	25.13	91.9%	1.04	76.66	2.94
	5.56	21.60	1.16	2.49	24.97	24.61	90.1%	1.01	71.82	2.88
	5.61	21.10	1.13	2.44	23.90	24.10	88.2%	0.99	67.20	2.81
	5.66	20.60	1.11	2.39	22.86	23.58	86.3%	0.97	62.78	2.75
	5.71	20.10	1.09	2.34	21.84	23.07	84.4%	0.95	58.56	2.68
	5.76	19.54	1.07	2.29	20.85	22.51	82.4%	0.93	54.63	2.62
	5.81	18.88	1.05	2.24	19.89	21.83	79.9%	0.91	51.17	2.57
WL	5.86	18.09	1.05	2.19	18.96	21.04	77.0%	0.90	48.13	2.54
	5.91	17.23	1.05	2.14	18.08	20.17	73.8%	0.90	45.50	2.52
	5.96	16.89	1.02	2.09	17.23	19.80	72.5%	0.87	42.03	2.44
	6.01	16.56	0.99	2.04	16.39	19.46	71.2%	0.84	38.69	2.36
	6.06	15.46	1.01	1.99	15.58	18.32	67.0%	0.85	36.93	2.37
	6.11	15.10	0.98	1.94	14.82	17.90	65.5%	0.83	34.11	2.30
	6.16	14.75	0.95	1.89	14.07	17.47	63.9%	0.81	31.44	2.23
	6.21	13.56	0.99	1.84	13.36	16.19	59.2%	0.82	30.34	2.27
	6.26	13.05	0.97	1.79	12.69	15.57	57.0%	0.82	28.37	2.24
	6.31	12.55	0.96	1.74	12.05	14.95	54.7%	0.81	26.52	2.20
	6.36	11.89	0.96	1.69	11.44	14.17	51.9%	0.81	25.05	2.19
	6.41	11.07	0.98	1.64	10.87	13.23	48.4%	0.82	24.05	2.21
	6.46	10.76	0.96	1.59	10.32	12.79	46.8%	0.81	22.33	2.16
	6.51	10.46	0.94	1.54	9.79	12.36	45.2%	0.79	20.70	2.11
	6.56	10.15	0.91	1.49	9.27	11.92	43.6%	0.78	19.15	2.06
	6.61	9.85	0.89	1.44	8.77	11.49	42.0%	0.76	17.69	2.02
	6.66	9.54	0.87	1.39	8.29	11.05	40.4%	0.75	16.30	1.97
	6.71	9.24	0.85	1.34	7.82	10.62	38.9%	0.74	15.00	1.92
	6.76	8.93	0.82	1.29	7.37	10.18	37.3%	0.72	13.77	1.87
	6.81	8.63	0.80	1.24	6.93	9.75	35.7%	0.71	12.62	1.82
	6.86	8.32	0.78	1.19	6.50	9.31	34.1%	0.70	11.54	1.78
	6.91	7.81	0.78	1.14	6.10	8.67	31.7%	0.70	10.79	1.77
	6.96	7.03	0.82	1.09	5.73	7.78	28.5%	0.74	10.51	1.83
	7.01	6.93	0.78	1.04	5.38	7.62	27.9%	0.71	9.38	1.74
	7.06	6.87	0.73	0.99	5.04	7.50	27.4%	0.67	8.24	1.64
	7.11	6.81	0.69	0.94	4.70	7.38	27.0%	0.64	7.18	1.53
	7.16	6.75	0.65	0.89	4.36	7.27	26.6%	0.60	10.36	2.38
	7.21	6.69	0.60	0.84	4.02	7.15	26.2%	0.56	8.37	2.08
	7.26	6.62	0.56	0.79	3.69	7.03	25.7%	0.52	6.67	1.81
	7.31	6.56	0.51	0.74	3.36	6.92	25.3%	0.49	5.22	1.55
	7.36	6.50	0.47	0.69	3.03	6.80	24.9%	0.45	4.01	1.32
	7.41	6.44	0.42	0.64	2.71	6.68	24.4%	0.41	3.01	1.11
	7.46	6.33	0.38	0.59	2.39	6.52	23.9%	0.37	2.22	0.93
	7.51	6.10	0.34	0.54	2.08	6.27	22.9%	0.33	1.64	0.79
	7.56	5.87	0.30	0.49	1.78	6.02	22.0%	0.30	1.17	0.66
	7.61	5.63	0.26	0.44	1.49	5.76	21.1%	0.26	0.80	0.54

STREAM NAME: North Fork White River
XS LOCATION: Abv Big Fish Creek Conf
XS NUMBER: 1 Upper (2018)

SUMMARY SHEET

MEASURED FLOW (Qm)=	42.78	cfs
CALCULATED FLOW (Qc)=	43.20	cfs
(Qm-Qc)/Qm * 100 =	-1.0	%
MEASURED WATERLINE (WLm)=	5.85	ft
CALCULATED WATERLINE (WLc)=	5.86	ft
(WLm-WLc)/WLm * 100 =	-0.2	%
MAX MEASURED DEPTH (Dm)=	2.20	ft
MAX CALCULATED DEPTH (Dc)=	2.19	ft
(Dm-Dc)/Dm * 100	0.7	%
MEAN VELOCITY=	2.28	ft/sec
MANNING'S N=	0.066	
SLOPE=	0.011875	ft/ft
.4 * Qm =	17.1	cfs
2.5 * Qm=	107.0	cfs

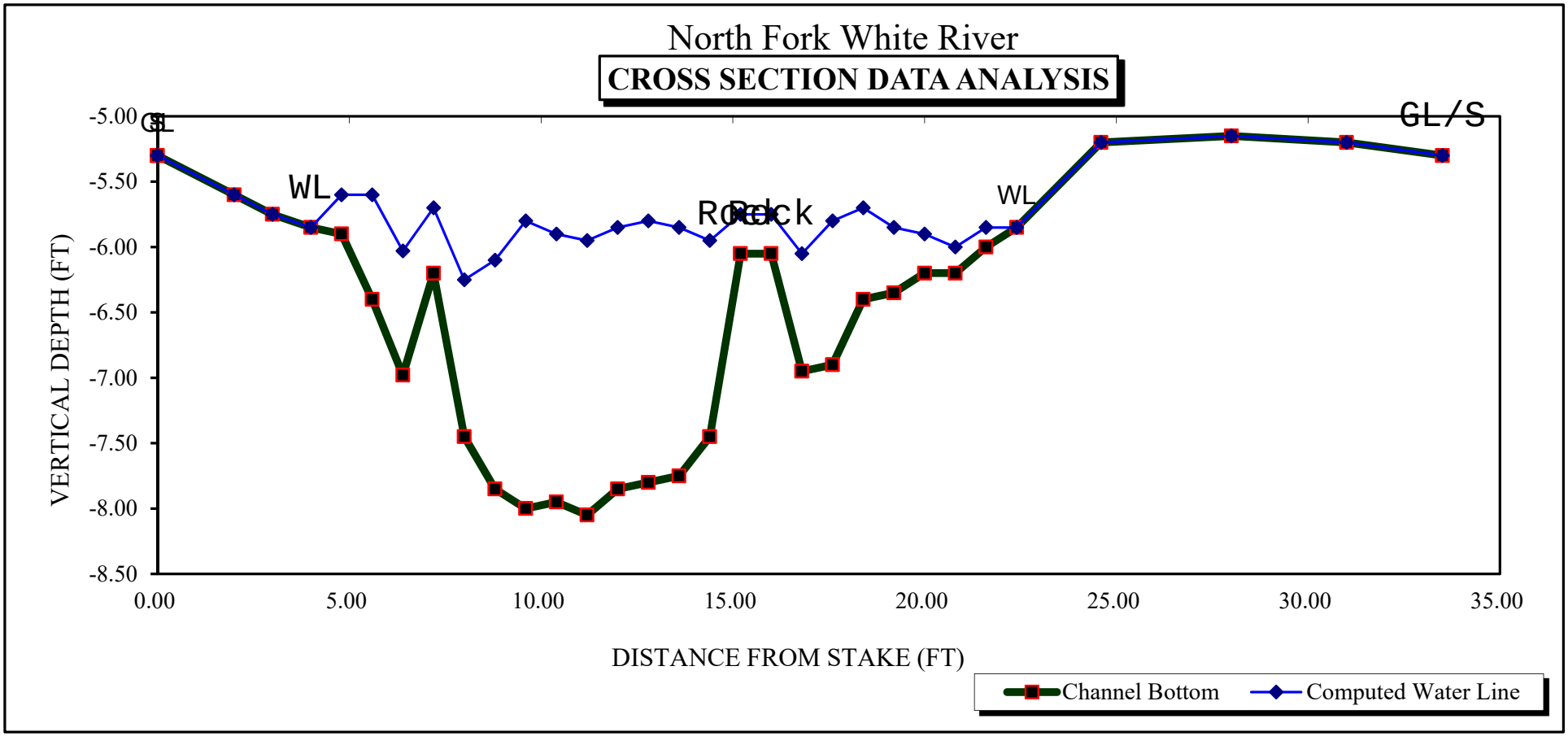
RECOMMENDED INSTREAM FLOW:
==========

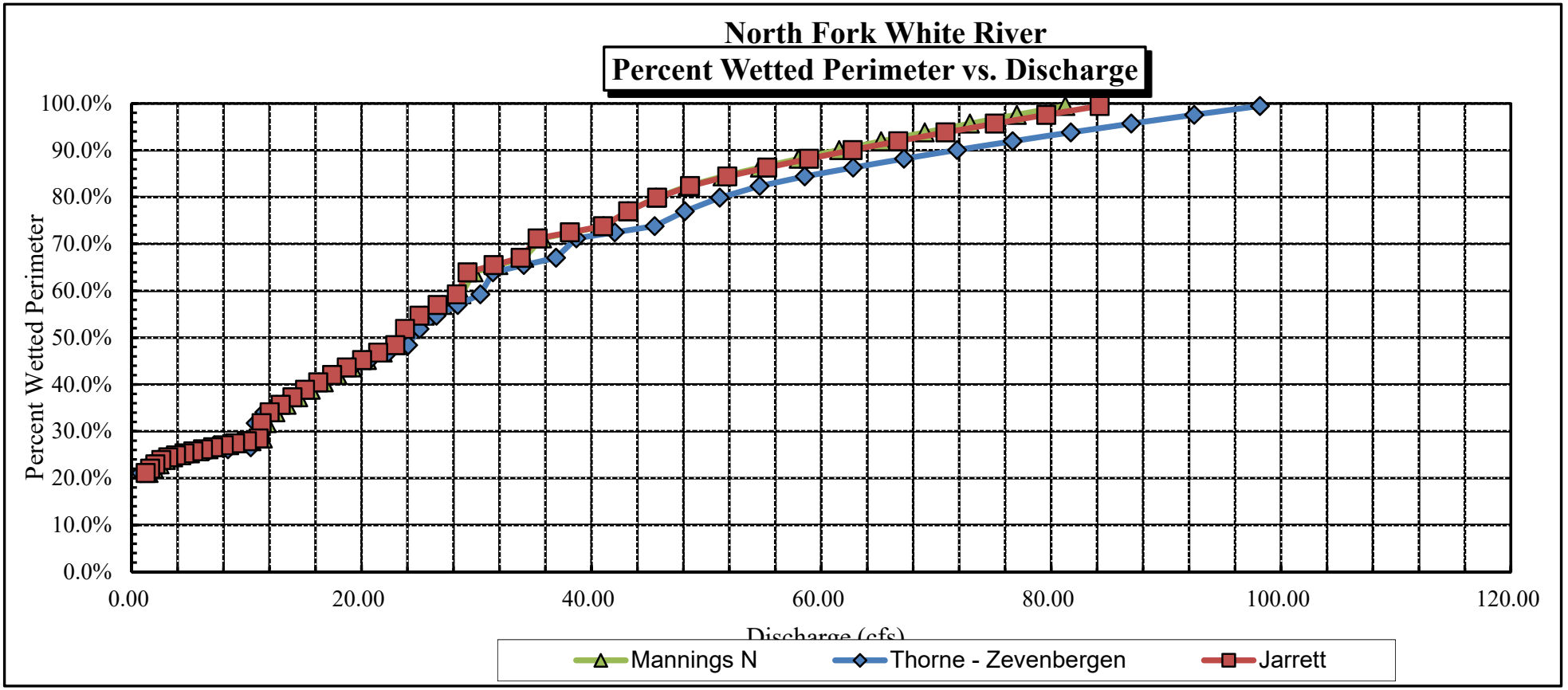
FLOW (CFS)	PERIOD
==========	========
_____	_____
_____	_____
_____	_____
_____	_____

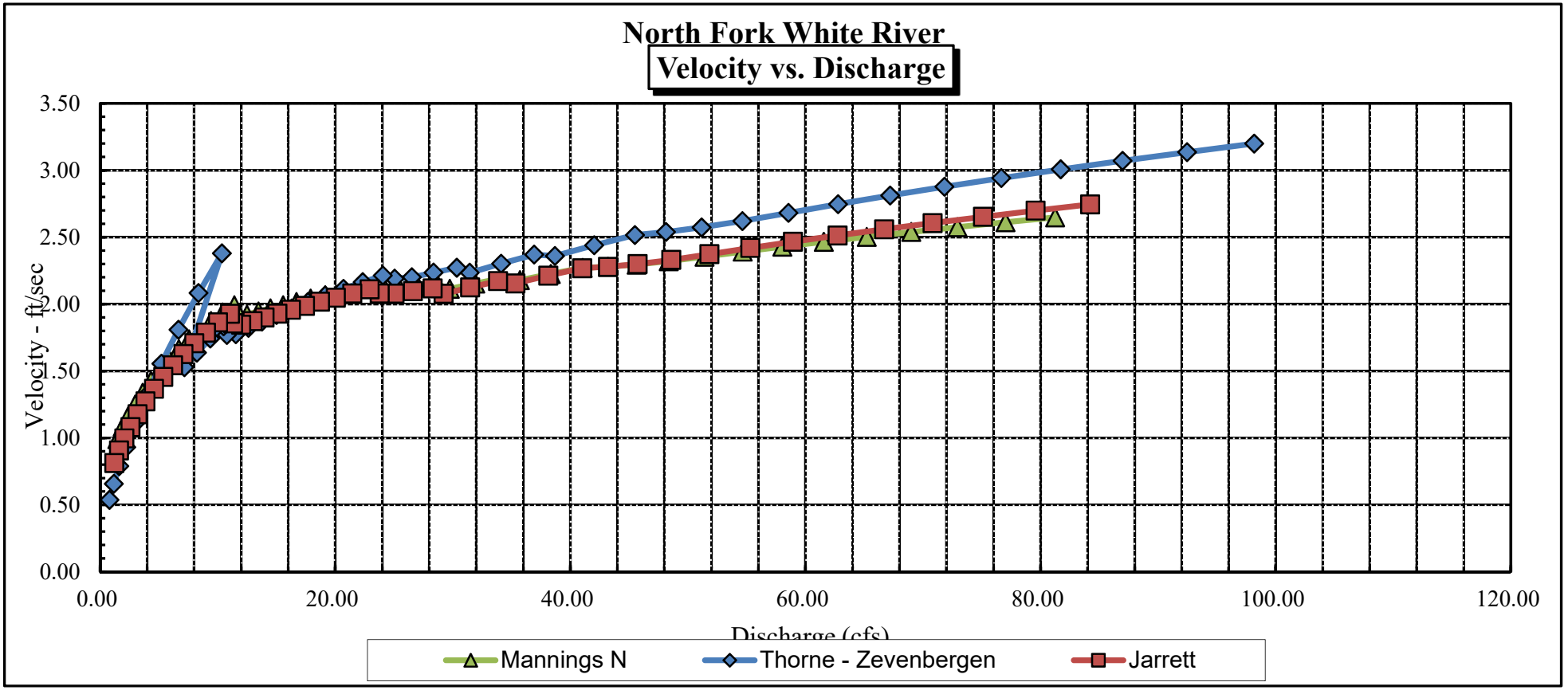
RATIONALE FOR RECOMMENDATION:
==========

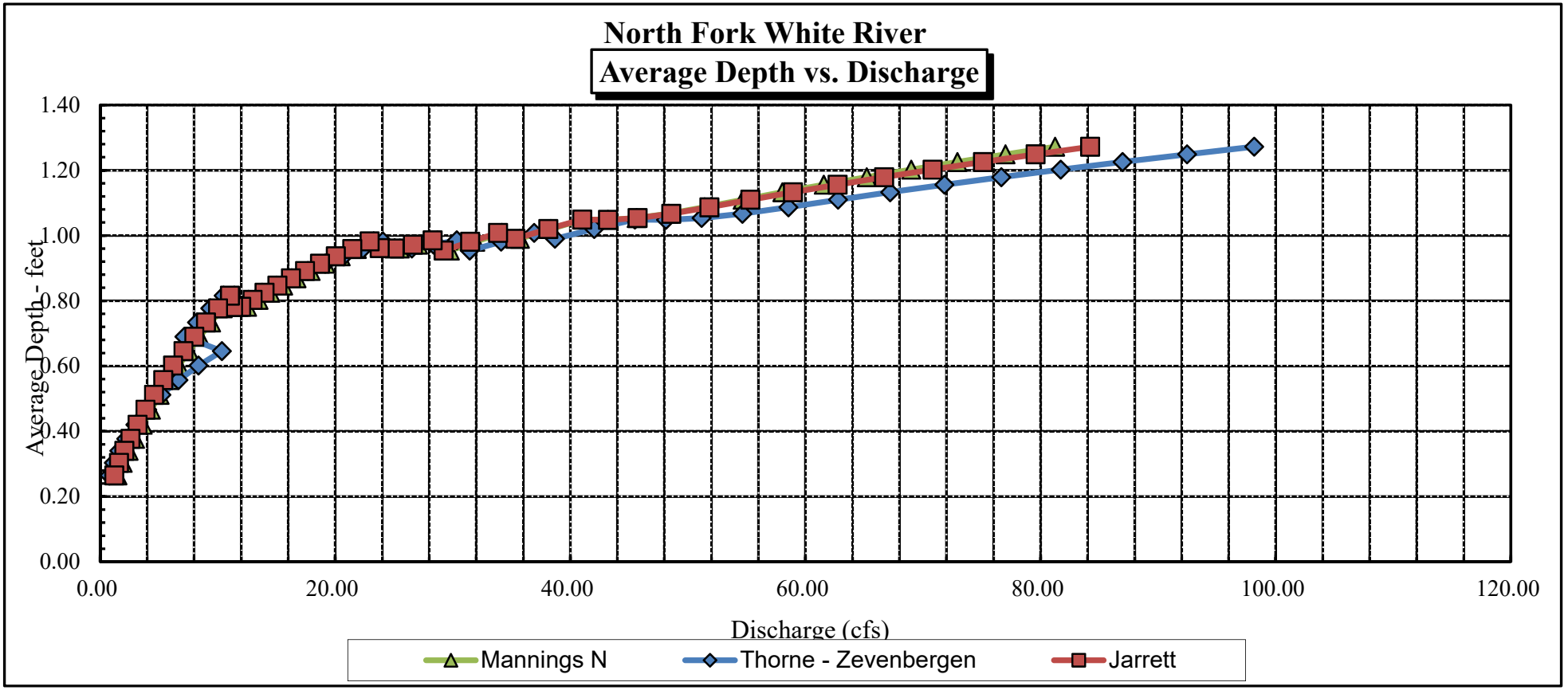
RECOMMENDATION BY: …….. AGENCY…….. DATE:……

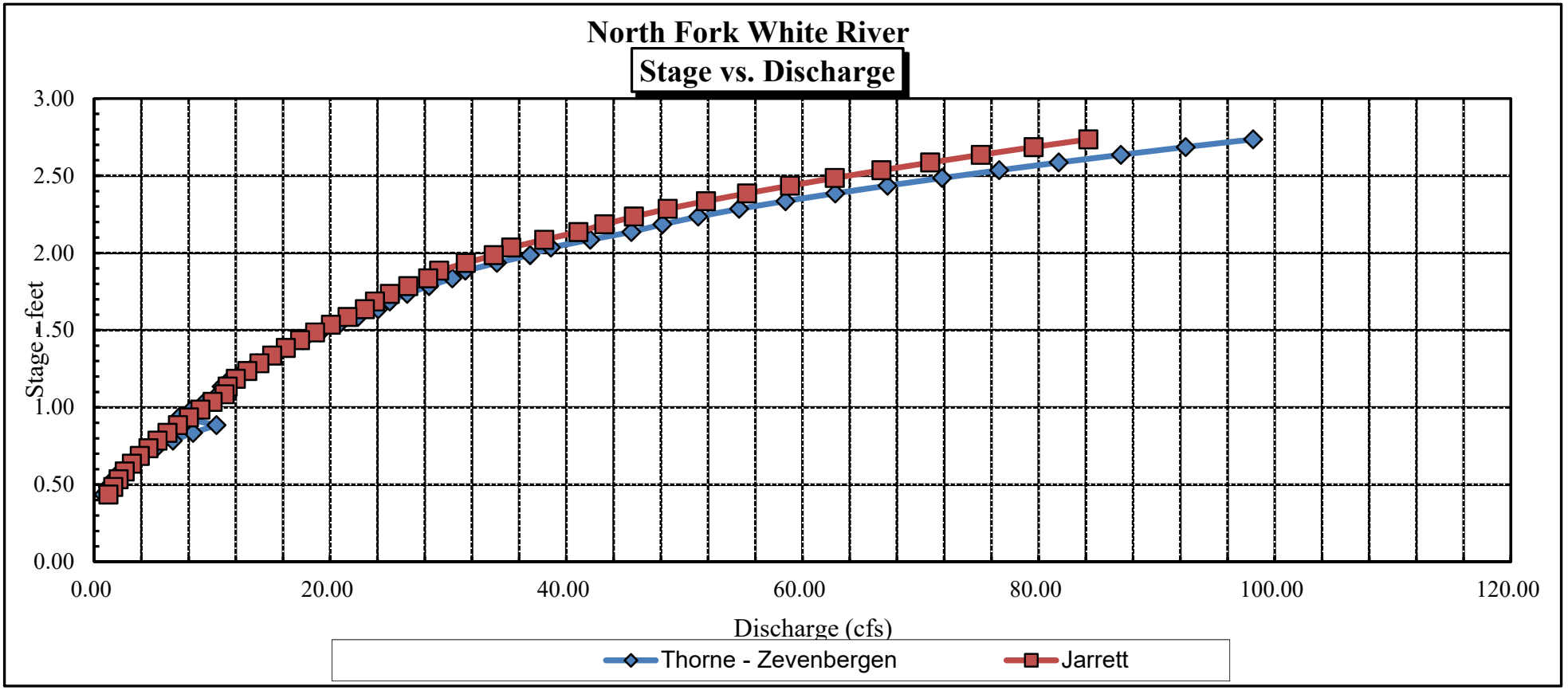
CWCB REVIEW BY: …….. DATE:……


North Fork White River
CROSS SECTION DATA ANALYSIS
GL
GL/S
WL
WL
Rock
Rock
-5.00
-5.50
-6.00
-6.50
-7.00
-7.50
-8.00
-8.50
VERTICAL DEPTH (FT)
0.00
5.00
10.00
15.00
20.00
25.00
30.00
35.00
DISTANCE FROM STAKE (FT)
Channel Bottom
Computed Water Line


North Fork White River
Percent Wetted Perimeter vs. Discharge
Percent Wetted Perimeter
100.0%
90.0%
80.0%
70.0%
60.0%
50.0%
40.0%
30.0%
20.0%
10.0%
0.0%
0.00
20.00
40.00
60.00
80.00
100.00
120.00
Discharge (cfs)
Mannings N
Thorne - Zevenbergen
Jarrett


North Fork White River
Velocity vs. Discharge
Velocity - ft/sec
3.50
3.00
2.50
2.00
1.50
1.00
0.50
0.00
0.00
20.00
40.00
60.00
80.00
100.00
120.00
Discharge (cfs)
Mannings N
Thorne - Zevenbergen
Jarrett


North Fork White River
Average Depth vs. Discharge
Average Depth - feet
1.40
1.20
1.00
0.80
0.60
0.40
0.20
0.00
0.00
20.00
40.00
60.00
80.00
100.00
120.00
Discharge (cfs)
Mannings N
Thorne - Zevenbergen
Jarrett


North Fork White River
Stage vs. Discharge
3.00
2.50
2.00
1.50
1.00
0.50
0.00
Stage - feet
0.00
20.00
40.00
60.00
80.00
100.00
120.00
Discharge (cfs)
Thorne - Zevenbergen
Jarrett

Data Input & Proofing

STREAM NAME:	North Fork White River
XS LOCATION:	Abv Big Fish Creek Conf
XS NUMBER:	1 Upper (2018)
DATE:	7/11/2018
OBSERVERS:	Skinner, Birch, Meeker Crew
1/4 SEC:	Lat: 40.027183
SECTION:	Long: -107.273791
TWP:	
RANGE:	
PM:	
COUNTY:	Garfield
WATERSHED:	White River
DIVISION:	6
DOW CODE:	22741
USGS MAP:	
USFS MAP:	
	Level and Rod Survey
TAPE WT:	0.0106 lbs / ft
TENSION:	99999 lbs
SLOPE:	0.011875 ft / ft

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

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

Total Data Points = 32

GL=1	FEATURE	DIST	VERT DEPTH	WATER DEPTH	VEL	A	Q	Tape to Water
	S	0.00	5.30			0.00	0.00	0.00
1	GL	0.00	5.30			0.00	0.00	0.00
		2.00	5.60			0.00	0.00	0.00
		3.00	5.75			0.00	0.00	0.00
	WL	4.00	5.85			0.00	0.00	0.00
		4.80	5.90	0.30	0.05	0.24	0.01	5.60
		5.60	6.40	0.80	0.45	0.64	0.29	5.60
		6.40	6.98	0.95	0.97	0.76	0.74	6.03
		7.20	6.20	0.50	0.96	0.40	0.38	5.70
		8.00	7.45	1.20	1.56	0.96	1.50	6.25
		8.80	7.85	1.75	2.74	1.40	3.84	6.10
		9.60	8.00	2.20	3.27	1.76	5.76	5.80
		10.40	7.95	2.05	3.44	1.64	5.64	5.90
		11.20	8.05	2.10	3.20	1.68	5.38	5.95
		12.00	7.85	2.00	2.58	1.60	4.13	5.85
		12.80	7.80	2.00	2.36	1.60	3.78	5.80
		13.60	7.75	1.90	2.50	1.52	3.80	5.85
		14.40	7.45	1.50	0.61	1.20	0.73	5.95
	Rock	15.20	6.05	0.30	3.87	0.24	0.93	5.75
	Rock	16.00	6.05	0.30	3.58	0.24	0.86	5.75
		16.80	6.95	0.90	3.31	0.72	2.38	6.05
		17.60	6.90	1.10	1.72	0.88	1.51	5.80
		18.40	6.40	0.70	1.13	0.56	0.63	5.70
		19.20	6.35	0.50	0.71	0.40	0.28	5.85
		20.00	6.20	0.30	0.39	0.24	0.09	5.90
		20.80	6.20	0.20	0.64	0.16	0.10	6.00
		21.60	6.00	0.15	0.18	0.12	0.02	5.85
	WL	22.40	5.85	0.00		0.00	0.00	0.00
		24.60	5.20			0.00	0.00	0.00
		28.00	5.15			0.00	0.00	0.00
		31.00	5.20			0.00	0.00	0.00
1	GL/S	33.50	5.30			0.00	0.00	0.00
					Totals	18.96	42.78	

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

LOCATION INFORMATION

STREAM NAME:	NF White River
XS LOCATION:	Abv Big Fish Creek
XS NUMBER:	2 Lower (2018)
DATE:	11-Jul-18
OBSERVERS:	Birch, Skinner, Meeker Crew
1/4 SEC:	Lat: 40.026600
SECTION:	Long: -107.272289
TWP:	0
RANGE:	0
PM:	0
COUNTY:	Garfield
WATERSHED:	White River
DIVISION:	3
DOW CODE:	22741
USGS MAP:	0
USFS MAP:	0

SUPPLEMENTAL DATA

TAPE WT:	0.0106
TENSION:	99999

*** NOTE ***
Leave TAPE WT and TENSION at defaults for data collected with a survey level and rod

CHANNEL PROFILE DATA

SLOPE:	0.03666667

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

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

STREAM NAME: NF White River
XS LOCATION: Abv Big Fish Creek
XS NUMBER: 2 Lower (2018)

DATA POINTS= 30

VALUES COMPUTED FROM RAW FIELD DATA

	FEATURE	DIST	VERT DEPTH	WATER DEPTH	VEL	WETTED PERIM.	WATER DEPTH	AREA (Am)	Q (Qm)	% Q CELL
	S	0.00	2.70			0.00		0.00	0.00	0.0%
		1.90	3.30			0.00		0.00	0.00	0.0%
1	GL	2.50	3.35			0.00		0.00	0.00	0.0%
		3.40	3.95			0.00		0.00	0.00	0.0%
	WL	4.50	4.16	0.00	1.38	0.00		0.00	0.00	0.0%
		6.50	4.45	0.30	1.38	2.02	0.30	0.60	0.83	1.9%
		8.50	4.80	0.70	1.38	2.03	0.70	1.40	1.94	4.5%
		10.50	5.15	1.20	1.38	2.03	1.20	2.40	3.32	7.8%
		12.50	5.05	1.10	1.38	2.00	1.10	2.20	3.04	7.1%
		14.50	5.05	1.00	1.38	2.00	1.00	2.00	2.77	6.5%
		16.50	5.40	0.20	1.38	2.03	0.20	0.40	0.55	1.3%
		18.50	5.05	0.80	1.38	2.03	0.80	1.60	2.21	5.2%
		20.50	5.25	0.95	1.38	2.01	0.95	1.90	2.63	6.1%
		22.50	4.85	0.65	1.38	2.04	0.65	1.30	1.80	4.2%
		24.50	4.85	0.70	1.38	2.00	0.70	1.40	1.94	4.5%
		26.50	4.65	0.40	1.38	2.01	0.40	0.80	1.11	2.6%
		28.50	4.85	0.60	1.38	2.01	0.60	1.20	1.66	3.9%
		30.50	4.70	0.30	1.38	2.01	0.30	0.60	0.83	1.9%
		32.50	4.60	0.20	1.38	2.00	0.20	0.40	0.55	1.3%
		34.50	4.80	0.40	1.38	2.01	0.40	0.80	1.11	2.6%
		36.50	4.95	0.45	1.38	2.01	0.45	0.90	1.25	2.9%
		38.50	5.00	0.50	1.38	2.00	0.50	1.00	1.38	3.2%
		40.50	5.60	1.30	1.38	2.09	1.30	2.47	3.42	8.0%
	Log	42.30	5.65	1.75	1.38	1.80	1.75	3.33	4.60	10.8%
		44.30	5.90	1.35	1.38	2.02	1.35	3.85	5.32	12.4%
		48.00	4.40	0.15	1.38	3.99	0.15	0.32	0.44	1.0%
		48.50	4.30	0.05	1.38	0.51	0.05	0.06	0.09	0.2%
	WL	50.50	4.16	0.00	1.38	2.00		0.00	0.00	0.0%
1	GL	53.70	3.15			0.00		0.00	0.00	0.0%
	S	55.50	2.65			0.00		0.00	0.00	0.0%
	TOTALS ----------					46.65	1.75 (Max.)	30.92	42.78	100.0%

Manning's n = 0.1563
Hydraulic Radius= 0.66280154

STREAM NAME: NF White River
XS LOCATION: Abv Big Fish Creek
XS NUMBER: 2 Lower (2018)

WATER LINE COMPARISON TABLE

WATER LINE	MEAS AREA	COMP AREA	AREA ERROR
	30.92	36.67	18.6%
3.91	30.92	48.43	56.6%
3.93	30.92	47.47	53.5%
3.95	30.92	46.51	50.4%
3.97	30.92	45.56	47.3%
3.99	30.92	44.61	44.3%
4.01	30.92	43.66	41.2%
4.03	30.92	42.72	38.2%
4.05	30.92	41.78	35.1%
4.07	30.92	40.84	32.1%
4.09	30.92	39.91	29.1%
4.11	30.92	38.98	26.1%
4.12	30.92	38.51	24.6%
4.13	30.92	38.05	23.1%
4.14	30.92	37.59	21.6%
4.15	30.92	37.13	20.1%
4.16	30.92	36.67	18.6%
4.17	30.92	36.21	17.1%
4.18	30.92	35.75	15.6%
4.19	30.92	35.30	14.2%
4.20	30.92	34.84	12.7%
4.21	30.92	34.39	11.2%
4.23	30.92	33.50	8.3%
4.25	30.92	32.61	5.5%
4.27	30.92	31.73	2.6%
4.29	30.92	30.86	-0.2%
4.31	30.92	30.00	-3.0%
4.33	30.92	29.15	-5.7%
4.35	30.92	28.30	-8.5%
4.37	30.92	27.45	-11.2%
4.39	30.92	26.61	-13.9%
4.41	30.92	25.77	-16.7%

WATERLINE AT ZERO
AREA ERROR = 4.289

STREAM NAME: NF White River
XS LOCATION: Abv Big Fish Creek
XS NUMBER: 2 Lower (2018)

Thorne-Zevenbergen D84 Correction Applied
User Supplied D84 = 0.63

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

Velocity based on test of R/D84>1

	DIST TO WATER (FT)	TOP WIDTH (FT)	AVG. DEPTH (FT)	MAX. DEPTH (FT)	AREA (SQ FT)	WETTED PERIM. (FT)	PERCENT WET PERIM (%)	HYDR RADIUS (FT)	FLOW (CFS)	AVG. VELOCITY (FT/SEC)
GL	3.35	50.57	1.50	2.55	76.01	51.54	100.0%	1.47	553.23	7.28
	3.39	50.39	1.47	2.51	74.06	51.34	99.6%	1.44	528.13	7.13
	3.44	50.15	1.43	2.46	71.54	51.09	99.1%	1.40	496.52	6.94
	3.49	49.92	1.38	2.41	69.04	50.83	98.6%	1.36	465.80	6.75
	3.54	49.69	1.34	2.36	66.55	50.58	98.1%	1.32	435.97	6.55
	3.59	49.45	1.30	2.31	64.07	50.32	97.6%	1.27	407.05	6.35
	3.64	49.22	1.25	2.26	61.61	50.06	97.1%	1.23	379.03	6.15
	3.69	48.99	1.21	2.21	59.15	49.81	96.6%	1.19	351.93	5.95
	3.74	48.75	1.16	2.16	56.71	49.55	96.1%	1.14	325.75	5.74
	3.79	48.52	1.12	2.11	54.28	49.29	95.6%	1.10	300.49	5.54
	3.84	48.28	1.07	2.06	51.85	49.04	95.1%	1.06	276.16	5.33
	3.89	48.05	1.03	2.01	49.45	48.78	94.6%	1.01	252.77	5.11
	3.94	47.82	0.98	1.96	47.05	48.53	94.1%	0.97	230.32	4.90
	3.99	47.44	0.94	1.91	44.67	48.13	93.4%	0.93	209.39	4.69
	4.04	47.02	0.90	1.86	42.31	47.70	92.5%	0.89	189.54	4.48
	4.09	46.60	0.86	1.81	39.97	47.27	91.7%	0.85	170.63	4.27
	4.14	46.18	0.82	1.76	37.65	46.83	90.9%	0.80	152.66	4.06
	4.19	45.39	0.78	1.71	35.35	46.04	89.3%	0.77	136.67	3.87
	4.24	44.33	0.75	1.66	33.11	44.97	87.3%	0.74	122.33	3.69
WL	4.29	43.27	0.71	1.61	30.92	43.91	85.2%	0.70	108.85	3.52
	4.34	42.57	0.68	1.56	28.78	43.20	83.8%	0.67	95.41	3.32
	4.39	41.98	0.64	1.51	26.66	42.60	82.6%	0.63	75.24	2.82
	4.44	41.48	0.59	1.46	24.58	42.09	81.7%	0.58	63.46	2.58
	4.49	41.06	0.55	1.41	22.51	41.65	80.8%	0.54	52.84	2.35
	4.54	40.65	0.50	1.36	20.47	41.23	80.0%	0.50	43.47	2.12
	4.59	40.24	0.46	1.31	18.45	40.81	79.2%	0.45	35.29	1.91
	4.64	38.67	0.43	1.26	16.47	39.22	76.1%	0.42	29.26	1.78
	4.69	35.99	0.41	1.21	14.60	36.52	70.8%	0.40	24.83	1.70
	4.74	33.34	0.39	1.16	12.87	33.84	65.7%	0.38	20.91	1.62
	4.79	30.76	0.37	1.11	11.26	31.24	60.6%	0.36	17.42	1.55
	4.84	28.06	0.35	1.06	9.79	28.51	55.3%	0.34	14.47	1.48
	4.89	24.41	0.35	1.01	8.51	24.85	48.2%	0.34	12.60	1.48
	4.94	23.09	0.32	0.96	7.33	23.50	45.6%	0.31	9.83	1.34
	4.99	20.73	0.30	0.91	6.23	21.12	41.0%	0.29	7.87	1.26
	5.04	19.49	0.27	0.86	5.23	19.86	38.5%	0.26	5.89	1.13
	5.09	15.06	0.29	0.81	4.38	15.39	29.9%	0.28	5.26	1.20
	5.14	12.16	0.30	0.76	3.70	12.46	24.2%	0.30	4.63	1.25
	5.19	10.26	0.31	0.71	3.15	10.52	20.4%	0.30	3.95	1.26
	5.24	8.65	0.31	0.66	2.67	8.88	17.2%	0.30	3.37	1.26
	5.29	7.62	0.30	0.61	2.27	7.82	15.2%	0.29	2.71	1.19
	5.34	6.76	0.28	0.56	1.91	6.93	13.4%	0.28	2.10	1.10
	5.39	5.89	0.27	0.51	1.60	6.04	11.7%	0.26	1.63	1.02
	5.44	5.48	0.24	0.46	1.31	5.61	10.9%	0.23	1.13	0.86
	5.49	5.19	0.20	0.41	1.05	5.30	10.3%	0.20	0.71	0.68
	5.54	4.90	0.16	0.36	0.80	4.99	9.7%	0.16	0.41	0.52
	5.59	4.61	0.12	0.31	0.56	4.68	9.1%	0.12	0.21	0.38
	5.64	3.05	0.12	0.26	0.36	3.12	6.0%	0.12	0.11	0.31
	5.69	2.21	0.11	0.21	0.23	2.27	4.4%	0.10	0.06	0.24
	5.74	1.69	0.08	0.16	0.14	1.73	3.4%	0.08	0.02	0.16
	5.79	1.16	0.06	0.11	0.06	1.19	2.3%	0.05	0.01	0.09
	5.84	0.64	0.03	0.06	0.02	0.66	1.3%	0.03	0.00	0.03
	5.89	0.12	0.01	0.01	0.00	0.12	0.2%	0.01	0.00	0.00

STREAM NAME: NF White River
XS LOCATION: Abv Big Fish Creek
XS NUMBER: 2 Lower (2018)

SUMMARY SHEET

MEASURED FLOW (Qm)=	42.78	cfs
CALCULATED FLOW (Qc)=	44.54	cfs
(Qm-Qc)/Qm * 100 =	-4.1	%
MEASURED WATERLINE (WLm)=	4.16	ft
CALCULATED WATERLINE (WLc)=	4.29	ft
(WLm-WLc)/WLm * 100 =	-3.1	%
MAX MEASURED DEPTH (Dm)=	1.75	ft
MAX CALCULATED DEPTH (Dc)=	1.61	ft
(Dm-Dc)/Dm * 100	7.9	%
MEAN VELOCITY=	1.44	ft/sec
MANNING'S N=	0.156	
SLOPE=	0.03666667	ft/ft
.4 * Qm =	17.1	cfs
2.5 * Qm=	107.0	cfs

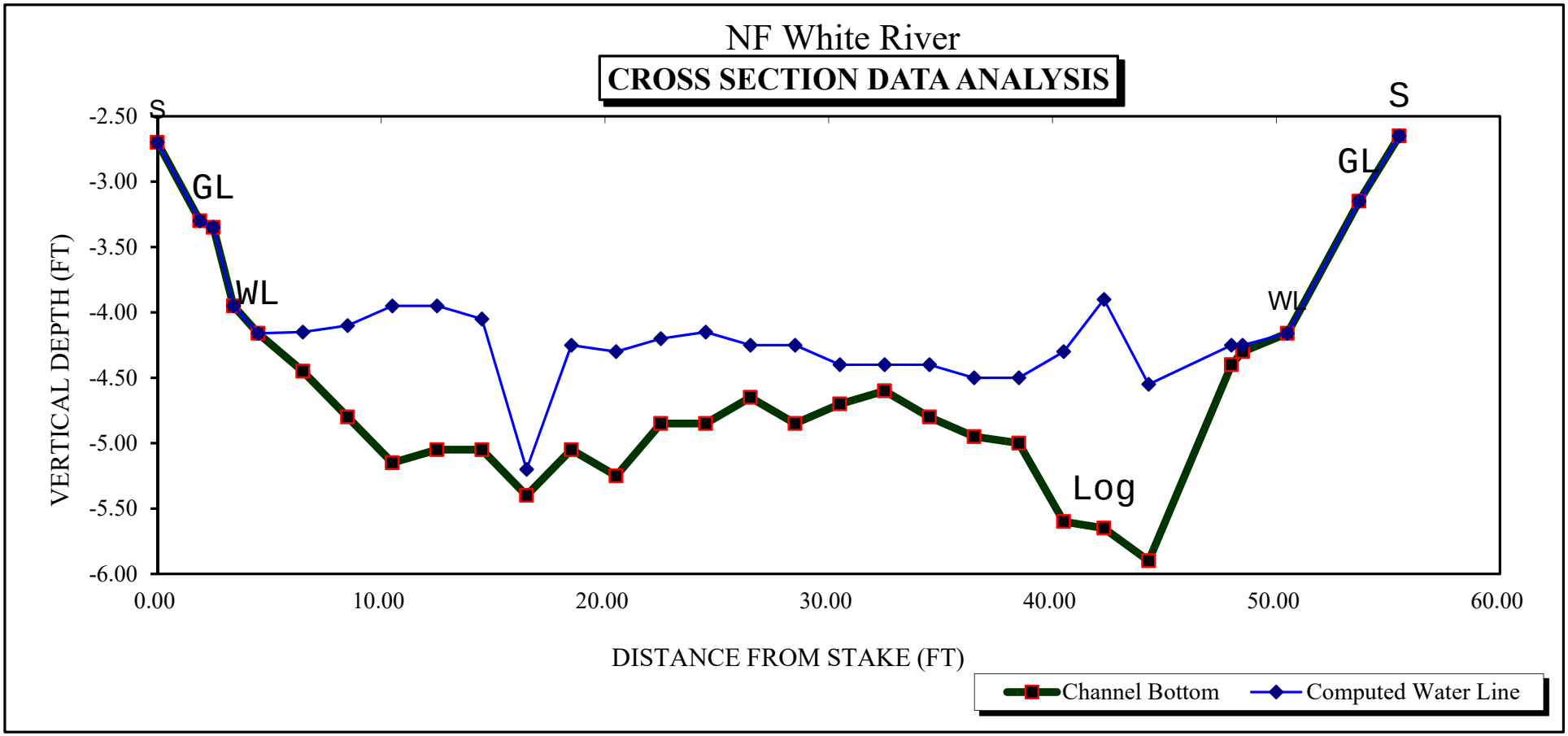
RECOMMENDED INSTREAM FLOW:
============================

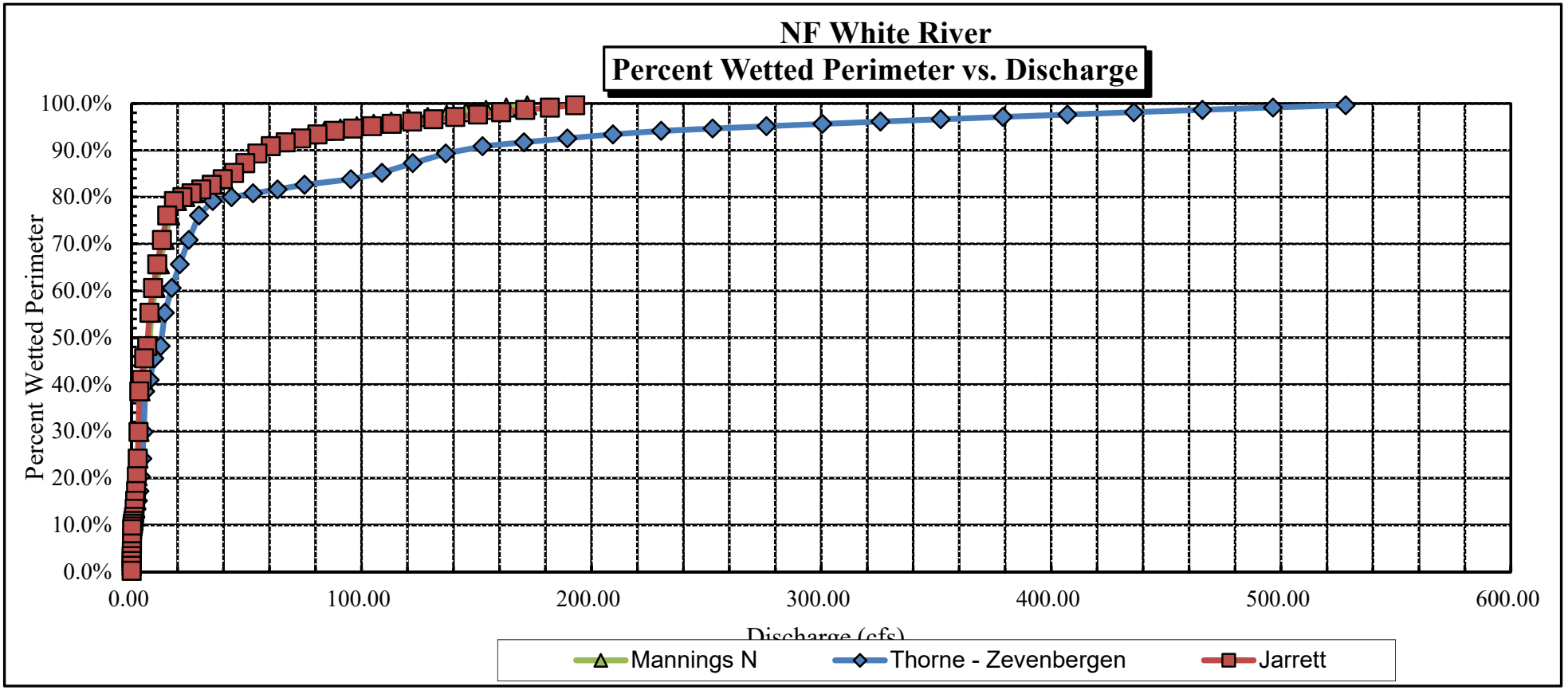
FLOW (CFS)	PERIOD
===========	========
____________________	____________________
____________________	____________________
____________________	____________________
____________________	____________________

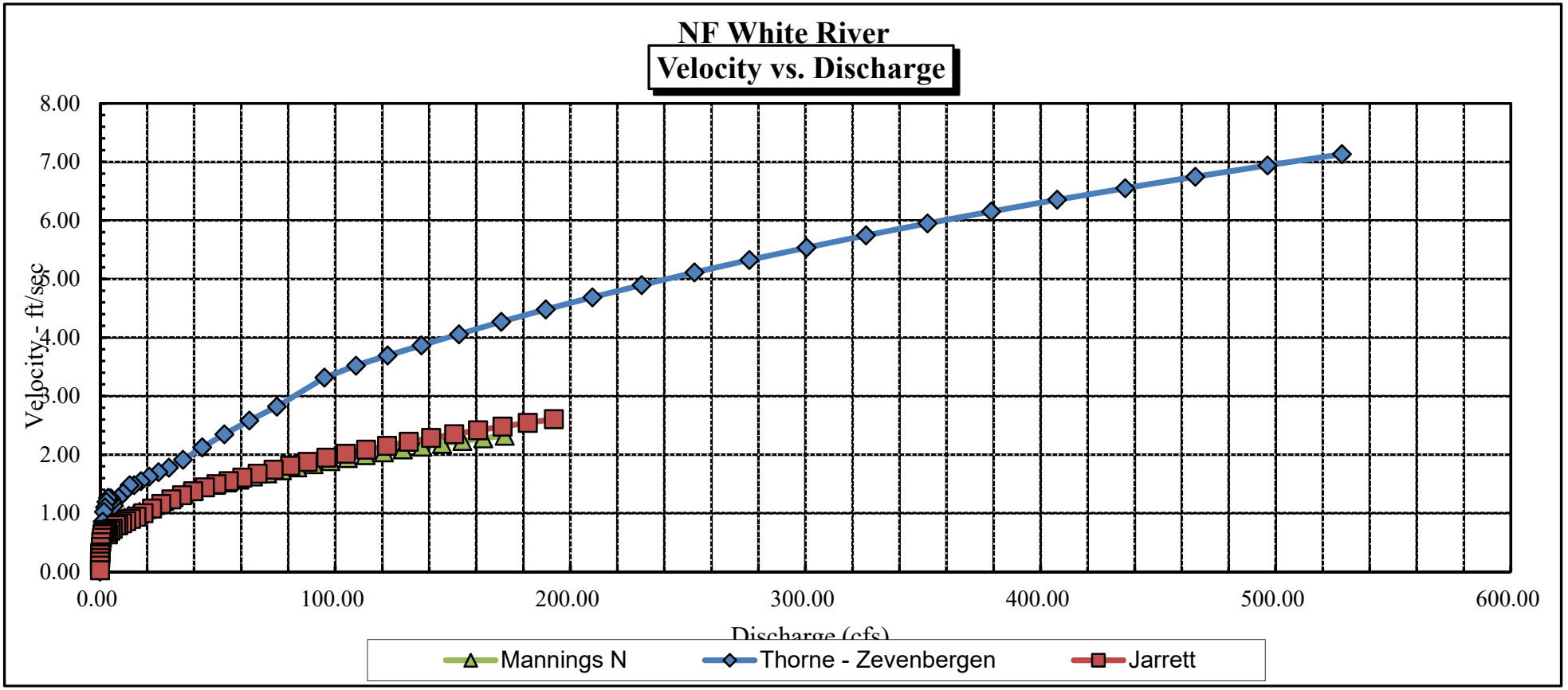
RATIONALE FOR RECOMMENDATION:
============================

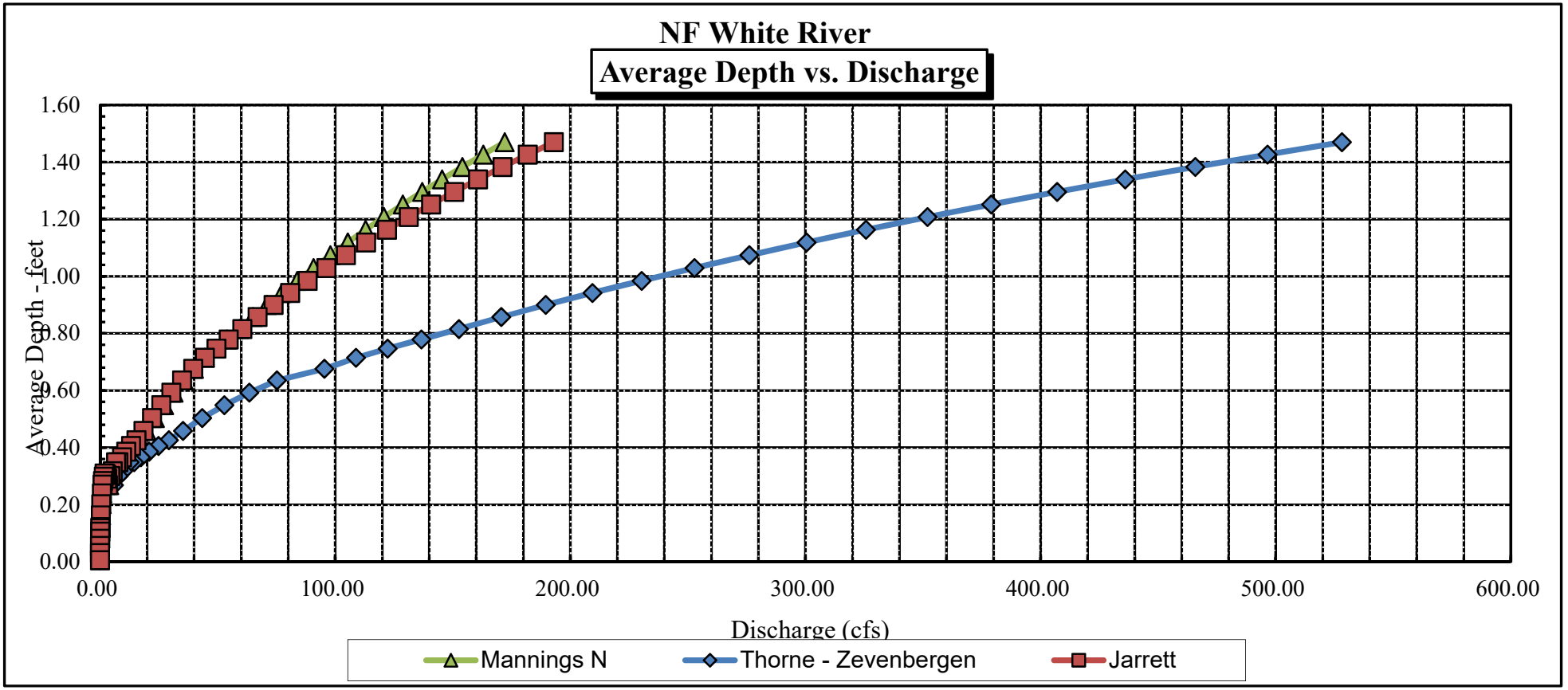
RECOMMENDATION BY: ……………………………………………… AGENCY……………………………………………… DATE:……………………

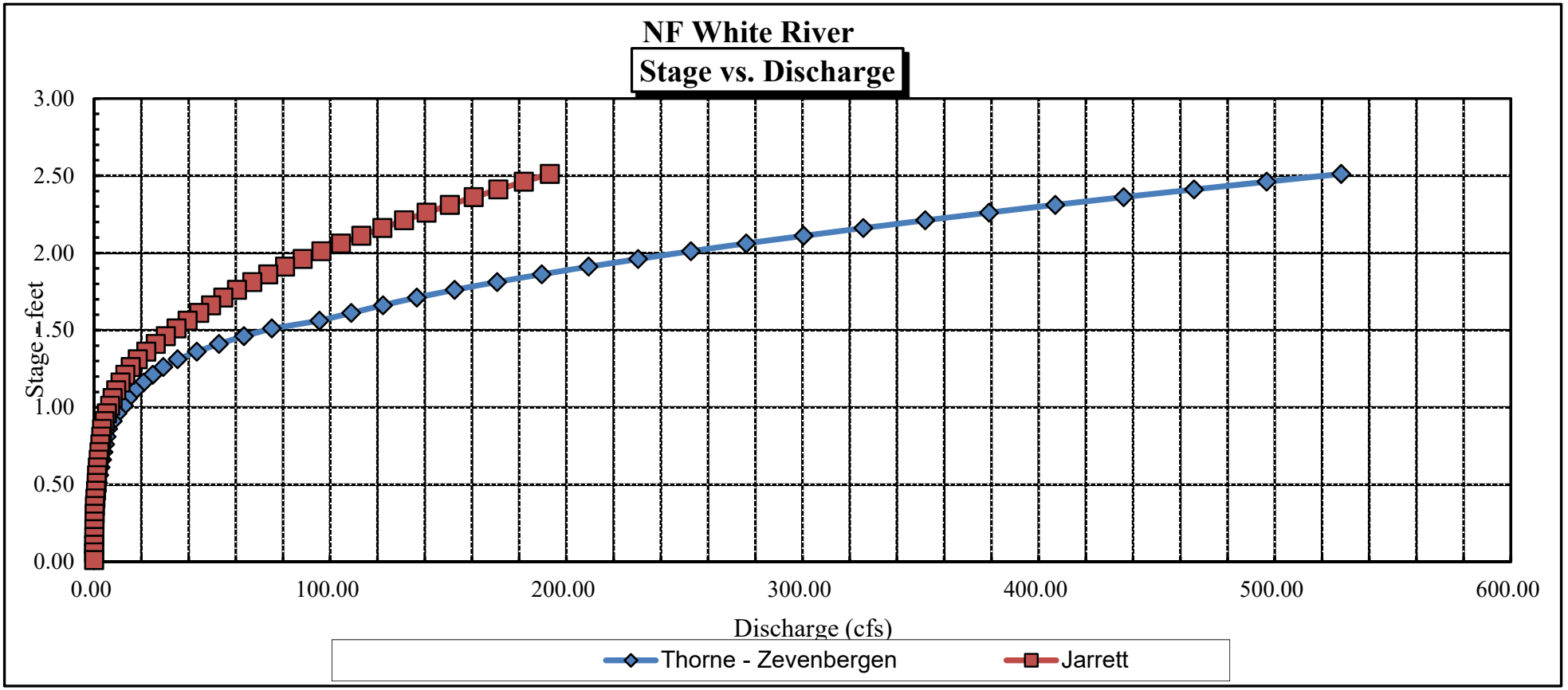
CWCB REVIEW BY: ……………………………………………………………………………………………… DATE:……………………


NF White River
CROSS SECTION DATA ANALYSIS
S
GL
WL
Log
WL
GL
S
-2.50
-3.00
-3.50
-4.00
-4.50
-5.00
-5.50
-6.00
VERTICAL DEPTH (FT)
0.00
10.00
20.00
30.00
40.00
50.00
60.00
DISTANCE FROM STAKE (FT)
Channel Bottom
Computed Water Line


NF White River
Percent Wetted Perimeter vs. Discharge
Percent Wetted Perimeter
100.0%
90.0%
80.0%
70.0%
60.0%
50.0%
40.0%
30.0%
20.0%
10.0%
0.0%
0.00
100.00
200.00
300.00
400.00
500.00
600.00
Discharge (cfs)
Mannings N
Thorne - Zevenbergen
Jarrett


NF White River
Velocity vs. Discharge
Velocity - ft/sec
8.00
7.00
6.00
5.00
4.00
3.00
2.00
1.00
0.00
0.00
100.00
200.00
300.00
400.00
500.00
600.00
Discharge (cfs)
Mannings N
Thorne - Zevenbergen
Jarrett


NF White River
Average Depth vs. Discharge
Average Depth - feet
1.60
1.40
1.20
1.00
0.80
0.60
0.40
0.20
0.00
0.00
100.00
200.00
300.00
400.00
500.00
600.00
Discharge (cfs)
Mannings N
Thorne - Zevenbergen
Jarrett


NF White River
Stage vs. Discharge
3.00
2.50
2.00
1.50
1.00
0.50
0.00
Stage - feet
0.00
100.00
200.00
300.00
400.00
500.00
600.00
Discharge (cfs)
Thorne - Zevenbergen
Jarrett

Data Input & Proofing

STREAM NAME:	NF White River
XS LOCATION:	Abv Big Fish Creek
XS NUMBER:	2 Lower (2018)
DATE:	7/11/2018
OBSERVERS:	Birch, Skinner, Meeker Crew
1/4 SEC:	Lat: 40.026600
SECTION:	Long: -107.272289
TWP:	
RANGE:	
PM:	
COUNTY:	Garfield
WATERSHED:	White River
DIVISION:	3
DOW CODE:	22741
USGS MAP:	
USFS MAP:	
	Level and Rod Survey
TAPE WT:	0.0106 lbs / ft
TENSION:	99999 lbs
SLOPE:	0.036666667 ft / ft

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

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

GL=1	FEATURE	DIST	VERT DEPTH	WATER DEPTH	VEL	A	Q	Tape to Water
			Total Data Points = 30					
	S	0.00	2.70			0.00	0.00	0.00
		1.90	3.30			0.00	0.00	0.00
1	GL	2.50	3.35			0.00	0.00	0.00
		3.40	3.95			0.00	0.00	0.00
	WL	4.50	4.16	0.00	1.38	0.00	0.00	0.00
		6.50	4.45	0.30	1.38	0.60	0.83	4.15
		8.50	4.80	0.70	1.38	1.40	1.94	4.10
		10.50	5.15	1.20	1.38	2.40	3.32	3.95
		12.50	5.05	1.10	1.38	2.20	3.04	3.95
		14.50	5.05	1.00	1.38	2.00	2.77	4.05
		16.50	5.40	0.20	1.38	0.40	0.55	5.20
		18.50	5.05	0.80	1.38	1.60	2.21	4.25
		20.50	5.25	0.95	1.38	1.90	2.63	4.30
		22.50	4.85	0.65	1.38	1.30	1.80	4.20
		24.50	4.85	0.70	1.38	1.40	1.94	4.15
		26.50	4.65	0.40	1.38	0.80	1.11	4.25
		28.50	4.85	0.60	1.38	1.20	1.66	4.25
		30.50	4.70	0.30	1.38	0.60	0.83	4.40
		32.50	4.60	0.20	1.38	0.40	0.55	4.40
		34.50	4.80	0.40	1.38	0.80	1.11	4.40
		36.50	4.95	0.45	1.38	0.90	1.25	4.50
		38.50	5.00	0.50	1.38	1.00	1.38	4.50
		40.50	5.60	1.30	1.38	2.47	3.42	4.30
	Log	42.30	5.65	1.75	1.38	3.33	4.60	3.90
		44.30	5.90	1.35	1.38	3.85	5.32	4.55
		48.00	4.40	0.15	1.38	0.32	0.44	4.25
		48.50	4.30	0.05	1.38	0.06	0.09	4.25
	WL	50.50	4.16	0.00	1.38	0.00	0.00	0.00
1	GL	53.70	3.15			0.00	0.00	0.00
					Totals	30.92	42.78	

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

LOCATION INFORMATION

STREAM NAME:	North Fk White River
XS LOCATION:	At Mirror Lake TH Bridge (100' U/S)
XS NUMBER:	1 - Upper
DATE:	12-Sep-18
OBSERVERS:	Birch, Landers, Skinner
1/4 SEC:	NE
SECTION:	13
TWP:	1 N
RANGE:	89 W
PM:	6
COUNTY:	Rio Blanco County
WATERSHED:	White
DIVISION:	6
DOW CODE:	22741
USGS MAP:	0
USFS MAP:	0

SUPPLEMENTAL DATA

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

CHANNEL PROFILE DATA

SLOPE:	0.013

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

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

STREAM NAME: North Fk White River
XS LOCATION: At Mirror Lake TH Bridge (100' U/S)
XS NUMBER: 1 - Upper

DATA POINTS= 33

VALUES COMPUTED FROM RAW FIELD DATA

	FEATURE	DIST	VERT DEPTH	WATER DEPTH	VEL	WETTED PERIM.	WATER DEPTH	AREA (Am)	Q (Qm)	% Q CELL
1	S/GL	0.00	6.45			0.00		0.00	0.00	0.0%
	WL	2.60	7.53	0.00	0.00	0.00		0.00	0.00	0.0%
	R	3.30	7.35	0.00	0.00	0.00		0.00	0.00	0.0%
		5.00	8.50	1.00	0.00	2.05	1.00	1.85	0.00	0.0%
		7.00	8.60	1.10	1.22	2.00	1.10	2.20	2.68	4.0%
		9.00	8.60	1.05	1.36	2.00	1.05	2.10	2.85	4.2%
		11.00	8.70	1.10	0.00	2.00	1.10	2.20	0.00	0.0%
		13.00	8.55	1.05	0.05	2.01	1.05	2.10	0.11	0.2%
		15.00	8.40	0.90	2.68	2.01	0.90	1.80	4.82	7.1%
		17.00	8.15	0.75	2.56	2.02	0.75	1.50	3.84	5.7%
		19.00	8.45	1.05	2.19	2.02	1.05	2.10	4.59	6.8%
		21.00	8.15	0.70	1.60	2.02	0.70	1.40	2.23	3.3%
		23.00	8.15	0.70	2.02	2.00	0.70	1.40	2.83	4.2%
		25.00	8.35	0.90	1.97	2.01	0.90	1.80	3.54	5.2%
		27.00	8.10	0.60	0.97	2.02	0.60	1.20	1.16	1.7%
		29.00	7.85	0.40	1.52	2.02	0.40	0.80	1.22	1.8%
		31.00	8.30	0.75	0.00	2.05	0.75	1.50	0.00	0.0%
		33.00	8.65	1.15	0.48	2.03	1.15	2.30	1.10	1.6%
		35.00	8.50	1.05	2.31	2.01	1.05	2.10	4.85	7.2%
		37.00	8.45	1.00	2.62	2.00	1.00	2.00	5.24	7.7%
		39.00	8.35	0.75	0.00	2.00	0.75	1.50	0.00	0.0%
		41.00	8.50	0.90	2.41	2.01	0.90	1.80	4.34	6.4%
		43.00	8.75	1.15	2.68	2.02	1.15	2.30	6.16	9.1%
		45.00	8.50	0.90	0.11	2.02	0.90	1.80	0.20	0.3%
		47.00	8.30	0.85	3.04	2.01	0.85	1.70	5.17	7.6%
		49.00	8.00	0.55	2.57	2.02	0.55	1.10	2.83	4.2%
		51.00	8.25	0.70	3.52	2.02	0.70	1.40	4.93	7.3%
		53.00	8.10	0.60	2.22	2.01	0.60	1.20	2.66	3.9%
		55.00	7.90	0.40	0.48	2.01	0.40	0.80	0.38	0.6%
	WL	57.00	7.51	0.00	0.00	2.04		0.00	0.00	0.0%
		60.00	7.30			0.00		0.00	0.00	0.0%
		62.00	7.25			0.00		0.00	0.00	0.0%
1	S/GL	65.00	6.60			0.00		0.00	0.00	0.0%
	TOTALS ----------					54.40	1.15 (Max.)	43.95	67.74	100.0%

Manning's n = 0.0954
Hydraulic Radius= 0.80794683

STREAM NAME: North Fk White River
XS LOCATION: At Mirror Lake TH Bridge (100' U/S)
XS NUMBER: 1 - Upper

WATER LINE COMPARISON TABLE

WATER LINE	MEAS AREA	COMP AREA	AREA ERROR
	43.95	47.77	8.7%
7.18	43.95	62.32	41.8%
7.20	43.95	61.11	39.1%
7.22	43.95	59.91	36.3%
7.24	43.95	58.70	33.6%
7.26	43.95	57.50	30.8%
7.28	43.95	56.32	28.1%
7.30	43.95	55.15	25.5%
7.32	43.95	53.99	22.9%
7.34	43.95	52.85	20.2%
7.36	43.95	51.70	17.6%
7.38	43.95	50.57	15.1%
7.39	43.95	50.01	13.8%
7.40	43.95	49.45	12.5%
7.41	43.95	48.89	11.2%
7.42	43.95	48.33	10.0%
7.43	43.95	47.77	8.7%
7.44	43.95	47.22	7.4%
7.45	43.95	46.67	6.2%
7.46	43.95	46.12	4.9%
7.47	43.95	45.58	3.7%
7.48	43.95	45.03	2.5%
7.50	43.95	43.95	0.0%
7.52	43.95	42.88	-2.4%
7.54	43.95	41.81	-4.9%
7.56	43.95	40.75	-7.3%
7.58	43.95	39.69	-9.7%
7.60	43.95	38.63	-12.1%
7.62	43.95	37.57	-14.5%
7.64	43.95	36.52	-16.9%
7.66	43.95	35.47	-19.3%
7.68	43.95	34.42	-21.7%

WATERLINE AT ZERO
AREA ERROR = 7.500

STREAM NAME: North Fk White River
XS LOCATION: At Mirror Lake TH Bridge (100' U/S)
XS NUMBER: 1 - Upper

Thorne-Zevenbergen D84 Correction Applied
User Supplied D84 = 0.40

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

Velocity based on test of R/D84>1

	DIST TO WATER (FT)	TOP WIDTH (FT)	AVG. DEPTH (FT)	MAX. DEPTH (FT)	AREA (SQ FT)	WETTED PERIM. (FT)	PERCENT WET PERIM (%)	HYDR RADIUS (FT)	FLOW (CFS)	AVG. VELOCITY (FT/SEC)
GL	6.60	64.64	1.53	2.15	98.63	65.62	100.0%	1.50	505.62	5.13
	6.60	64.64	1.53	2.15	98.63	65.62	100.0%	1.50	505.56	5.13
	6.65	64.29	1.48	2.10	95.40	65.25	99.4%	1.46	477.44	5.00
	6.70	63.94	1.44	2.05	92.20	64.89	98.9%	1.42	450.05	4.88
	6.75	63.58	1.40	2.00	89.01	64.52	98.3%	1.38	423.41	4.76
	6.80	63.23	1.36	1.95	85.84	64.16	97.8%	1.34	397.50	4.63
	6.85	62.88	1.31	1.90	82.69	63.79	97.2%	1.30	372.35	4.50
	6.90	62.53	1.27	1.85	79.55	63.42	96.6%	1.25	347.95	4.37
	6.95	62.18	1.23	1.80	76.43	63.06	96.1%	1.21	324.30	4.24
	7.00	61.83	1.19	1.75	73.33	62.69	95.5%	1.17	301.41	4.11
	7.05	61.48	1.14	1.70	70.25	62.32	95.0%	1.13	279.29	3.98
	7.10	61.13	1.10	1.65	67.19	61.96	94.4%	1.08	257.93	3.84
	7.15	60.78	1.06	1.60	64.14	61.59	93.9%	1.04	237.35	3.70
	7.20	60.42	1.01	1.55	61.11	61.22	93.3%	1.00	217.55	3.56
	7.25	60.07	0.97	1.50	58.10	60.85	92.7%	0.95	198.54	3.42
	7.30	57.95	0.95	1.45	55.15	58.73	89.5%	0.94	185.01	3.35
	7.35	57.12	0.92	1.40	52.27	57.88	88.2%	0.90	168.95	3.23
	7.40	56.01	0.88	1.35	49.44	56.74	86.5%	0.87	154.29	3.12
	7.45	54.91	0.85	1.30	46.67	55.61	84.7%	0.84	140.35	3.01
WL	7.50	53.81	0.82	1.25	43.95	54.47	83.0%	0.81	127.10	2.89
	7.55	53.20	0.78	1.20	41.28	53.83	82.0%	0.77	113.59	2.75
	7.60	52.87	0.73	1.15	38.63	53.48	81.5%	0.72	100.28	2.60
	7.65	52.54	0.69	1.10	35.99	53.13	81.0%	0.68	87.73	2.44
	7.70	52.21	0.64	1.05	33.37	52.78	80.4%	0.63	75.94	2.28
	7.75	51.88	0.59	1.00	30.77	52.43	79.9%	0.59	64.94	2.11
	7.80	51.55	0.55	0.95	28.19	52.08	79.4%	0.54	54.72	1.94
	7.85	51.22	0.50	0.90	25.62	51.73	78.8%	0.50	45.31	1.77
	7.90	50.26	0.46	0.85	23.08	50.75	77.3%	0.45	37.21	1.61
	7.95	49.07	0.42	0.80	20.60	49.52	75.5%	0.42	30.03	1.46
	8.00	47.87	0.38	0.75	18.17	48.30	73.6%	0.38	19.09	1.05
	8.05	45.94	0.34	0.70	15.83	46.34	70.6%	0.34	15.21	0.96
	8.10	44.01	0.31	0.65	13.58	44.37	67.6%	0.31	11.84	0.87
	8.15	39.91	0.29	0.60	11.43	40.24	61.3%	0.28	9.46	0.83
	8.20	36.25	0.26	0.55	9.53	36.54	55.7%	0.26	7.40	0.78
	8.25	32.59	0.24	0.50	7.81	32.83	50.0%	0.24	5.66	0.73
	8.30	29.99	0.21	0.45	6.24	30.19	46.0%	0.21	4.06	0.65
	8.35	27.17	0.18	0.40	4.81	27.33	41.6%	0.18	2.79	0.58
	8.40	23.57	0.15	0.35	3.54	23.70	36.1%	0.15	1.84	0.52
	8.45	19.71	0.12	0.30	2.46	19.80	30.2%	0.12	1.12	0.46
	8.50	15.52	0.10	0.25	1.58	15.58	23.7%	0.10	0.62	0.39
	8.55	12.10	0.07	0.20	0.89	12.15	18.5%	0.07	0.28	0.32
	8.60	6.68	0.06	0.15	0.37	6.71	10.2%	0.06	0.08	0.22
	8.65	3.26	0.04	0.10	0.12	3.28	5.0%	0.04	0.02	0.13
	8.70	0.80	0.02	0.05	0.02	0.81	1.2%	0.02	0.00	0.04

STREAM NAME: North Fk White River
XS LOCATION: At Mirror Lake TH Bridge (100' U/S)
XS NUMBER: 1 - Upper

SUMMARY SHEET

MEASURED FLOW (Qm)=	67.74	cfs
CALCULATED FLOW (Qc)=	67.68	cfs
(Qm-Qc)/Qm * 100 =	0.1	%
MEASURED WATERLINE (WLm)=	7.43	ft
CALCULATED WATERLINE (WLc)=	7.50	ft
(WLm-WLc)/WLm * 100 =	-0.9	%
MAX MEASURED DEPTH (Dm)=	1.15	ft
MAX CALCULATED DEPTH (Dc)=	1.25	ft
(Dm-Dc)/Dm * 100	-8.7	%
MEAN VELOCITY=	1.54	ft/sec
MANNING'S N=	0.095	
SLOPE=	0.013	ft/ft
.4 * Qm =	27.1	cfs
2.5 * Qm=	169.4	cfs

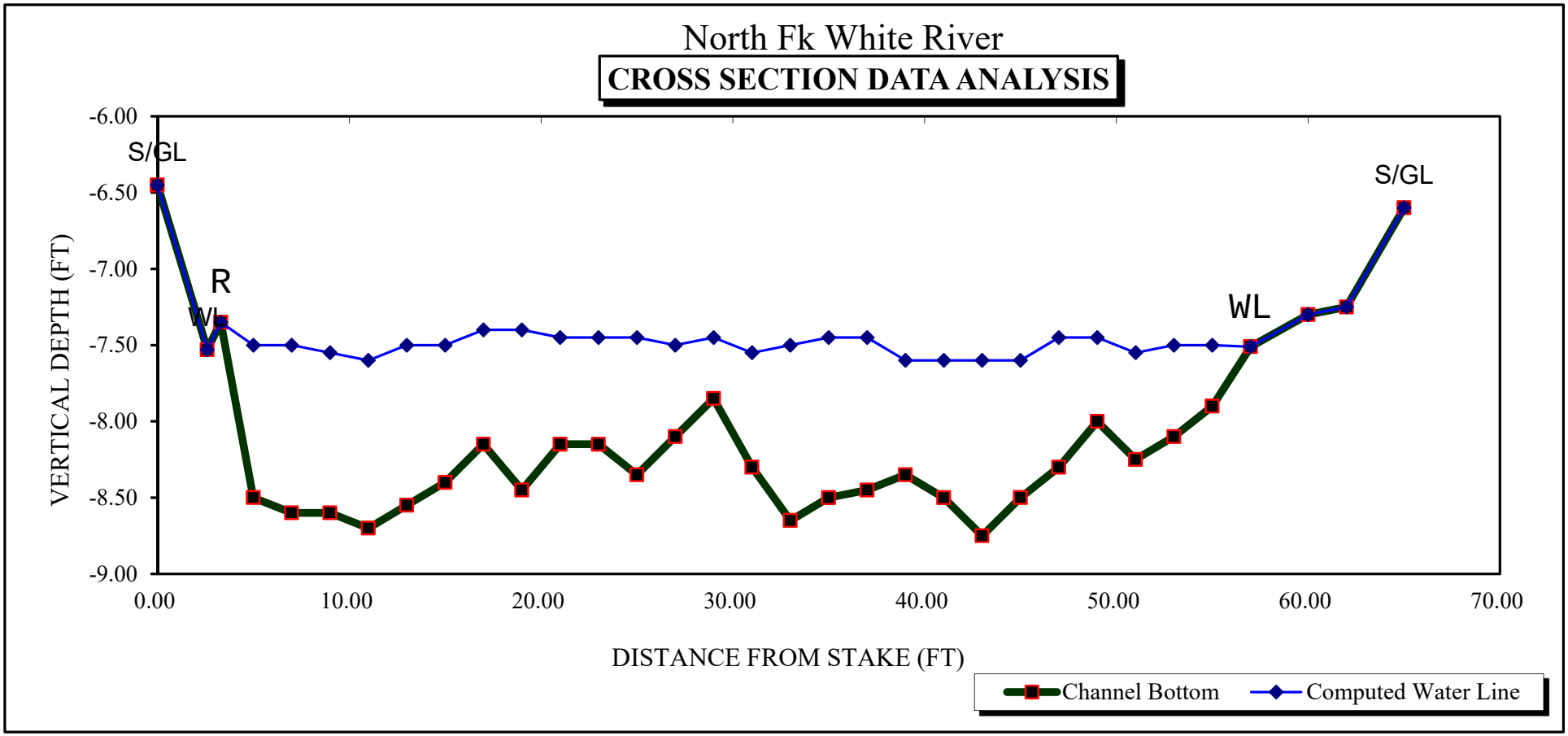
RECOMMENDED INSTREAM FLOW:
==========

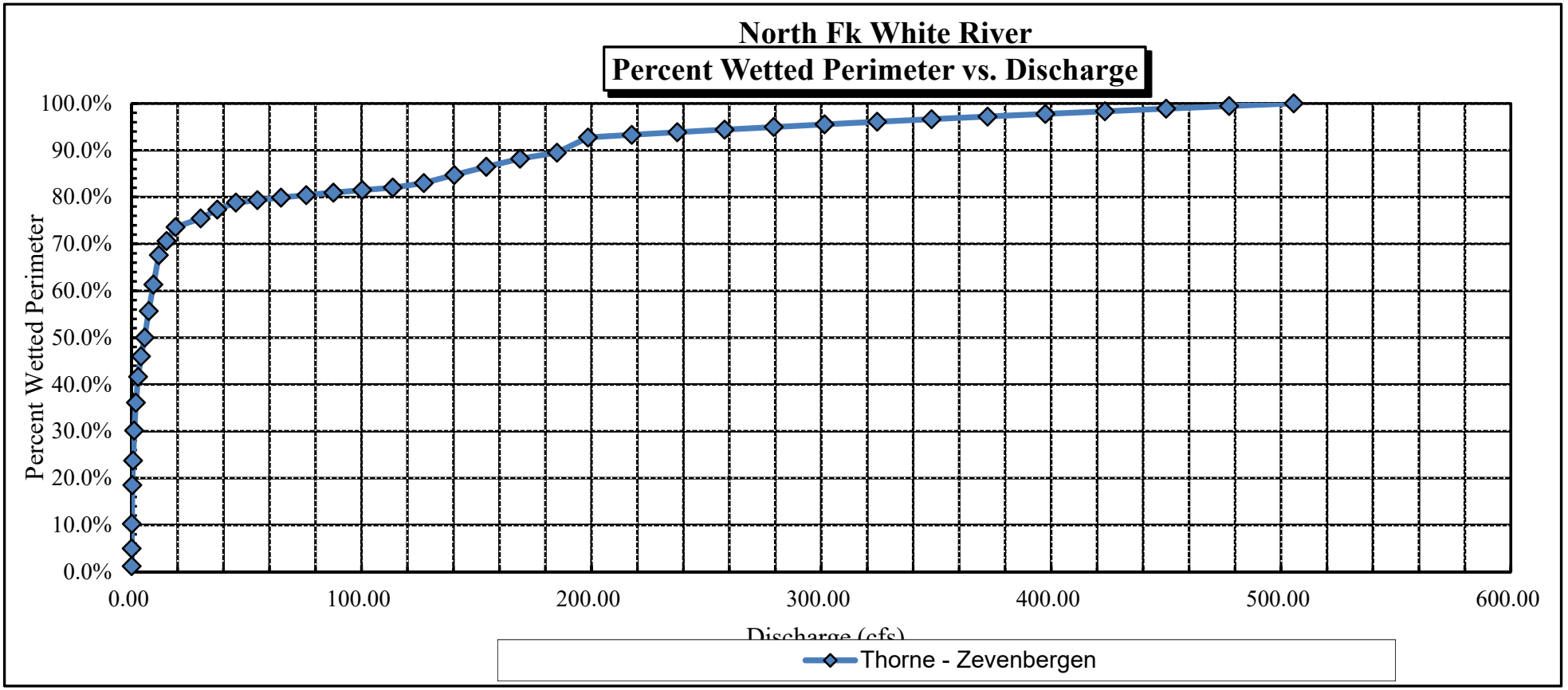
FLOW (CFS)	PERIOD
==========	========
_____	_____
_____	_____
_____	_____
_____	_____

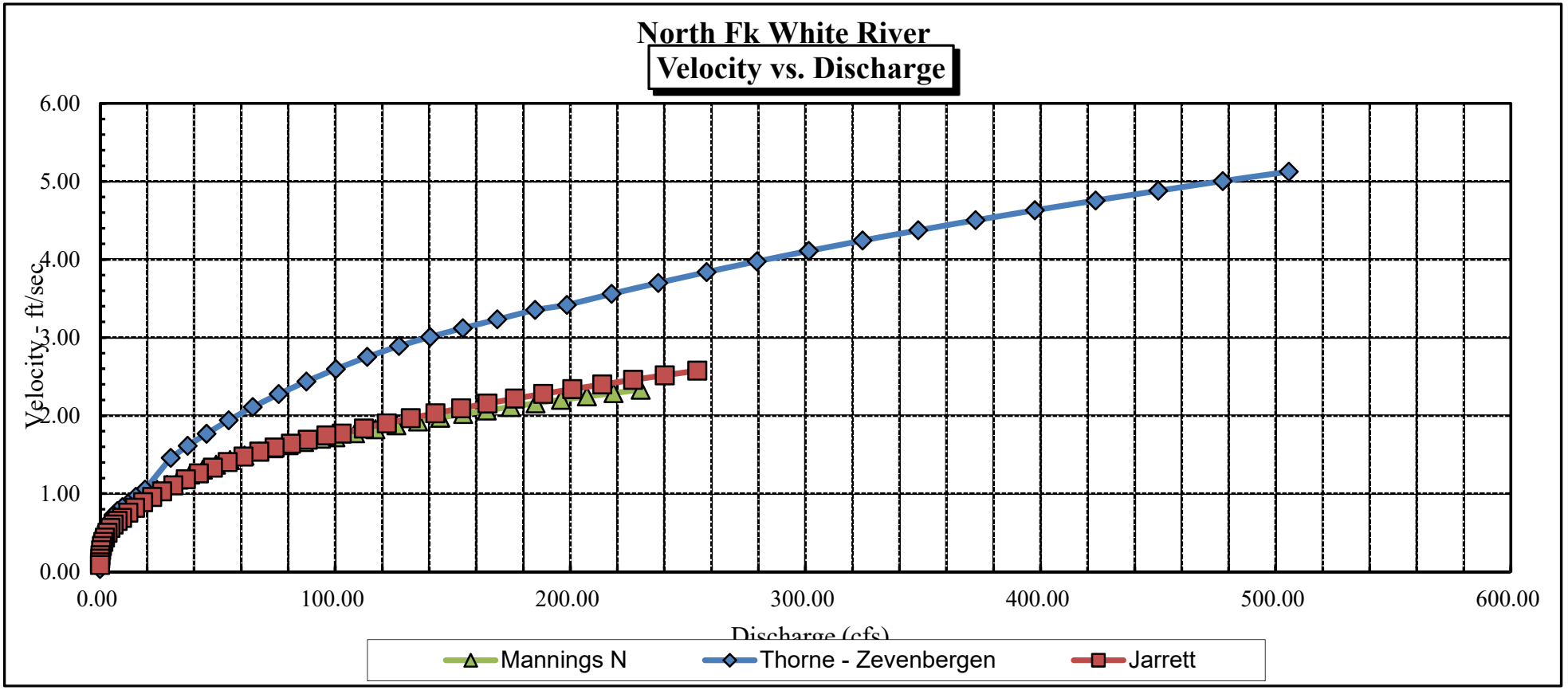
RATIONALE FOR RECOMMENDATION:
==========

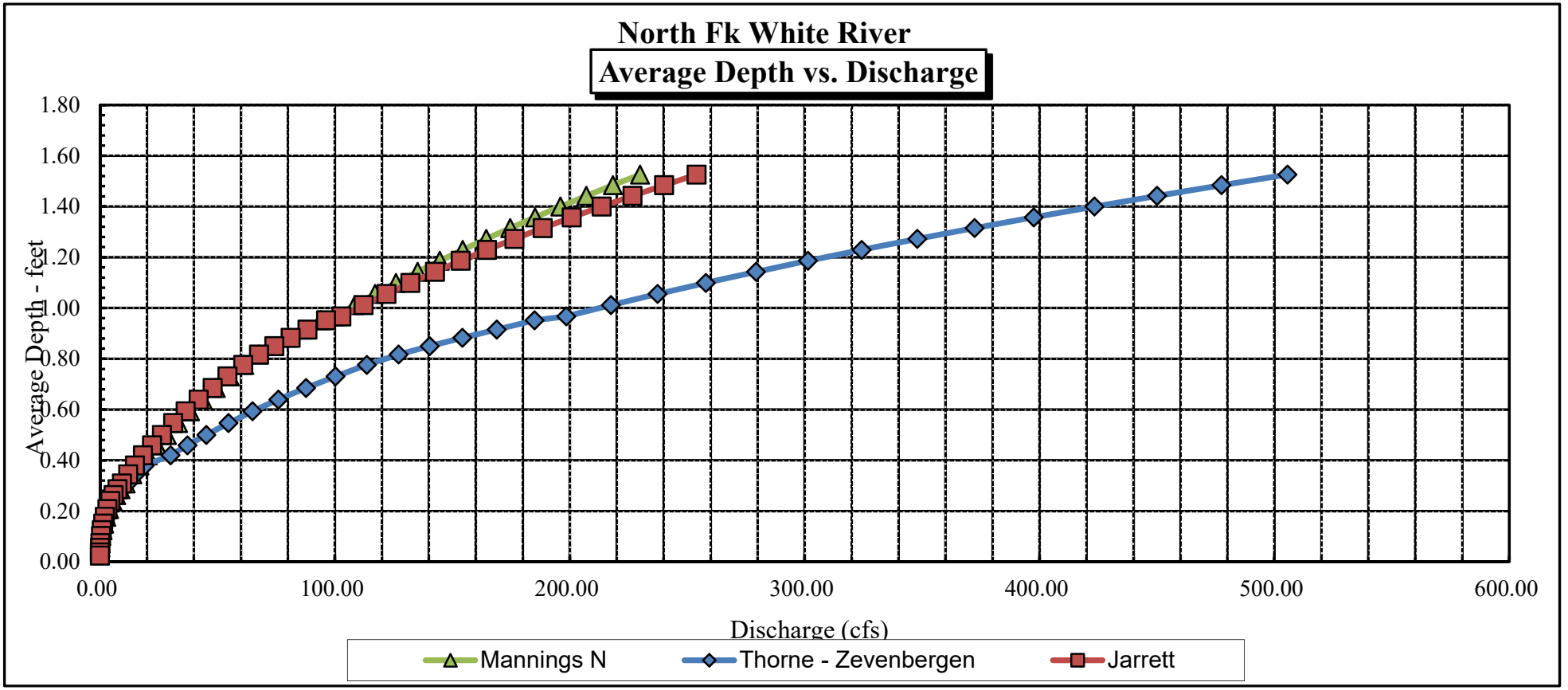
RECOMMENDATION BY: …….. AGENCY…….. DATE:……

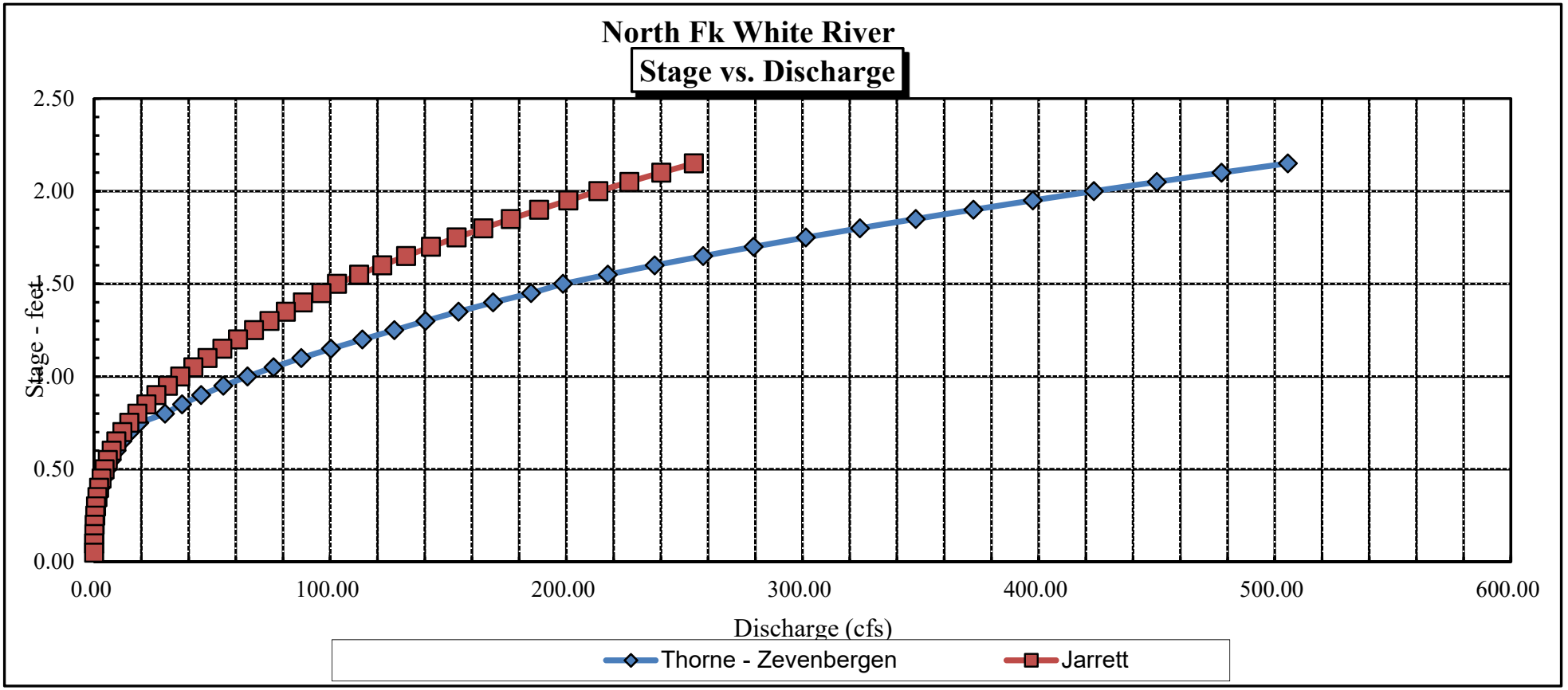
CWCB REVIEW BY: …….. DATE:……


North Fk White River
CROSS SECTION DATA ANALYSIS
-6.00
-6.50
-7.00
-7.50
-8.00
-8.50
-9.00
VERTICAL DEPTH (FT)
S/GL
R
WL
WL
S/GL
0.00
10.00
20.00
30.00
40.00
50.00
60.00
70.00
DISTANCE FROM STAKE (FT)
Channel Bottom
Computed Water Line


North Fk White River
Percent Wetted Perimeter vs. Discharge
Percent Wetted Perimeter
100.0%
90.0%
80.0%
70.0%
60.0%
50.0%
40.0%
30.0%
20.0%
10.0%
0.0%
0.00
100.00
200.00
300.00
400.00
500.00
600.00
Discharge (cfs)
Thorne - Zevenbergen


North Fk White River
Velocity vs. Discharge
Velocity - ft/sec
6.00
5.00
4.00
3.00
2.00
1.00
0.00
0.00
100.00
200.00
300.00
400.00
500.00
600.00
Discharge (cfs)
Mannings N
Thorne - Zevenbergen
Jarrett


North Fk White River
Average Depth vs. Discharge
Average Depth - feet
1.80
1.60
1.40
1.20
1.00
0.80
0.60
0.40
0.20
0.00
0.00
100.00
200.00
300.00
400.00
500.00
600.00
Discharge (cfs)
Mannings N
Thorne - Zevenbergen
Jarrett


North Fk White River
Stage vs. Discharge
2.50
2.00
1.50
1.00
0.50
0.00
Stage - feet
0.00
100.00
200.00
300.00
400.00
500.00
600.00
Discharge (cfs)
Thorne - Zevenbergen
Jarrett

Data Input & Proofing

STREAM NAME:	North Fk White River
XS LOCATION:	At Mirror Lake TH Bridge (100' U/S)
XS NUMBER:	1 - Upper
DATE:	9/12/2018
OBSERVERS:	Birch, Landers, Skinner
1/4 SEC:	NE
SECTION:	13
TWP:	1 N
RANGE:	89 W
PM:	6
COUNTY:	Rio Blanco County
WATERSHED:	White
DIVISION:	6
DOW CODE:	22741
USGS MAP:	
USFS MAP:	
	Level and Rod Survey
TAPE WT:	0.0106 lbs / ft
TENSION:	99999 lbs
SLOPE:	0.013 ft / ft

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

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

GL=1	FEATURE	DIST	VERT DEPTH	WATER DEPTH	VEL	A	Q	Tape to Water
			Total Data Points = 33					
1	S/GL	0.00	6.45			0.00	0.00	0.00
	WL	2.60	7.53	0.00	0.00	0.00	0.00	0.00
	R	3.30	7.35	0.00	0.00	0.00	0.00	0.00
		5.00	8.50	1.00	0.00	1.85	0.00	7.50
		7.00	8.60	1.10	1.22	2.20	2.68	7.50
		9.00	8.60	1.05	1.36	2.10	2.85	7.55
		11.00	8.70	1.10	0.00	2.20	0.00	7.60
		13.00	8.55	1.05	0.05	2.10	0.11	7.50
		15.00	8.40	0.90	2.68	1.80	4.82	7.50
		17.00	8.15	0.75	2.56	1.50	3.84	7.40
		19.00	8.45	1.05	2.19	2.10	4.59	7.40
		21.00	8.15	0.70	1.60	1.40	2.23	7.45
		23.00	8.15	0.70	2.02	1.40	2.83	7.45
		25.00	8.35	0.90	1.97	1.80	3.54	7.45
		27.00	8.10	0.60	0.97	1.20	1.16	7.50
		29.00	7.85	0.40	1.52	0.80	1.22	7.45
		31.00	8.30	0.75	0.00	1.50	0.00	7.55
		33.00	8.65	1.15	0.48	2.30	1.10	7.50
		35.00	8.50	1.05	2.31	2.10	4.85	7.45
		37.00	8.45	1.00	2.62	2.00	5.24	7.45
		39.00	8.35	0.75	0.00	1.50	0.00	7.60
		41.00	8.50	0.90	2.41	1.80	4.34	7.60
		43.00	8.75	1.15	2.68	2.30	6.16	7.60
		45.00	8.50	0.90	0.11	1.80	0.20	7.60
		47.00	8.30	0.85	3.04	1.70	5.17	7.45
		49.00	8.00	0.55	2.57	1.10	2.83	7.45
		51.00	8.25	0.70	3.52	1.40	4.93	7.55
		53.00	8.10	0.60	2.22	1.20	2.66	7.50
		55.00	7.90	0.40	0.48	0.80	0.38	7.50
	WL	57.00	7.51	0.00	0.00	0.00	0.00	0.00
		60.00	7.30			0.00	0.00	0.00
		62.00	7.25			0.00	0.00	0.00
1	S/GL	65.00	6.60			0.00	0.00	0.00
					Totals	43.95	67.74	

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

LOCATION INFORMATION

STREAM NAME:	North Fk White River
XS LOCATION:	At Mirron Lake TH Bridge
XS NUMBER:	2 (Lower)
DATE:	12-Sep-18
OBSERVERS:	Birch, Skinner, Landers
1/4 SEC:	NE
SECTION:	13
TWP:	1 N
RANGE:	89 W
PM:	6
COUNTY:	Rio Blanco County
WATERSHED:	White
DIVISION:	6
DOW CODE:	22741
USGS MAP:	0
USFS MAP:	0

SUPPLEMENTAL DATA

TAPE WT:	0.0106
TENSION:	99999

*** NOTE ***
Leave TAPE WT and TENSION at defaults for data collected with a survey level and rod

CHANNEL PROFILE DATA

SLOPE:	0.01493776

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

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

STREAM NAME: North Fk White River
XS LOCATION: At Mirron Lake TH Bridge
XS NUMBER: 2 (Lower)

DATA POINTS= 40

VALUES COMPUTED FROM RAW FIELD DATA

FEATURE	DIST	VERT DEPTH	WATER DEPTH	VEL	WETTED PERIM.	WATER DEPTH	AREA (Am)	Q (Qm)	% Q CELL
1 S/GL	0.00	4.00			0.00		0.00	0.00	0.0%
	0.80	4.20			0.00		0.00	0.00	0.0%
WL	0.90	4.93	0.00	0.00	0.00		0.00	0.00	0.0%
	3.00	5.50	0.60	1.30	2.18	0.60	1.23	1.60	2.9%
	5.00	5.50	0.65	1.30	2.00	0.65	1.30	1.70	3.1%
	7.00	5.35	0.50	1.30	2.01	0.50	1.00	1.30	2.3%
	9.00	5.20	0.45	1.30	2.01	0.45	0.90	1.17	2.1%
	11.00	5.15	0.35	1.30	2.00	0.35	0.70	0.91	1.6%
	13.00	5.20	0.50	1.30	2.00	0.50	1.00	1.30	2.3%
	15.00	5.25	0.50	1.30	2.00	0.50	1.00	1.30	2.3%
	17.00	5.25	0.45	1.30	2.00	0.45	0.90	1.17	2.1%
	19.00	5.20	0.55	1.30	2.00	0.55	1.10	1.43	2.6%
	21.00	5.35	0.70	1.30	2.01	0.70	1.40	1.83	3.3%
	23.00	5.30	0.70	1.30	2.00	0.70	1.40	1.83	3.3%
	25.00	5.30	0.65	1.30	2.00	0.65	1.30	1.70	3.1%
	27.00	5.45	0.80	1.30	2.01	0.80	1.60	2.09	3.8%
	29.00	5.55	0.85	1.30	2.00	0.85	1.70	2.22	4.0%
	31.00	5.10	0.50	1.30	2.05	0.50	1.00	1.30	2.3%
	33.00	5.60	1.10	1.30	2.06	1.10	2.20	2.87	5.2%
	35.00	5.65	1.10	1.30	2.00	1.10	2.20	2.87	5.2%
	37.00	5.80	1.20	1.30	2.01	1.20	2.40	3.13	5.6%
	39.00	5.50	0.95	1.30	2.02	0.95	1.90	2.48	4.5%
	41.00	5.45	0.90	1.30	2.00	0.90	1.80	2.35	4.2%
	43.00	5.25	0.65	1.30	2.01	0.65	1.30	1.70	3.1%
	45.00	5.10	0.50	1.30	2.01	0.50	1.00	1.30	2.3%
	47.00	5.20	0.60	1.30	2.00	0.60	1.20	1.56	2.8%
	49.00	5.15	0.50	1.30	2.00	0.50	1.00	1.30	2.3%
	51.00	5.25	0.70	1.30	2.00	0.70	1.40	1.83	3.3%
	53.00	5.20	0.60	1.30	2.00	0.60	1.20	1.56	2.8%
	55.00	4.95	0.30	1.30	2.02	0.30	0.60	0.78	1.4%
	57.00	5.10	0.40	1.30	2.01	0.40	0.80	1.04	1.9%
	59.00	5.05	0.40	1.30	2.00	0.40	0.80	1.04	1.9%
	61.00	5.15	0.30	1.30	2.00	0.30	0.60	0.78	1.4%
	63.00	5.15	0.30	1.30	2.00	0.30	0.60	0.78	1.4%
	65.00	5.30	0.45	1.30	2.01	0.45	0.90	1.17	2.1%
	67.00	5.60	0.80	1.30	2.02	0.80	1.60	2.09	3.8%
	69.00	5.75	0.95	1.30	2.01	0.95	1.57	2.04	3.7%
WL	70.30	4.80	0.00	0.00	1.61		0.00	0.00	0.0%
	70.80	4.10			0.00		0.00	0.00	0.0%
1 S/GL	72.30	3.70			0.00		0.00	0.00	0.0%
TOTALS ----------					70.03	1.2 (Max.)	42.60	55.55	100.0%

Manning's n = 0.1000
Hydraulic Radius= 0.60823381

STREAM NAME: North Fk White River
XS LOCATION: At Mirron Lake TH Bridge
XS NUMBER: 2 (Lower)

WATER LINE COMPARISON TABLE

WATER LINE	MEAS AREA	COMP AREA	AREA ERROR
	42.60	30.63	-28.1%
4.62	42.60	48.00	12.7%
4.64	42.60	46.61	9.4%
4.66	42.60	45.22	6.2%
4.68	42.60	43.83	2.9%
4.70	42.60	42.44	-0.4%
4.72	42.60	41.05	-3.6%
4.74	42.60	39.66	-6.9%
4.76	42.60	38.27	-10.2%
4.78	42.60	36.88	-13.4%
4.80	42.60	35.49	-16.7%
4.82	42.60	34.10	-19.9%
4.83	42.60	33.41	-21.6%
4.84	42.60	32.71	-23.2%
4.85	42.60	32.02	-24.8%
4.86	42.60	31.33	-26.5%
4.87	42.60	30.63	-28.1%
4.88	42.60	29.94	-29.7%
4.89	42.60	29.25	-31.3%
4.90	42.60	28.56	-33.0%
4.91	42.60	27.86	-34.6%
4.92	42.60	27.17	-36.2%
4.94	42.60	25.79	-39.5%
4.96	42.60	24.40	-42.7%
4.98	42.60	23.03	-45.9%
5.00	42.60	21.66	-49.1%
5.02	42.60	20.31	-52.3%
5.04	42.60	18.97	-55.5%
5.06	42.60	17.64	-58.6%
5.08	42.60	16.33	-61.7%
5.10	42.60	15.06	-64.6%
5.12	42.60	13.83	-67.5%

WATERLINE AT ZERO
AREA ERROR = 4.693

STREAM NAME: North Fk White River
XS LOCATION: At Mirron Lake TH Bridge
XS NUMBER: 2 (Lower)

Thorne-Zevenbergen D84 Correction Applied
User Supplied D84 = 0.40

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

Velocity based on test of R/D84>1

	DIST TO WATER (FT)	TOP WIDTH (FT)	AVG. DEPTH (FT)	MAX. DEPTH (FT)	AREA (SQ FT)	WETTED PERIM. (FT)	PERCENT WET PERIM (%)	HYDR RADIUS (FT)	FLOW (CFS)	AVG. VELOCITY (FT/SEC)
GL	4.00	71.18	1.28	1.80	91.04	72.84	100.0%	1.25	420.52	4.62
	4.04	70.84	1.24	1.76	88.01	72.50	99.5%	1.21	396.06	4.50
	4.09	70.46	1.20	1.71	84.48	72.10	99.0%	1.17	368.27	4.36
	4.14	70.20	1.15	1.66	80.96	71.82	98.6%	1.13	340.94	4.21
	4.19	69.96	1.11	1.61	77.46	71.55	98.2%	1.08	314.48	4.06
	4.24	69.89	1.06	1.56	73.96	71.41	98.0%	1.04	288.52	3.90
	4.29	69.85	1.01	1.51	70.47	71.30	97.9%	0.99	263.45	3.74
	4.34	69.81	0.96	1.46	66.98	71.19	97.7%	0.94	239.37	3.57
	4.39	69.76	0.91	1.41	63.49	71.08	97.6%	0.89	216.30	3.41
	4.44	69.72	0.86	1.36	60.00	70.97	97.4%	0.85	194.25	3.24
	4.49	69.68	0.81	1.31	56.52	70.85	97.3%	0.80	173.24	3.07
	4.54	69.64	0.76	1.26	53.03	70.74	97.1%	0.75	153.29	2.89
	4.59	69.59	0.71	1.21	49.55	70.63	97.0%	0.70	134.42	2.71
	4.64	69.55	0.66	1.16	46.07	70.52	96.8%	0.65	116.66	2.53
WL	4.69	69.51	0.61	1.11	42.60	70.41	96.7%	0.61	100.01	2.35
	4.74	69.47	0.56	1.06	39.12	70.29	96.5%	0.56	84.51	2.16
	4.79	69.42	0.51	1.01	35.65	70.18	96.3%	0.51	70.18	1.97
	4.84	69.35	0.46	0.96	32.18	70.05	96.2%	0.46	57.08	1.77
	4.89	69.28	0.41	0.91	28.72	69.92	96.0%	0.41	45.20	1.57
	4.94	69.16	0.37	0.86	25.25	69.74	95.7%	0.36	24.73	0.98
	4.99	68.00	0.32	0.81	21.82	68.55	94.1%	0.32	19.30	0.88
	5.04	66.68	0.28	0.76	18.45	67.21	92.3%	0.27	14.74	0.80
	5.09	62.80	0.24	0.71	15.21	63.30	86.9%	0.24	11.27	0.74
	5.14	58.97	0.21	0.66	12.17	59.43	81.6%	0.20	8.33	0.68
	5.19	47.54	0.20	0.61	9.52	47.96	65.8%	0.20	6.41	0.67
	5.24	37.19	0.20	0.56	7.40	37.56	51.6%	0.20	4.96	0.67
	5.29	30.96	0.19	0.51	5.75	31.29	43.0%	0.18	3.67	0.64
	5.34	23.80	0.19	0.46	4.41	24.08	33.1%	0.18	2.78	0.63
	5.39	20.57	0.16	0.41	3.31	20.80	28.6%	0.16	1.87	0.56
	5.44	17.72	0.13	0.36	2.35	17.91	24.6%	0.13	1.15	0.49
	5.49	13.32	0.12	0.31	1.57	13.47	18.5%	0.12	0.67	0.43
	5.54	8.79	0.12	0.26	1.06	8.90	12.2%	0.12	0.42	0.40
	5.59	7.68	0.09	0.21	0.65	7.76	10.6%	0.08	0.20	0.30
	5.64	4.92	0.07	0.16	0.33	4.98	6.8%	0.07	0.07	0.22
	5.69	2.99	0.05	0.11	0.14	3.02	4.2%	0.05	0.02	0.14
	5.74	1.26	0.03	0.06	0.03	1.26	1.7%	0.03	0.00	0.06
	5.79	0.15	0.00	0.01	0.00	0.15	0.2%	0.00	0.00	0.00

STREAM NAME: North Fk White River
XS LOCATION: At Mirron Lake TH Bridge
XS NUMBER: 2 (Lower)

SUMMARY SHEET

MEASURED FLOW (Qm)=	55.55	cfs
CALCULATED FLOW (Qc)=	55.35	cfs
(Qm-Qc)/Qm * 100 =	0.4	%
MEASURED WATERLINE (WLm)=	4.87	ft
CALCULATED WATERLINE (WLc)=	4.69	ft
(WLm-WLc)/WLm * 100 =	3.5	%
MAX MEASURED DEPTH (Dm)=	1.20	ft
MAX CALCULATED DEPTH (Dc)=	1.11	ft
(Dm-Dc)/Dm * 100	7.7	%
MEAN VELOCITY=	1.30	ft/sec
MANNING'S N=	0.100	
SLOPE=	0.01493776	ft/ft
.4 * Qm =	22.2	cfs
2.5 * Qm=	138.9	cfs

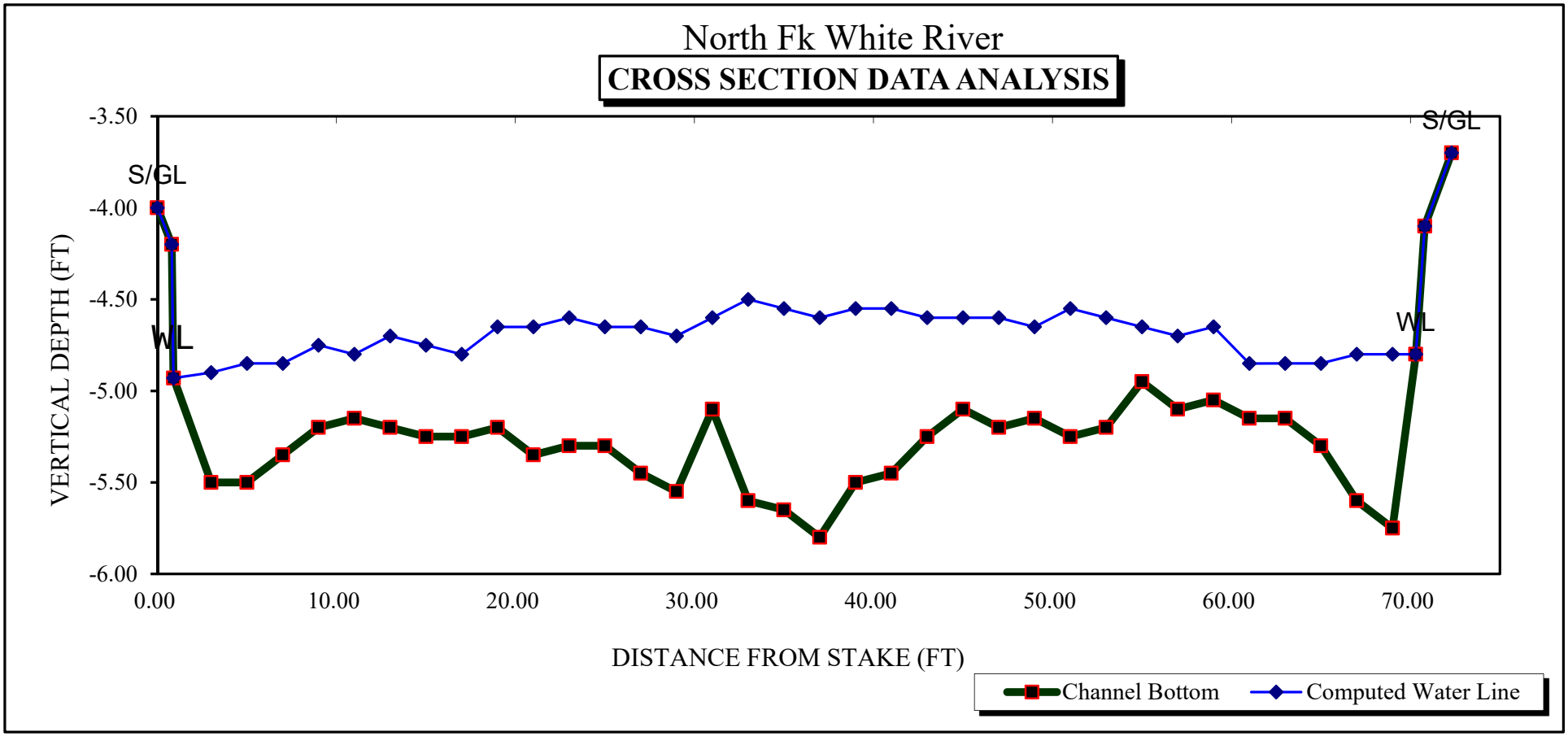
RECOMMENDED INSTREAM FLOW:
============================

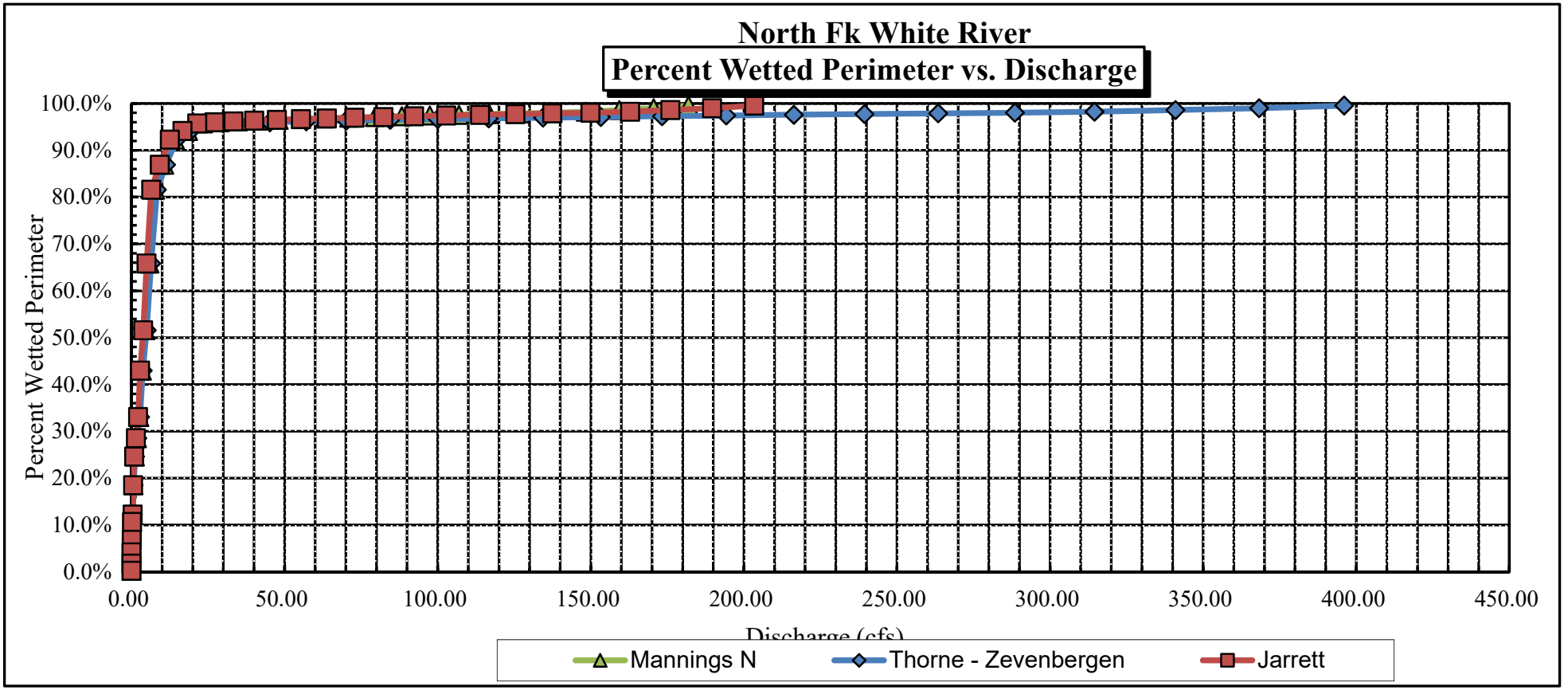
FLOW (CFS)	PERIOD
===========	========
____________________	____________________
____________________	____________________
____________________	____________________
____________________	____________________

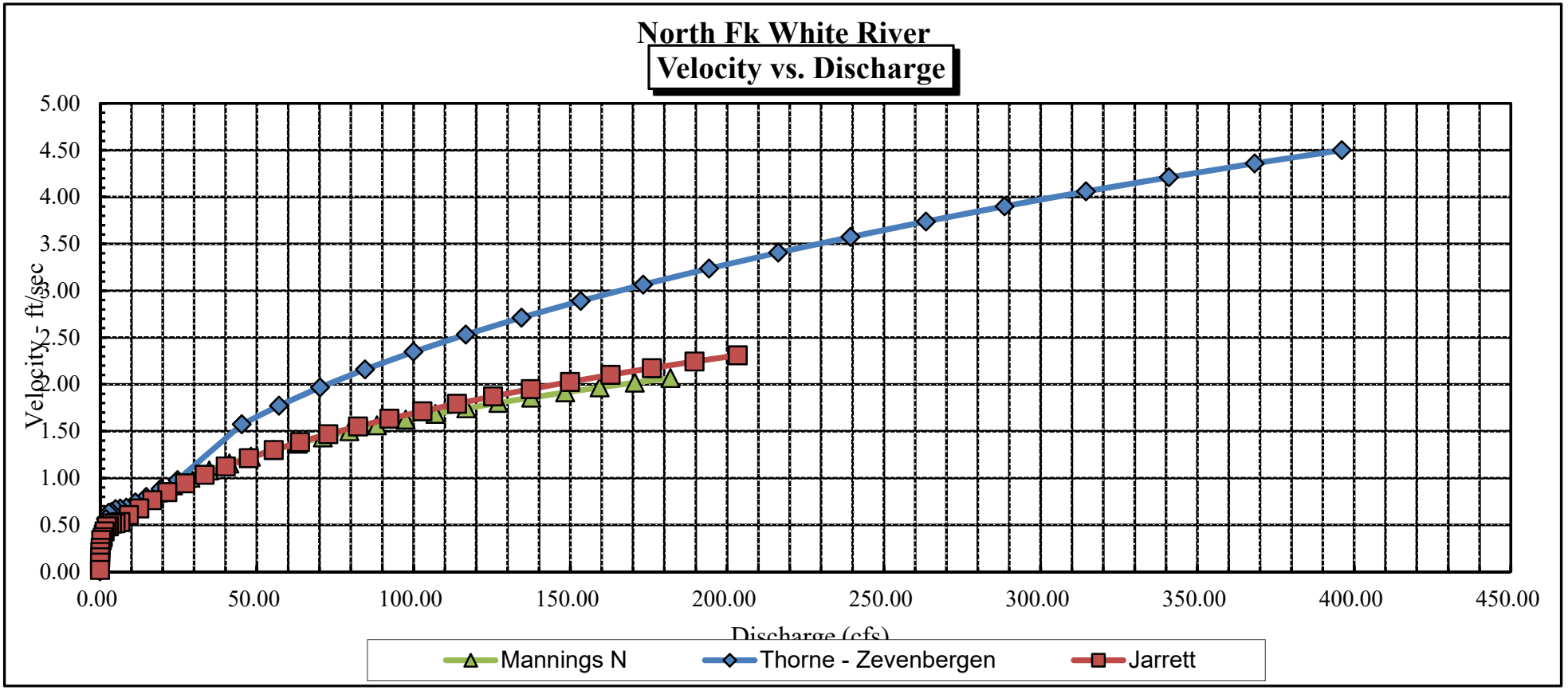
RATIONALE FOR RECOMMENDATION:
============================

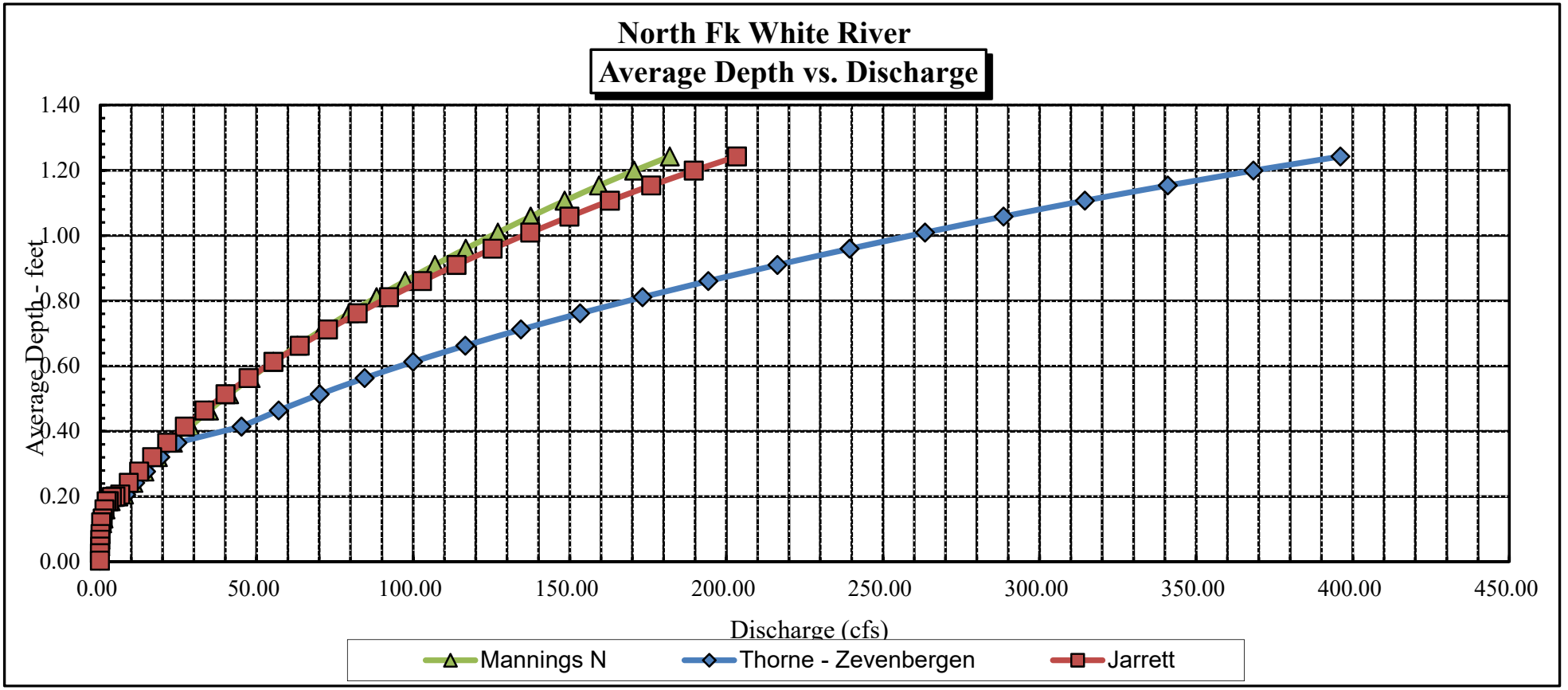
RECOMMENDATION BY: ……………….………..……............................... AGENCY..……………………......……....…..……....... DATE:.......…..….......……………

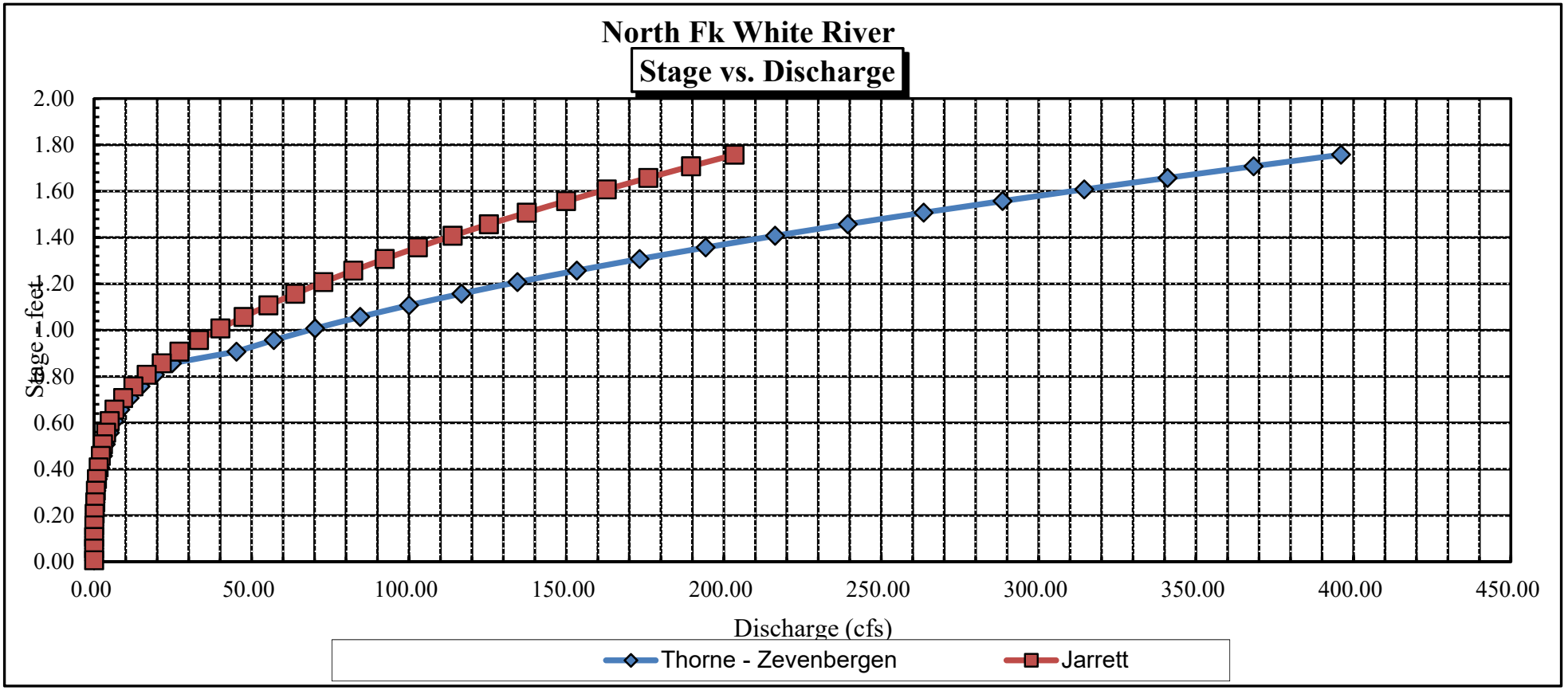
CWCB REVIEW BY: ..…………………………....…………………………………………………..…............... DATE:...................………………...…


North Fk White River
CROSS SECTION DATA ANALYSIS
-3.50
-4.00
-4.50
-5.00
-5.50
-6.00
VERTICAL DEPTH (FT)
S/GL
WL
S/GL
WL
0.00
10.00
20.00
30.00
40.00
50.00
60.00
70.00
DISTANCE FROM STAKE (FT)
Channel Bottom
Computed Water Line


North Fk White River
Percent Wetted Perimeter vs. Discharge
Percent Wetted Perimeter
100.0%
90.0%
80.0%
70.0%
60.0%
50.0%
40.0%
30.0%
20.0%
10.0%
0.0%
0.00
50.00
100.00
150.00
200.00
250.00
300.00
350.00
400.00
450.00
Discharge (cfs)
Mannings N
Thorne - Zevenbergen
Jarrett


North Fk White River
Velocity vs. Discharge
Velocity - ft/sec
5.00
4.50
4.00
3.50
3.00
2.50
2.00
1.50
1.00
0.50
0.00
0.00
50.00
100.00
150.00
200.00
250.00
300.00
350.00
400.00
450.00
Discharge (cfs)
Mannings N
Thorne - Zevenbergen
Jarrett


North Fk White River
Average Depth vs. Discharge
Average Depth - feet
1.40
1.20
1.00
0.80
0.60
0.40
0.20
0.00
0.00
50.00
100.00
150.00
200.00
250.00
300.00
350.00
400.00
450.00
Discharge (cfs)
Mannings N
Thorne - Zevenbergen
Jarrett


North Fk White River
Stage vs. Discharge
Stage - feet
2.00
1.80
1.60
1.40
1.20
1.00
0.80
0.60
0.40
0.20
0.00
0.00
50.00
100.00
150.00
200.00
250.00
300.00
350.00
400.00
450.00
Discharge (cfs)
Thorne - Zevenbergen
Jarrett

Data Input & Proofing

STREAM NAME:	North Fk White River
XS LOCATION:	At Mirron Lake TH Bridge
XS NUMBER:	2 (Lower)
DATE:	9/12/2018
OBSERVERS:	Birch, Skinner, Landers
1/4 SEC:	NE
SECTION:	13
TWP:	1 N
RANGE:	89 W
PM:	6
COUNTY:	Rio Blanco County
WATERSHED:	White
DIVISION:	6
DOW CODE:	22741
USGS MAP:	
USFS MAP:	
	Level and Rod Survey
TAPE WT:	0.0106 lbs / ft
TENSION:	99999 lbs
SLOPE:	0.014937759 ft / ft

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

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

Total Data Points = 40

GL=1	FEATURE	DIST	VERT DEPTH	WATER DEPTH	VEL	A	Q	Tape to Water
1	S/GL	0.00	4.00			0.00	0.00	0.00
		0.80	4.20			0.00	0.00	0.00
	WL	0.90	4.93	0.00	0.00	0.00	0.00	0.00
		3.00	5.50	0.60	1.30	1.23	1.60	4.90
		5.00	5.50	0.65	1.30	1.30	1.70	4.85
		7.00	5.35	0.50	1.30	1.00	1.30	4.85
		9.00	5.20	0.45	1.30	0.90	1.17	4.75
		11.00	5.15	0.35	1.30	0.70	0.91	4.80
		13.00	5.20	0.50	1.30	1.00	1.30	4.70
		15.00	5.25	0.50	1.30	1.00	1.30	4.75
		17.00	5.25	0.45	1.30	0.90	1.17	4.80
		19.00	5.20	0.55	1.30	1.10	1.43	4.65
		21.00	5.35	0.70	1.30	1.40	1.83	4.65
		23.00	5.30	0.70	1.30	1.40	1.83	4.60
		25.00	5.30	0.65	1.30	1.30	1.70	4.65
		27.00	5.45	0.80	1.30	1.60	2.09	4.65
		29.00	5.55	0.85	1.30	1.70	2.22	4.70
		31.00	5.10	0.50	1.30	1.00	1.30	4.60
		33.00	5.60	1.10	1.30	2.20	2.87	4.50
		35.00	5.65	1.10	1.30	2.20	2.87	4.55
		37.00	5.80	1.20	1.30	2.40	3.13	4.60
		39.00	5.50	0.95	1.30	1.90	2.48	4.55
		41.00	5.45	0.90	1.30	1.80	2.35	4.55
		43.00	5.25	0.65	1.30	1.30	1.70	4.60
		45.00	5.10	0.50	1.30	1.00	1.30	4.60
		47.00	5.20	0.60	1.30	1.20	1.56	4.60
		49.00	5.15	0.50	1.30	1.00	1.30	4.65
		51.00	5.25	0.70	1.30	1.40	1.83	4.55
		53.00	5.20	0.60	1.30	1.20	1.56	4.60
		55.00	4.95	0.30	1.30	0.60	0.78	4.65
		57.00	5.10	0.40	1.30	0.80	1.04	4.70
		59.00	5.05	0.40	1.30	0.80	1.04	4.65
		61.00	5.15	0.30	1.30	0.60	0.78	4.85
		63.00	5.15	0.30	1.30	0.60	0.78	4.85
		65.00	5.30	0.45	1.30	0.90	1.17	4.85
		67.00	5.60	0.80	1.30	1.60	2.09	4.80
		69.00	5.75	0.95	1.30	1.57	2.04	4.80
	WL	70.30	4.80	0.00	0.00	0.00	0.00	0.00
		70.80	4.10			0.00	0.00	0.00
1	S/GL	72.30	3.70			0.00	0.00	0.00
					Totals	42.60	55.55	

North Fork White River above Skinny Fish Creek Cross Section 1, looking upstream.

North Fork White River above Skinny Fish Creek Cross Section 1, looking downstream.

North Fork White River above Skinny Fish Creek Cross Section 1, looking across from left bank.

North Fork White River above Skinny Fish Creek Cross Section 2, looking upstream.

North Fork White River above Skinny Fish Creek Cross Section 2, looking downstream.

North Fork White River above Skinny Fish Creek Cross Section 2, looking across from right bank.

North Fork White River above Skinny Fish Creek Cross Section 2, large stonefly.

North Fork White River above Big Fish Creek, Cross Section 1, looking upstream.

North Fork White River above Big Fish Creek, Cross Section 1, looking downstream.

North Fork White River above Big Fish Creek, Cross Section 1, looking across from right bank.

North Fork White River above Big Fish Creek, Cross Section 2, looking upstream.

North Fork White River above Big Fish Creek, Cross Section 2, looking downstream.

North Fork White River above Big Fish Creek, Cross Section 2, looking across from left bank.

North Fork White River above Ripple Creek, Cross Section 2, looking upstream.

North Fork White River above Ripple Creek, Cross Section 2 from the bridge.

Natural environment of the North Fork White River.