United States Department of the Interior

BUREAU OF LAND MANAGEMENT
Colorado State Office
2850 Youngfield Street
Lakewood, Colorado 80215-7210
www.co.blm.gov

In Reply Refer To:
7250 (CO-932)

DEC 12 2017

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

Dear Ms. Bassi:

The Bureau of Land Management (BLM) is writing this letter to formally communicate its recommendation for an increase to an existing instream flow water right on Abrams Creek, located in Water Division 5.

Location and Land Status. Abrams Creek originates on the northeastern flank of Hardscrabble Mountain approximately seven miles southwest of the City of Eagle. This recommendation covers a reach that starts at the headwaters and extends downstream to the headgate of the Mrs. Paye Ditch. This stream reach covers a distance of approximately 3.95 miles. The BLM and U.S. Forest Service manage the upper 3.38 miles of the creek, while the lower 0.57 miles are located on private lands.

Existing Instream Flow Water Rights. In 1980, the Colorado Water Conservation Board (CWCB) appropriated an instream flow water right on Abrams Creek. The protected flow rate is 0.5 cfs from January 1, to December 31. The decree specifies that the existing instream flow water right extends from the headwaters to a headgate diversion located in the SE ¼ SW ¼, Section 9, T5S R84W, Sixth P.M. The recommending entities believe that this location refers to the measurement flume for the Mrs. Paye Ditch water right.

Biological Summary. Abrams Creek is a cold-water, high gradient stream. It flows through a narrow valley with a valley floor of up to one-fourth mile in width. The stream is often confined by bedrock, and the horizontal extent of alluvium along the stream is typically less than 100 feet. The stream generally has large substrate, typically consisting of cobbles and small boulder mixed with gravels. The stream also exhibits a large amount of woody debris in the stream channel, which adds to stream stability and habitat complexity. While riffle habitat is sufficient, Abrams Creek generally lacks extensive pool habitat, which could be a limiting factor for the fish population.

Fisheries surveys have revealed a self-sustaining population of native cutthroat trout. The Abrams Creek population is considered a Core Conservation population of pure Green-Lineage Colorado River cutthroat trout (*Oncorhynchus clarkii pleuriticus*). This is the only known aboriginal cutthroat population in the Eagle River watershed and is important with respect to future reclamation planning within the watershed and overall conservation efforts for the species. The population is small and limited in part by reduced water flow – primarily during irrigation season. Intensive macro-invertebrate surveys have not been conducted, but spot samples have revealed various species of mayfly, caddisfly and stonefly.

The riparian community is generally comprised of blue spruce and aspen in the higher elevation parts of the creek and is comprised of narrowleaf cottonwood and willow species in the lower elevation part of the creek. The riparian community is in very good condition, and provides adequate shading and cover for the fish habitat.

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

Cross Section Date	Discharge Rate	Top Width	Winter Flow Recommendation (meets 2 of 3 hydraulic criteria)	Summer Flow Recommendation (meets 3 of 3 hydraulic criteria)
7/1/13 #1	0.87 cfs	7.18 feet	0.75 cfs	1.71 cfs
7/1/13 #2	0.93 cfs	11.13 feet	0.75 cfs	Out of confidence interval for data set
7/1/13 #3	0.56 cfs	5.28 feet	0.56 cfs	Out of confidence interval for data set
7/1/13 #4	0.59 cfs	4.40 feet	0.59 cfs	1.22 cfs
6/26/14 #1	1.56 cfs	26.8 feet	Out of confidence interval for data set	Out of confidence interval for data set
6/26/14 #2	1.36 cfs	13.04 feet	0.86 cfs	Out of confidence interval for data set
6/26/14 #3	1.74 cfs	2.77 feet	Out of confidence interval for data set	0.83 cfs
		Averages:	0.70 cfs	1.25 cfs

Our analysis of this data indicates that the following flows are needed to preserve the fishery and other aspects of the natural environment to a reasonable degree:

> 1.25 cubic feet per second is recommended from May 1, to September 30, corresponding with the snowmelt runoff and summer monsoon periods. This recommendation is driven by the average velocity criteria. According to the wetted perimeter criteria, this flow rate also makes a very high percentage of the physical habitat available for fish usage, such as spawning during the spring.

If the CWCB decides to accept this recommendation, implementing it will require an increase of 0.75 cfs to the existing instream flow right between May 1 and September 30. BLM is not making a recommendation to increase the instream flow rate between October 1, and April 30, because insufficient water is available to support an increase.

Water Availability. The BLM is aware of the following water rights on Abrams Creek:

J P O Ditch #2 – 1.0 cfs, 1908 Priority; 2.0 cfs, 1916 Priority
Mrs. Paye Ditch – 0.8 cfs, 1899 Priority; 2.2 cfs, 1923 Priority

The BLM is not aware of any historic gage information on Abrams Creek. However, some historic diversion records are available for the Mrs. Paye Ditch, located in the lower part of the recommended reach, and for the JPO Ditch, located in the middle of the recommended reach. In addition, the owners of the JPO Ditch have maintained measurement flumes on Abrams Creek and on the JPO Ditch. Those records can be made available for review by the CWCB staff. Given the lack of historic gage data, the BLM recommends relying upon Streamstats for confirmation of water availability.

Relationship to Abrams Creek Project. This instream flow water right would help preserve the improved flow regime on Abrams Creek flows that will be achieved through the implementation of the Abrams Creek project. The Abrams Creek project is an irrigation delivery efficiency project that has been facilitated by Trout Unlimited. The project commits Buckhorn District, the owner of the JPO Ditch, to forego 40% of its Abram Creek diversions and curtail all diversions if flows are at or below 1.25 cfs. The CWCB contributed significant funds to the Abrams Creek project.

Relationship to Management Plans. Consistent with Colorado's Cutthroat Trout Conservation Strategy, the goal of this instream flow recommendation is to protect a precarious Core Conservation of Green-lineage cutthroat trout and increase the resiliency of the population. Specifically, protecting instream flows on Abrams Creek will assist with maintaining and protecting:

- Physical/wetted habitat along approximately 3.5 miles of stream
- In-stream habitat connectivity and quality
- Aquatic insect productivity, a critical food source for cutthroat trout
- Pool depths
- Riparian canopy cover
- Cooler water temperatures

Data sheets, R2Cross output, fishery survey information, and photographs of the cross section were included with our draft recommendation in January 2015. The BLM thanks the Colorado Water Conservation Board for its cooperation in this effort.

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

Sincerely,

Megan Gilbert

Megan A Gilbert
Acting Deputy State Director
Division of Resources and Fire Management

Cc: Brian Hopkins, Colorado River Valley Field Office
Chad Mickschl, Colorado River Valley Field Office
Tom Fresques, Colorado River Valley Field Office

December 8, 2017

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

Via email: linda.bassi@state.co.us

Re: Abrams Creek Instream Flow Water Right Appropriation

Dear Ms. Bassi,

Trout Unlimited (TU) joins BLM and Colorado Parks and Wildlife (CPW) in their recommendations for the appropriation of an instream flow water right in Abrams Creek, a tributary of the Eagle River.

Abrams Creek supports a Core Conservation population of Green-Lineage cutthroat trout that is the only known aboriginal cutthroat population in the Eagle River watershed. One of a few remnant indigenous populations left in the Upper Colorado River, the Abrams Creek Green-Lineage cutthroat trout population was not only found to be genetically pure, it also possesses a unique Haplotype that is genetically more distinct than other populations – making a significant contribution to the genetic diversity of cutthroat trout species and the local lineage. Furthermore, Abrams Creek cutthroat are distinctive because they reside in a relatively low elevation drainage, giving them probable adaptations to warmer temperatures and drought conditions that may benefit reintroduction efforts in the face of climate change.

A single irrigation ditch, the JPO Ditch, diverts water from Abrams Creek and delivers it to a different drainage, the Alkali Creek drainage, where the irrigated lands are located. To improve the resiliency of this important native cutthroat trout population, TU and CPW engaged with Buckhorn District, the owner of the JPO Ditch, to explore potential means to improve Abrams Creek flows while respecting the District's water rights. Discussions resulted in a proposed water delivery efficiency project whereby a pipeline will be constructed to deliver JPO Ditch water to the District and, in exchange, the District agrees to leave 40% of Abrams Creek flows in the stream and to forego all JPO Ditch diversions if flows are at or below 1.25 cfs. The CWCB has contributed significant funds for the project. The Abrams Creek project is now fully funded and construction is expected in 2018.

The proposed Abrams Creek instream flow water right would protect Abrams Creek's minimum flows from diversion by junior appropriators to the detriment of these highly valued native fishery.

Please do not hesitate to contact me with questions.

Sincerely,

Amelia (Mely) Whiting
P.O. Box 1544
Pagosa Springs, CO 81147
(720) 470-4758
mwhiting@tu.org

cc: Buckhorn District

Record Signed
Copy 6-28-16

AGREEMENT

This agreement (the "Agreement") is entered this 28 day of June, 2016, between Buckhorn Valley Metropolitan District No. 1 (the "District") and Trout Unlimited, Inc. ("Trout Unlimited"), for the purpose of partnering on a project designed to improve flows in Abrams Creek for the benefit of its native cutthroat trout fishery while preserving the District's ability to fully utilize its decreed water rights. The District and Trout Unlimited may collectively be referred to herein as the "Parties").

A. Recitals

1. Trout Unlimited is a non-profit, section 501(c)(3) corporation, which mission is to conserve, protect and restore North America's cold water fisheries and their watersheds.

2. The District is a quasi-municipal corporation and political subdivision of the State of Colorado organized pursuant to the laws of the State of Colorado in order to construct, operate and maintain certain public facilities and improvements in accordance with its approved service plan, including, but not limited to, irrigation services, and is authorized pursuant to § 32-1-1001(1)(d)(I), C.R.S., to enter into contracts affecting its affairs.

3. Abrams Creek contains a Core Conservation population of native, Green-Lineage cutthroat trout (*Oncorhynchus clarkii pleuriticus*). This population is the only known aboriginal cutthroat population in the Eagle River watershed and it possesses a unique genetic characteristic -a rare mitochondrial haplotype - which is not found in any other known cutthroat trout populations.

4. The District owns J.P.O Ditch No. 2 which diverts water from Abrams Creek. The JPO Ditch No. 2 is decreed a total of 3.0 cfs under Civil Action 548 (1.0 cfs for irrigation) and Civil Action 841 (2.0 cfs for irrigation and domestic use) in Water District 37, Division 5 ("JPO Ditch No. 2 water rights").

5. Water diverted by the JPO Ditch No. 2 is delivered to the District's irrigated lands, approximately 5 miles downstream in the Alkali Creek drainage. Preliminary estimates are that as much as 40 percent of the water diverted does not reach the irrigated lands due to ditch leakage. The District also diverts water at times from Abrams Creek during free river conditions for storage and plans to continue that practice.

6. The goals of Trout Unlimited and the District are to improve flows in Abrams Creek for the benefit of its native cutthroat fishery by improving the efficiency of the District's diversion and delivery system without impairing the District's JPO Ditch No. 2 water rights and the use thereof or its long term ability to operate and maintain its diversion and delivery system.

NOW THEREFORE, in consideration of the premises and the mutual promises and covenants set forth herein, the Parties agree as follows:

B. Project Description

1. Subject to the terms and conditions of this Agreement, the Parties propose to pipe portions of the JPO No. 2 Ditch to improve the efficiency of delivery of water to the District's irrigated lands

and reduce diversions from Abrams Creek for the benefit of the cutthroat trout fishery (the "Project").

a. New diversion works and a pipeline for the JPO Ditch No. 2 shall be designed and engineered to increase diversion efficiency and water carriage efficiency without impairing the District's JPO Ditch No. 2 water right and use thereof, and without impairing the District's long term ability to operate and maintain the diversion and pipeline system.

b. The location of the point of diversion for the JPO Ditch No. 2 will remain the same unless otherwise agreed to by the Parties.

c. Subject to the District's determination of the optimal design of the Project, it is foreseen that the pipeline will generally follow the existing ditch alignment unless an alternate alignment is agreed to by the Parties, which approval will not be unreasonably withheld.

d. The Project will use the appropriately sized diameter pipeline as needed to accommodate delivery of the JPO Ditch No. 2 water right and the JPO Ditch No. 1 water right owned by the District and which diverts water out of Hernage Creek before being combined with water diverted under the JPO Ditch No. 2 water right for delivery to the District (i.e. a total capacity adequate to carry 7 c.f.s). Certain sections of the pipeline may vary in diameter to accommodate the physical situation.

2. Immediately upon completion of construction of the Project, the District will leave in Abrams Creek 40 percent of the amount of water that is physically available at the JPO Ditch No. 2 diversion point, except for instances when that 40 percent will result in less than 1.25 cfs in the Creek, in which case diversions under the JPO Ditch No. 2 water right will be limited or stopped in order to leave up to 1.25 cfs in the Creek. For purposes of example only, if there is 2 cfs available at the JPO Ditch No. 2 headgate, the District may only divert 0.75 cfs under its JPO Ditch No. 2 water right while leaving 1.25 cfs in the Creek, but if there is 4 cfs available at the JPO Ditch No. 2 headgate, up to 2.4 cfs may be diverted and delivered to the District through the pipeline under the JPO Ditch No. 2 water right and 1.6 cfs shall be left in Abrams Creek. Under this Agreement, 5 cfs of flow at the JPO Ditch No. 2 headgate is required to divert the full 3.0 cfs decreed to the JPO Ditch No. 2 water right. This Agreement shall have no impact on the amount of water the District may divert under the JPO Ditch No. 1 water right. The District's obligations under this paragraph will be met even if the Project, as built, results in efficiencies of less than 40 percent. As part of the Project, measuring devices will be installed as needed to ensure that the provisions of this paragraph are being met.

3. A fish screen will be installed as part of the Project. The final design of the diversion and fish screen will be determined at the Project design stage, with input from Trout Unlimited and Colorado Parks and Wildlife.

4. During high flows periods in Abrams Creek at the diversion structure and to allow for periodic flushing flows beneficial to the cutthroat trout fishery, the District agrees that in some years it will further reduce or curtail diversions under the JPO Ditch No. 2 water rights for up to 7 days so that flows in Abrams Creek are higher during that time, so long as it can be done without causing material injury to the District's use of its JPO Ditch No. 2 water rights. The District

Ken V. Klein

agrees to cooperate with Trout Unlimited on determining the frequency, timing and amount of such flushing flows that meet the goals set forth in paragraph A.6.

C. Parties' Responsibilities

1. Securing adequate funding for the Project is a condition precedent to the other obligations set forth in this Agreement. Trout Unlimited is responsible for seeking $1.2 million in funding for the Project through application for grants and/or donations. The District will be responsible for seeking funding in addition to the $1.2 million, if any, as may be needed to complete the Project, provided that any financial obligations of the District hereunder are subject to annual appropriations as provided herein. The terms of any grants, donations or other funding must be reasonably acceptable to both Parties. Funding will be sought for Project design, permitting, engineering, construction, maintenance, and other costs associated with the design, approval and construction of the Project. Funding may be used to reimburse costs already incurred in the permitting and design of the Project but only if permitted under the terms of the grants and/or donations. Should Trout Unlimited or the District be unable to raise the necessary funds within 24 months of the date of this Agreement, then the Parties may agree to extend this Agreement for a mutually acceptable period. If no such extension is agreed to, then this Agreement shall automatically be rendered null and void and be of no further force and effect and the parties hereto shall have no obligations under this Agreement. The foregoing provision shall be self-effectuating.

2. Provided funding is obtained, the District will be responsible for (1) determining the optimal design of the Project, (2) design, plans and specifications to meet the Project goals set forth in this Agreement, and (3) contracting for construction and overseeing the construction of the Project in a manner consistent with this Agreement and with the terms of the grants and/or donations obtained to pay for the Project.

3. The Project shall be designed, constructed and maintained in a manner consistent with the goals set forth in paragraph A.6 of this Agreement. Trout Unlimited shall have the right to review Project design and construction for consistency with this Agreement and with the terms and conditions of any grant and/or donation for which Trout Unlimited is the fiscal agent or sponsor, provided, however, the District shall have the sole responsibility and authority for (a) determination of the appropriate Project design, construction methods, and materials, (b) location of all facilities, (c) contract letting and supervision of construction contracts, and (d) operation and maintenance of the Project. Design, construction, operation and maintenance of the fish screen contemplated under paragraph B.3 will be reasonably consistent with the recommendations of Colorado Parks and Wildlife. Project expenditures incurred by the District that are inconsistent with the terms and conditions of this Agreement and/or of any grant and/or donation for the Project will be the sole responsibility of the District.

4. Contracts with the company and/or engineers responsible for design and construction of the Project shall include adequate warranty and insurance provisions, and other appropriate provisions acceptable to the Parties.

5. Securing all necessary local, state and federal permits and approvals with conditions mutually acceptable to the Parties is also a condition precedent to the Project and the other obligations set forth in this Agreement. Trout Unlimited will seek funding, in the amount specified in a

Ken V. Klein

scope of work obtained by the District and reasonably acceptable to Trout Unlimited, for all such necessary permits and approvals, which will be part of the $1.2M being raised by Trout Unlimited. Trout Unlimited will assist the District in obtaining said permits and approvals for the Project before construction begins. The District will be the named applicant in said permits and approvals and will be responsible for the implementation of any and all terms and conditions of the permits and approvals. If permits and approvals acceptable to both Parties cannot be obtained with this funding within 12 months of the date of this Agreement, the Parties may agree to extend this Agreement for a mutually acceptable period. If no such extension is agreed to, then this Agreement shall automatically be rendered null and void and be of no further force and effect and the parties hereto shall have no obligations under this Agreement. The foregoing provision shall be self-effectuating.

6. The Parties understand this Project does not require a change of water rights and it is administrable by the State and Division Engineers without impairing the District's JPO Ditch No. 2 water rights and the use thereof. As part of the approvals described in paragraph C.5, above, which are a condition precedent of this Agreement, the District will seek to obtain a satisfactory approval of the Parties' understanding from the State and Division Engineers.

7. Once construction of the Project is completed, the District will be the exclusive owner of the Project infrastructure and will be responsible for the operation and maintenance of the Project including, but not limited to, the fish screen, maintenance of diversion structures and measuring devices to ensure that the District's obligations under this Agreement are met, and compliance with any terms and conditions imposed as part of the Project's permits and approvals. This Agreement shall not affect the District's discretion to continue its historical practice of diverting water under free river conditions at the JPO Ditch No. 1 and/or JPO Ditch No. 2, or to divert under new or changed water rights, so long as the District satisfies the terms of this Agreement.

8. The District will provide Trout Unlimited or its designee with such records including diversion records and stream flow measurements, so as to allow Trout Unlimited to monitor compliance with this Agreement. The District will also provide Trout Unlimited reasonable notice of any material issues related to implementation of the Project. Trout Unlimited will bear no responsibility for operation and maintenance of the Project or for compliance with conditions of the Project's permits and approvals under this Agreement.

D. Access

1. The District will grant access to JPO Ditch No. 1 and JPO Ditch No. 2, diversion structures, and other District facilities as may be reasonably necessary for the completion of the Project.

2. Once construction of the Project is completed, to the extent of the District's authority, the District will grant to Trout Unlimited and its authorized representatives access to the District's Project facilities as necessary to ensure that the provisions of paragraph B.2 are being met and the fish screen properly maintained.

3. The District will maintain District's access for operation and maintenance of the Project, to the extent practicable with the understanding that, at the time of this contract, the Project lies entirely on land owned by the US Bureau of Land Management.

Ben V. Klein

E. Term/Termination

Prior to satisfaction of the conditions precedent set forth in paragraphs C.1, C.5, and C.6 above, either party may terminate this Agreement by giving the other party written notice as provided under paragraph F. Once the conditions precedent set forth in paragraphs C.1, C.5, and C.6 above have been satisfied, the term of this Agreement is in perpetuity.

F. Notices and Representatives

The following are the primary contacts for each party. All notices and communications regarding the Project will include the named individuals, the preferred form of communication being email. Either party may from time to time designate by written notice substitute or additional contacts for the party.

District
Buckhorn Valley Metropolitan Districts No. 1
Attn: President
P.O. Box 5127
0044 Indian Heights Way
Gypsum, CO 81637
jvhill.co@gmail.com

Trout Unlimited
Attn: Project Manager
P.O. Box 1544
Pagosa Springs, CO 81147
mwhiting@tu.org

Copy to:
Icenogle Seaver Pogue, P.C.
Attn: Jennifer L. Ivey
4725 South Monaco Street, Suite 225
Denver, Colorado 80237
Telephone: 303.867.3003
Facsimile: 303.292.9101
JIvey@isp-law.com

G. General Provisions

1. No provision, covenant or agreement contained in this Agreement, nor any obligations herein imposed upon the District shall constitute or create an indebtedness or debt of the District within the meaning of any Colorado constitutional provision or statutory limitation.

2. The District does not intend to hereby to create a multiple-fiscal year direct or indirect debt or other financial obligation whatsoever. The performance of those obligations of the District hereunder requiring budgeting and appropriation of funds are subject to annual budgeting and appropriations and if such appropriations are not available in any given year, the obligations of this Agreement requiring said appropriations will not be enforced in that year. The District's obligation to forego water diversions as set forth in paragraphs B.2 and B.4 shall be unaffected by this provision.

3. The terms of this Agreement are severable, and should any term or provision hereof be declared invalid or become inoperative for any reason, including without limitation by judicial order, administrative order, and/or change in applicable law, such invalidity or change in a term or

provision shall not affect the validity of any other term or provision hereof, unless such an interpretation impairs the ability to achieve one or more of the goals set forth in Paragraph A.6, in which case the Agreement will be revised as needed to best accomplish those goals. No waiver of any of the provisions of this Agreement shall be deemed to constitute a waiver of any other provision of this Agreement, nor shall such waiver constitute a continuing waiver unless otherwise expressly provided herein, nor shall the waiver of any default hereunder be deemed to be a waiver of any subsequent default hereunder.

4. This Agreement shall be governed by and construed in accordance with the laws of the State of Colorado, and venue for any dispute hereunder shall lie in the Eagle County District Court.

5. The headings, captions and titles contained herein are intended for convenience and reference only and are not intended to construe the provisions hereof.

6. This Agreement contains the entire agreement between the Parties, and no statement, promise or inducement made by either party or the agent of either party that is not contained in this Agreement shall be valid or binding.

7. Nothing in this Agreement or in any actions taken by the Parties pursuant to this Agreement shall be deemed a waiver of the District's sovereign immunity under the Colorado Governmental Immunity Act, §§ 24-10-101, *et seq*., as amended from time to time.

8. The Parties may not assign or delegate their respective right, duties, and obligations hereunder absent the written consent of the other party.

9. All provisions herein, including the benefits and burdens, shall extend to and be binding upon the Parties' respective heirs, legal representatives, successors, and assigns.

10. This Agreement is a covenant that runs with and burdens the District's JPO No. 2 water rights to the extent not terminated pursuant to paragraphs C.1, C.5, or C.6. The District shall record this Agreement within the appropriate clerk and recorder office(s) within ten (10) days after it is executed by both Parties. The District shall provide notice to Trout Unlimited of its intent to sell or lease any portion of the JPO Ditch No. 2 water right no less than thirty (30) days prior to any such sale or lease. If the Agreement is terminated pursuant to paragraphs C.1, C.5, or C.6, either Party may record a Notice of Termination of the Agreement.

11. This Agreement may be executed in multiple identical original counterparts constituting one agreement.

12. Modifications of this Agreement shall not be effective unless agreed to by the Parties in a written, properly executed amendment hereto.

13. Enforcement of this Agreement and all rights and obligations hereunder are reserved solely to the Parties. Any services or benefits which third parties receive as a result of this Agreement are incidental to the Agreement and do not create any rights for such third parties.

14. The Parties agree that the terms and conditions of this Agreement are enforceable by specific performance.

TROUT UNLIMITED

By: _____

Title: Drew Peternell
Colorado Water Project
Director

BUCKHORN VALLEY METROPOLITAN DISTRICT NO. 1

By: _____

Title: President

COLORADO
Parks and Wildlife
Department of Natural Resources

CPW Assistant Director of Capital, Parks, and Trails
6060 Broadway
Denver, CO 80216
Phone: 303-866-3203 ext. 4610

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

January 3, 2018

Dear Ms. Bassi:

CPW is submitting this letter in support of the Bureau of Land Management's request for an enlargement of the Abrams Creek instream flow. Abrams Creek supports a Core Conservation (genetic purity of 99% or greater) population of green-lineage cutthroat trout, which is the only known aboriginal cutthroat trout population in the Eagle River watershed. The existing instream flow of 0.5 cfs was decreed in 80CW118, from the headwaters of Abrams Creek to the headgate of the Mrs. Paye Ditch near the town of Eagle. The proposed enlargement to 1.25 cfs from May 1 thru September 30 (0.75 cfs additional) would provide critical habitat protection for the Abrams Creek cutthroat trout population, and aligns with the low flow provisions imbedded in the 2016 Abrams Creek Flow Agreement signed by the Buckhorn Valley Metropolitan Water District ('Buckhorn District') and Trout Unlimited ('TU').

Conservation Efforts on Abrams Creek

Abrams Creek cutthroat have been considered a genetically important population since the 1990's by cutthroat conservation advocates. In 2014 using innovative genetic analysis techniques, CPW was able to confirm their significance as the only aboriginal cutthroat population in the Eagle River Watershed, a population that is also distinct from other indigenous Upper Colorado River cutthroat trout populations. The genetic distinction of the Abrams Creek cutthroat population compelled CPW to cultivate discussions with owners of the JPO Ditch No. 2 water right ('JPO right'), located approximately 4 miles above the mouth of Abrams Creek. The JPO right totals 3.0 cfs (1.0 cfs under a 1908 priority and 2.0 cfs under a 1916 priority). Though junior to a 0.8 cfs Mrs. Paye Ditch priority, the JPO Ditch is the only structure on Abrams Creek above the Mrs. Paye Ditch, and if the Mrs. Paye Ditch was not diverting, the JPO No. 2 Ditch could dewater the lower reach of Abrams Creek. Potential changes at the Mrs. Paye Ditch and increasing awareness of the significance of the Abrams Creek cutthroats warranted a few specific actions by project partners: (1) construction of an upstream fish migration barrier near the mouth of Abrams Creek to prevent upstream migration of non-native trout (accomplished as mitigation for the Eagle Ranch development); (2) improvements and enhancements to fish passage upstream of the barrier by replacing an impending road crossing with a modified culvert that specifically encourages fish movement; and (3) collaboration with owners of the JPO ditch to determine whether a formal agreement to preserve and potentially, to improve flow conditions below the JPO Ditch could be reached. The TU - Buckhorn District Flow Agreement (Flow Agreement) represents the culmination of many years of efforts by CPW, the Buckhorn District, TU, BLM and other local partners (Eagle County, Town of Gypsum, Eagle River Watershed Council, local chapter of TU) to ensure adequate flow conditions for the survival of this population of native fish. Most of the Abrams Creek watershed above the mouth lies on BLM land. So, BLM has been the lead agency nominating Abrams Creek for this instream flow (ISF) enlargement.

TU - Buckhorn Metro Flow Agreement

The Flow Agreement is a perpetual flow agreement that exchanges payment for a below-ground pipeline for diversion forbearance that allows the ditch efficiencies to be realized as improvements in streamflow. Importantly, the Flow Agreement also includes baseflow protections below the diversion. Specifically, construction of an in-ground pipeline to replace the open-ditch and natural drainage network previously utilized by the Buckhorn District was estimated to save approximately 40% of the water diverted from Abrams Creek. The Agreement specifies that these pipeline efficiencies would be realized directly as flow increases in Abrams Creek, yet allows the Buckhorn District to continue to divert 60% of the flow in Abrams Creek provided flows at the diversion remain above 1.25 cfs. When flows at the diversion are at or below 1.25 cfs, the Buckhorn District will forego all diversions to the JPO No. 2 Ditch. This Agreement preserves a reasonable semblance of peak and shoulder flows during high runoff, and also maintains 100 percent of the baseflow produced in the Abrams Creek watershed above the diversion, maximizing a limiting factor for fish habitat in the creek. In exchange for forbearance of diversion, TU agreed to raise approximately $1.2 million for construction of the pipeline. To date, over $1.0 million has been secured through multiple sources, with the Colorado Water Conservation Board committing to a large component through the Fish and Wildlife Resources Fund. This ISF enlargement will legally protect this water for this unique population of cutthroat trout in perpetuity.

Implementation of the ditch efficiency project and the Flow Agreement, complemented by this ISF enlargement, will provide important protective measures for this rare lineage of endemic cutthroat trout. These actions represent one small but tangible step forward implementing provisions of the State's Conservation Agreement for Colorado River Cutthroat Trout (*Oncorhynchus clarkii pleuriticus*) in the States of Colorado, Utah, and Wyoming (June 2006). CPW also will continue to be an active partner with CWCB implementing the instream flow program, and will look for additional opportunities for creative partnerships with water providers and non-governmental organizations such as TU.

Thank you for this opportunity to comment on this filing. If you have any questions, please don't hesitate to contact either David Graf (970-255-6142) or Jay Skinner (303-291-7260) re: the Abrams Creek project.

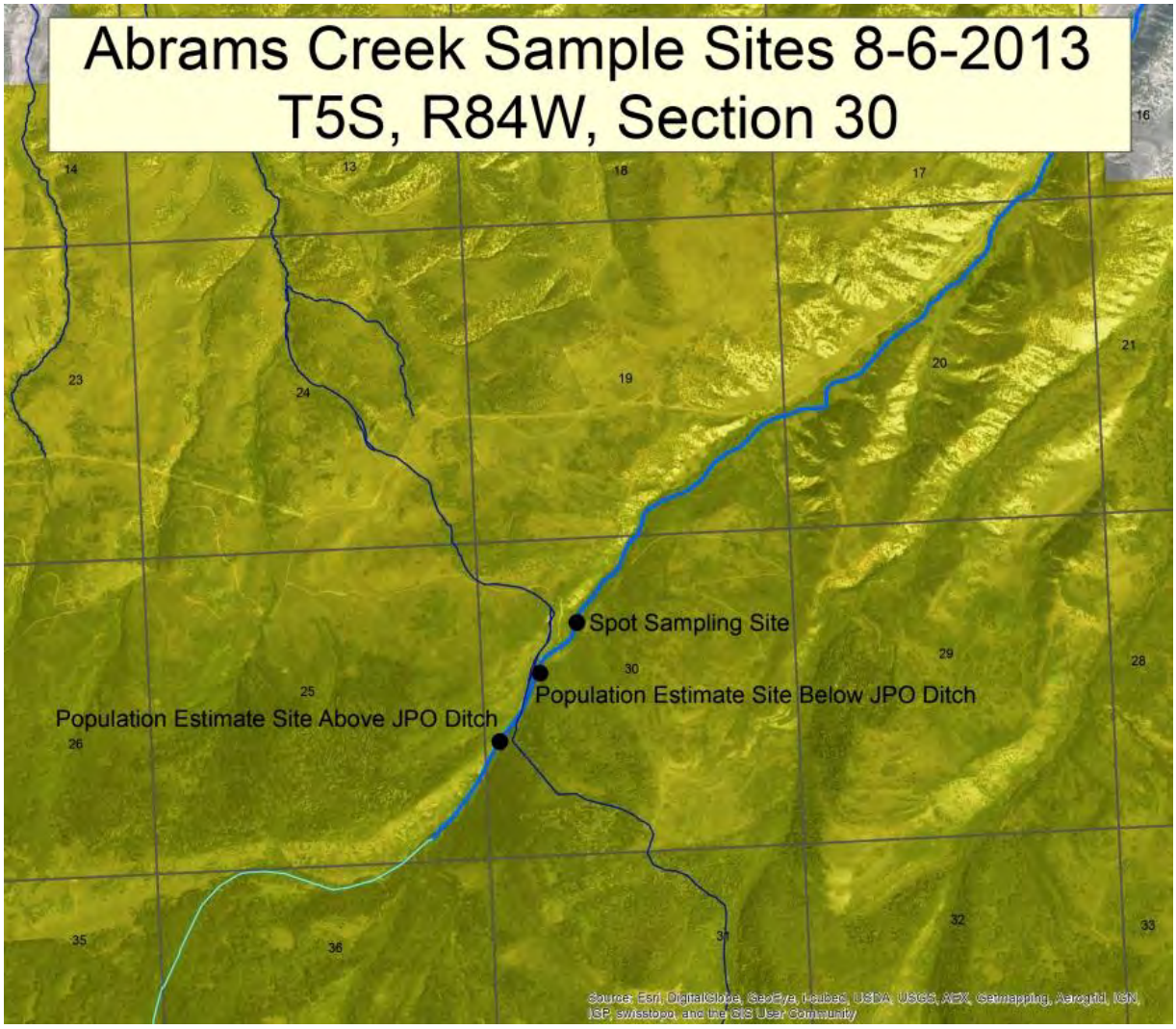
Sincerely,

Margaret Taylor
CPW Assistant Director
Capital, Parks, and Trails

Colorado River Valley Field Office Stream Surveys
August 2013

Abrams Creek - Water Code #23414

Abrams Creek, located on lands managed by the Colorado River Valley Field Office, was sampled on August 6, 2013. Two population estimates were completed, one above the JPO Diversion Ditch, and one below the JPO Diversion Ditch. Each population estimate was completed using one backpack electroshocker. Data was obtained to compare population densities above and below this significant water diversion feature. Additional presence/absence spot sampling was done below BLM road 8380 for approximately 400 feet. Personnel present were Tom Fresques, Gregor Dekleva, and Matt Ringer, BLM, and Kendall Bakich and crew, Colorado Parks and Wildlife.




SIMMS

Discussion:

General

Abrams Creek contains a genetically pure population of Colorado River Cutthroat Trout - Green Lineage. In addition, this population has unique haplotypes that distinguish it amongst other green lineage populations which makes this population more unique. It is the only pure population of its kind in the entire Eagle River watershed and appears to be an aboriginal population that has likely been in existence since the last ice age. The population is small but stable and is currently restricted to approximately one 1-1.5 miles of habitat.

Site 1 (Above JPO Diversion Ditch)

CPW has the data associated with the sampling of this site.

Site 2 (Below JPO Diversion Ditch)

The stream at this site is small with an average width of 3 feet and an estimated flow of approximately 1.5 cfs. Habitat consists of small drop pools and areas of undercut banks with small riffle and run areas. The stream is a Rosgen B channel type. Riparian vegetation is lush, dense, and diverse consisting of rocky mountain maple, alder, willow, chokecherry, horsetail, aspen, wildrose, sedge, spruce, fir, and nettle. The stream contains excellent streamside cover and shading. Noxious weeds including Canada thistle and houndstongue are also common along portions of the creek.

The site is slightly impacted by cattle that concentrate at a couple stream crossings in this reach. Generally, flows below the JPO Ditch are 0.50 - 0.75 cfs less than those above the ditch. At the time of sampling, it did not appear that the full allocation of water was being diverted. Based on our sampling, this site is representitive of 156 adult cutthroat trout (>150 mm TL) + or – 6 fish, at the 95% confidence interval, per mile of stream.

Spot Sampling below the Road Crossing

Approximately 400 feet of stream was spot sampled below the road crossing to document presence of cutthroat trout and get some relative abundance information. Cutthroats were collected throughout the segment and nice sized adult fish as well as a few smaller fish were noted. Densities appear to be similar to slightly higher than the population estimate site above the road but below the JPO Diversion Ditch. All fish collected appeared healthy. Habitat was similar as the other sites with dense riparian vegetation and cover and excellent stream shading. Large, deep pools are lacking.

Recommendations:

- Resample the two population estimate sites again to get some more confidence as well as trend data
- Grazing permittees will complete the new allotment boundary fence to better manage cows and reduce trespass and stream crossing impacts
- Consider treating weeds including thistle and houndstongue

Data Input & Proofing

STREAM NAME:	Abrams Creek
XS LOCATION:	2000' downstream from road crossing
XS NUMBER:	2
DATE:	6/26/2014
OBSERVERS:	J. Skinner, D. Graf
1/4 SEC:	SW
SECTION:	20
TWP:	5S
RANGE:	84W
PM:	Sixth
COUNTY:	Eagle
WATERSHED:	Eagle
DIVISION:	5
DOW CODE:	23414
USGS MAP:	
USFS MAP:	
	Level and Rod Survey
TAPE WT:	0.0106 lbs / ft
TENSION:	99999 lbs
SLOPE:	0.065 ft / ft

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

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

Total Data Points = 27

GL=1	FEATURE	DIST	VERT DEPTH	WATER DEPTH	VEL	A	Q	Tape to Water
	S	0.00	5.45			0.00	0.00	0.00
		3.30	6.15			0.00	0.00	0.00
		5.80	6.00			0.00	0.00	0.00
1	G	8.80	6.00			0.00	0.00	0.00
		10.70	6.10			0.00	0.00	0.00
		11.70	6.60			0.00	0.00	0.00
	W	12.00	6.86	0.00	0.00	0.00	0.00	0.00
		12.30	6.95	0.15	2.91	0.05	0.13	6.80
		12.60	7.00	0.20	2.73	0.06	0.16	6.80
		12.90	7.35	0.50	1.27	0.15	0.19	6.85
		13.20	7.30	0.50	1.23	0.15	0.18	6.80
		13.50	7.25	0.40	1.58	0.12	0.19	6.85
		13.80	7.20	0.40	0.68	0.12	0.08	6.80
		14.10	7.20	0.35	0.56	0.11	0.06	6.85
		14.40	7.15	0.20	0.44	0.06	0.03	6.95
		14.70	7.15	0.30	0.85	0.09	0.08	6.85
		15.00	7.15	0.30	0.88	0.09	0.08	6.85
		15.30	7.05	0.25	0.90	0.08	0.07	6.80
		15.60	6.95	0.10	1.57	0.03	0.05	6.85
		15.90	7.05	0.10	0.20	0.03	0.01	6.95
		16.20	7.00	0.15	1.36	0.05	0.06	6.85
	W	16.50	6.86	0.00	0.00	0.00	0.00	0.00
		16.70	6.60			0.00	0.00	0.00
		18.50	6.25			0.00	0.00	0.00
		18.80	5.70			0.00	0.00	0.00
1	G	21.30	5.45			0.00	0.00	0.00
	S	23.30	5.15			0.00	0.00	0.00

Totals	1.17	1.36

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

LOCATION INFORMATION

STREAM NAME:	Abrams Creek
XS LOCATION:	2000' downstream from road crossing
XS NUMBER:	2
DATE:	26-Jun-14
OBSERVERS:	J. Skinner, D. Graf
1/4 SEC:	SW
SECTION:	20
TWP:	5S
RANGE:	84W
PM:	Sixth
COUNTY:	Eagle
WATERSHED:	Eagle
DIVISION:	5
DOW CODE:	23414
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:	0.065

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

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

STREAM NAME: Abrams Creek
XS LOCATION: 2000' downstream from road crossing
XS NUMBER: 2

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	5.45			0.00		0.00	0.00	0.0%
		3.30	6.15			0.00		0.00	0.00	0.0%
		5.80	6.00			0.00		0.00	0.00	0.0%
1	G	8.80	6.00			0.00		0.00	0.00	0.0%
		10.70	6.10			0.00		0.00	0.00	0.0%
		11.70	6.60			0.00		0.00	0.00	0.0%
	W	12.00	6.86	0.00	0.00	0.00		0.00	0.00	0.0%
		12.30	6.95	0.15	2.91	0.31	0.15	0.05	0.13	9.6%
		12.60	7.00	0.20	2.73	0.30	0.20	0.06	0.16	12.0%
		12.90	7.35	0.50	1.27	0.46	0.50	0.15	0.19	14.0%
		13.20	7.30	0.50	1.23	0.30	0.50	0.15	0.18	13.5%
		13.50	7.25	0.40	1.58	0.30	0.40	0.12	0.19	13.9%
		13.80	7.20	0.40	0.68	0.30	0.40	0.12	0.08	6.0%
		14.10	7.20	0.35	0.56	0.30	0.35	0.11	0.06	4.3%
		14.40	7.15	0.20	0.44	0.30	0.20	0.06	0.03	1.9%
		14.70	7.15	0.30	0.85	0.30	0.30	0.09	0.08	5.6%
		15.00	7.15	0.30	0.88	0.30	0.30	0.09	0.08	5.8%
		15.30	7.05	0.25	0.90	0.32	0.25	0.08	0.07	4.9%
		15.60	6.95	0.10	1.57	0.32	0.10	0.03	0.05	3.5%
		15.90	7.05	0.10	0.20	0.32	0.10	0.03	0.01	0.4%
		16.20	7.00	0.15	1.36	0.30	0.15	0.05	0.06	4.5%
	W	16.50	6.86	0.00	0.00	0.33		0.00	0.00	0.0%
		16.70	6.60			0.00		0.00	0.00	0.0%
		18.50	6.25			0.00		0.00	0.00	0.0%
		18.80	5.70			0.00		0.00	0.00	0.0%
1	G	21.30	5.45			0.00		0.00	0.00	0.0%
	S	23.30	5.15			0.00		0.00	0.00	0.0%
	TOTALS ----------					4.78	0.5 (Max.)	1.17	1.36	100.0%

Manning's n = 0.1272
Hydraulic Radius= 0.24483352

STREAM NAME: Abrams Creek
XS LOCATION: 2000' downstream from road crossing
XS NUMBER: 2

WATER LINE COMPARISON TABLE

WATER LINE	MEAS AREA	COMP AREA	AREA ERROR
	1.17	1.11	-4.9%
6.61	1.17	2.30	96.4%
6.63	1.17	2.20	87.9%
6.65	1.17	2.10	79.5%
6.67	1.17	2.00	71.2%
6.69	1.17	1.91	62.9%
6.71	1.17	1.81	54.7%
6.73	1.17	1.71	46.5%
6.75	1.17	1.62	38.4%
6.77	1.17	1.53	30.4%
6.79	1.17	1.43	22.5%
6.81	1.17	1.34	14.6%
6.82	1.17	1.29	10.6%
6.83	1.17	1.25	6.7%
6.84	1.17	1.20	2.9%
6.85	1.17	1.16	-1.0%
6.86	1.17	1.11	-4.9%
6.87	1.17	1.07	-8.7%
6.88	1.17	1.02	-12.5%
6.89	1.17	0.98	-16.2%
6.90	1.17	0.94	-19.9%
6.91	1.17	0.89	-23.5%
6.93	1.17	0.81	-30.6%
6.95	1.17	0.73	-37.6%
6.97	1.17	0.65	-44.2%
6.99	1.17	0.58	-50.3%
7.01	1.17	0.52	-56.0%
7.03	1.17	0.45	-61.2%
7.05	1.17	0.40	-65.9%
7.07	1.17	0.35	-70.4%
7.09	1.17	0.30	-74.8%
7.11	1.17	0.25	-79.0%

WATERLINE AT ZERO
AREA ERROR = 6.847

STREAM NAME: Abrams Creek
XS LOCATION: 2000' downstream from road crossing
XS NUMBER: 2

Constant Manning's n

STAGING TABLE

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

	DIST TO WATER (FT)	TOP WIDTH (FT)	AVG. DEPTH (FT)	MAX. DEPTH (FT)	AREA (SQ FT)	WETTED PERIM. (FT)	PERCENT WET PERIM (%)	HYDR RADIUS (FT)	FLOW (CFS)	AVG. VELOCITY (FT/SEC)
GL	6.00	13.04	0.52	1.35	6.82	13.87	100.0%	0.49	12.64	1.85
	6.05	11.10	0.56	1.30	6.24	11.90	85.8%	0.52	12.10	1.94
	6.10	9.06	0.63	1.25	5.74	9.81	70.7%	0.58	11.96	2.08
	6.15	7.82	0.68	1.20	5.32	8.52	61.4%	0.62	11.57	2.17
	6.20	7.63	0.65	1.15	4.93	8.30	59.8%	0.59	10.39	2.11
	6.25	7.51	0.61	1.10	4.56	8.13	58.6%	0.56	9.22	2.02
	6.30	7.16	0.58	1.05	4.19	7.77	56.0%	0.54	8.26	1.97
	6.35	6.80	0.56	1.00	3.84	7.39	53.3%	0.52	7.39	1.92
	6.40	6.45	0.54	0.95	3.51	7.02	50.6%	0.50	6.58	1.88
	6.45	6.09	0.52	0.90	3.19	6.64	47.9%	0.48	5.84	1.83
	6.50	5.73	0.51	0.85	2.90	6.27	45.2%	0.46	5.16	1.78
	6.55	5.38	0.49	0.80	2.62	5.90	42.5%	0.44	4.55	1.73
	6.60	5.02	0.47	0.75	2.36	5.52	39.8%	0.43	3.99	1.69
	6.65	4.91	0.43	0.70	2.11	5.37	38.7%	0.39	3.38	1.60
	6.70	4.81	0.39	0.65	1.87	5.23	37.7%	0.36	2.81	1.50
	6.75	4.72	0.35	0.60	1.63	5.09	36.7%	0.32	2.28	1.39
	6.80	4.62	0.30	0.55	1.40	4.95	35.7%	0.28	1.79	1.28
WL	6.85	4.52	0.26	0.50	1.17	4.81	34.7%	0.24	1.36	1.16
	6.90	4.30	0.22	0.45	0.95	4.56	32.9%	0.21	0.99	1.05
	6.95	4.02	0.18	0.40	0.74	4.27	30.8%	0.17	0.69	0.93
	7.00	3.34	0.17	0.35	0.56	3.55	25.6%	0.16	0.48	0.87
	7.05	2.69	0.15	0.30	0.41	2.86	20.6%	0.14	0.33	0.81
	7.10	2.47	0.11	0.25	0.28	2.62	18.9%	0.11	0.18	0.67
	7.15	2.28	0.07	0.20	0.16	2.39	17.2%	0.07	0.08	0.49
	7.20	1.35	0.06	0.15	0.08	1.43	10.3%	0.06	0.04	0.44
	7.25	0.70	0.05	0.10	0.04	0.76	5.5%	0.05	0.01	0.39
	7.30	0.36	0.03	0.05	0.01	0.39	2.8%	0.02	0.00	0.25
	7.35	0.02	0.00	0.00	0.00	0.02	0.1%	0.00	0.00	0.03

STREAM NAME: Abrams Creek
XS LOCATION: 2000' downstream from road crossing
XS NUMBER: 2

SUMMARY SHEET

MEASURED FLOW (Qm)=	1.36	cfs
CALCULATED FLOW (Qc)=	1.36	cfs
(Qm-Qc)/Qm * 100 =	0.5	%
MEASURED WATERLINE (WLm)=	6.86	ft
CALCULATED WATERLINE (WLc)=	6.85	ft
(WLm-WLc)/WLm * 100 =	0.2	%
MAX MEASURED DEPTH (Dm)=	0.50	ft
MAX CALCULATED DEPTH (Dc)=	0.50	ft
(Dm-Dc)/Dm * 100	-0.5	%
MEAN VELOCITY=	1.16	ft/sec
MANNING'S N=	0.127	
SLOPE=	0.065	ft/ft
.4 * Qm =	0.5	cfs
2.5 * Qm=	3.4	cfs

RECOMMENDED INSTREAM FLOW:
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FLOW (CFS)	PERIOD
==========	========
_____	_____
_____	_____
_____	_____
_____	_____

RATIONALE FOR RECOMMENDATION:
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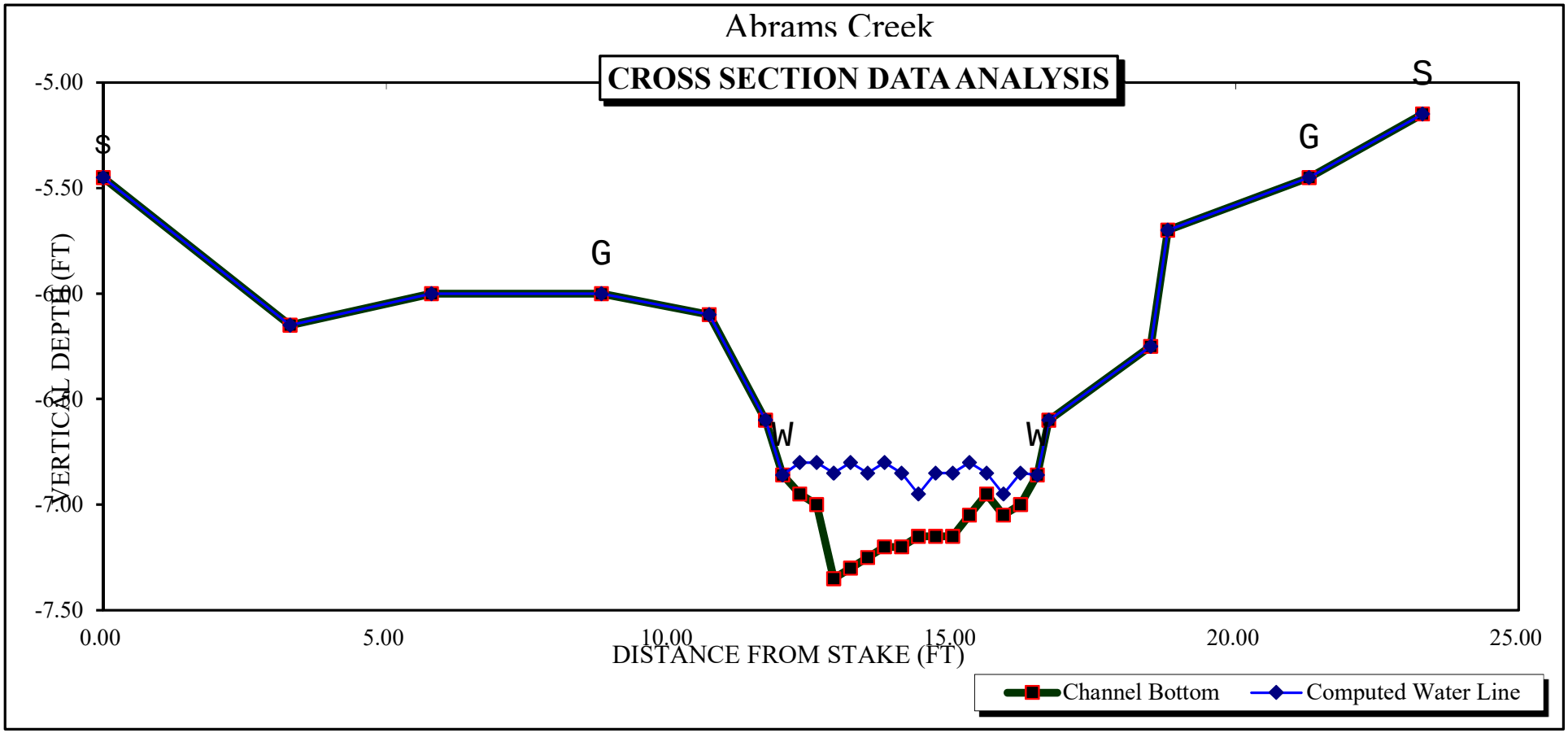
RECOMMENDATION BY: …….. AGENCY…….. DATE:……

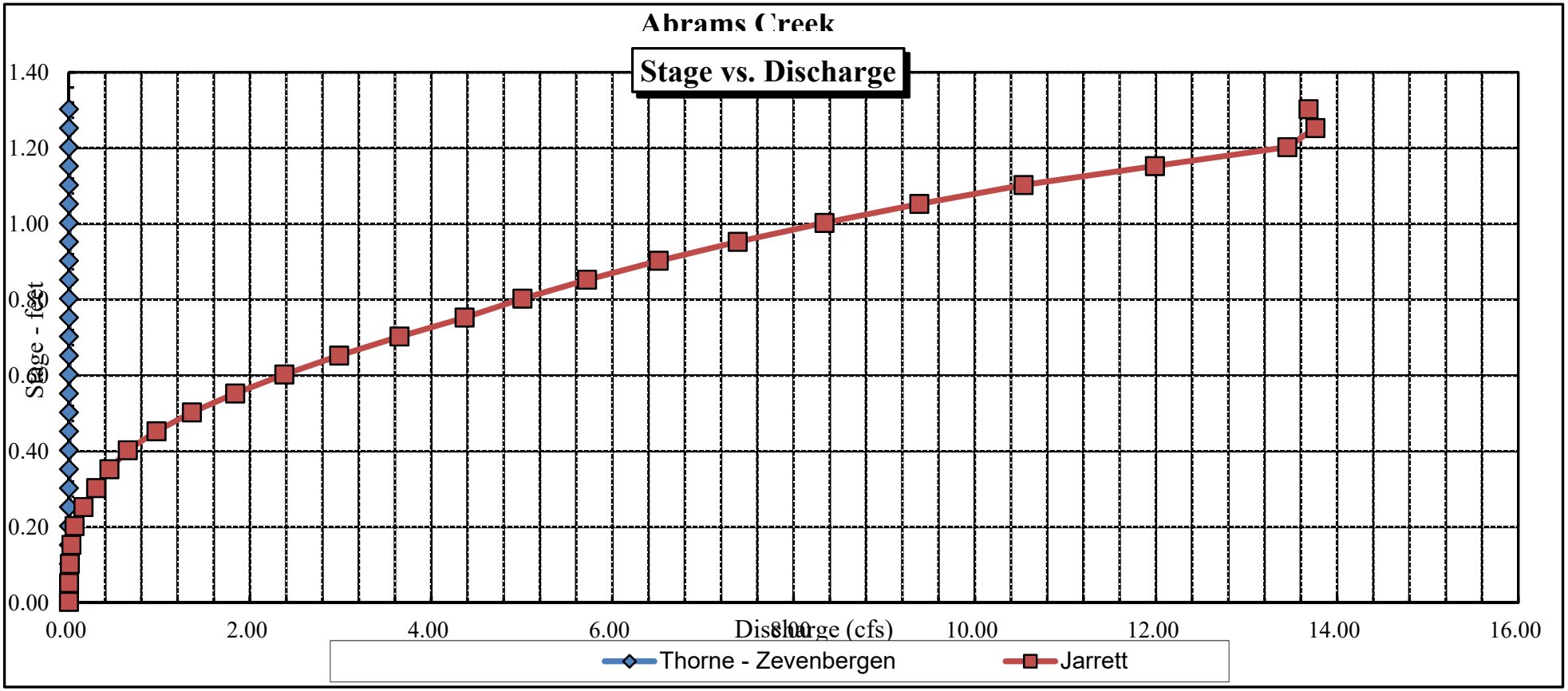
CWCB REVIEW BY: …….. DATE:……

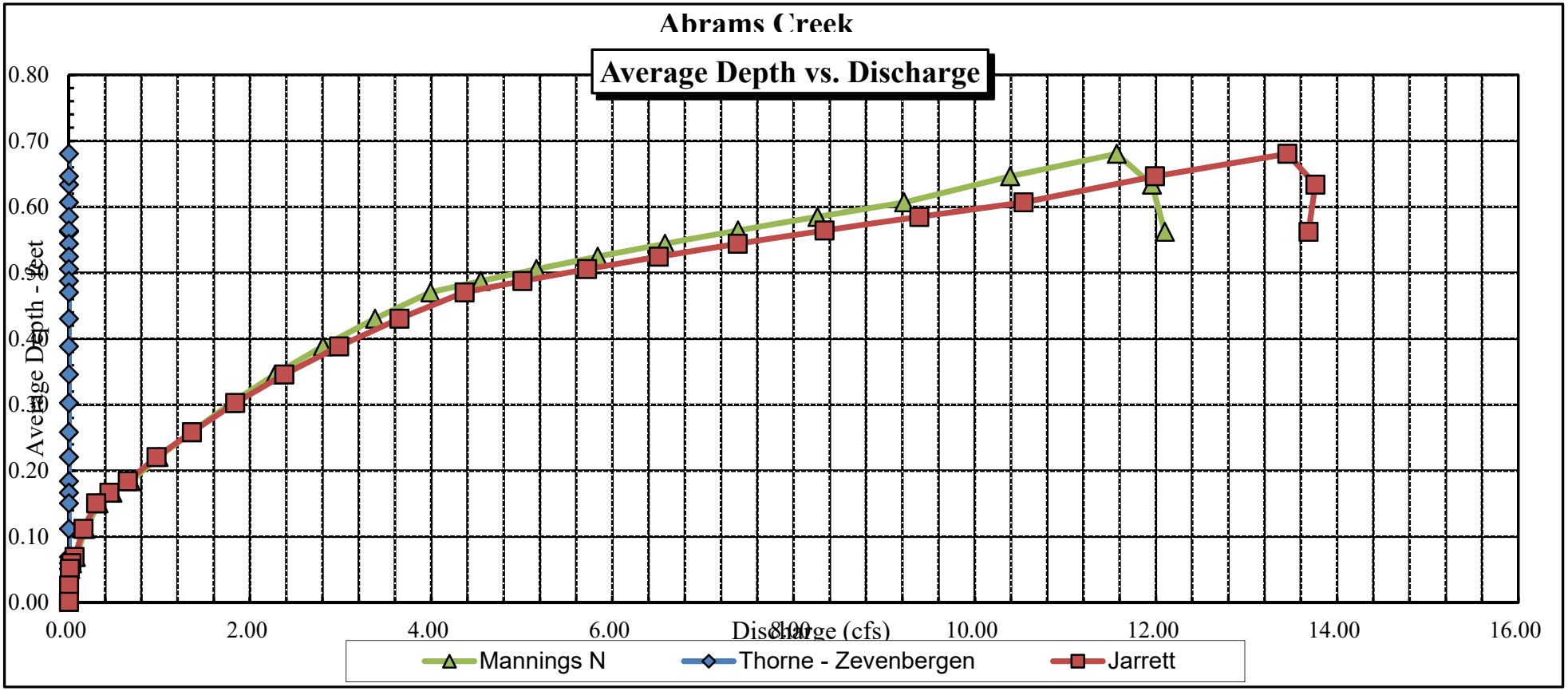
STREAM NAME: Abrams Creek
XS LOCATION: 2000' downstream from road crossing
XS NUMBER: 2 Jarrett Variable Manning's n Correction Applied

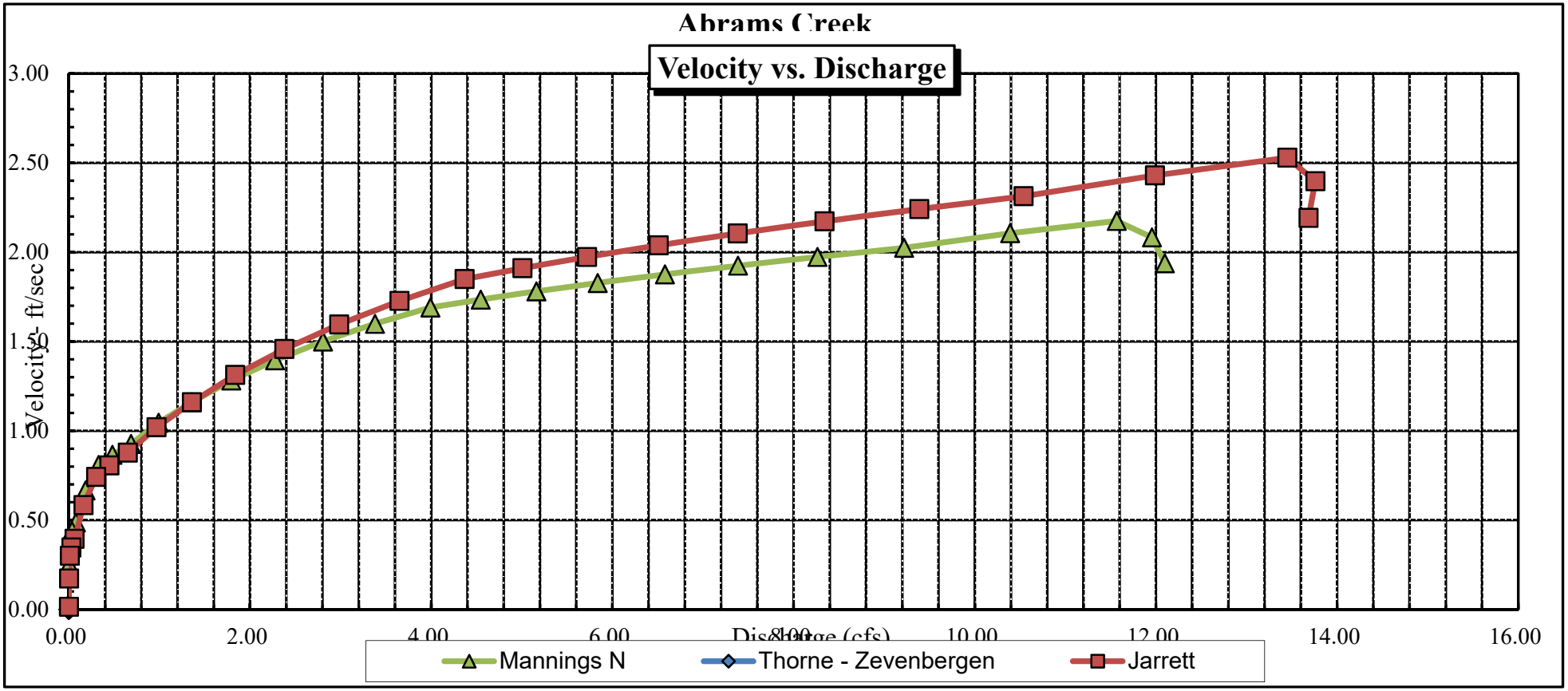
GL = lowest Grassline elevation corrected for sag
STAGING TABLE *WL* = Waterline corrected for variations in field measured water surface elevations and sag

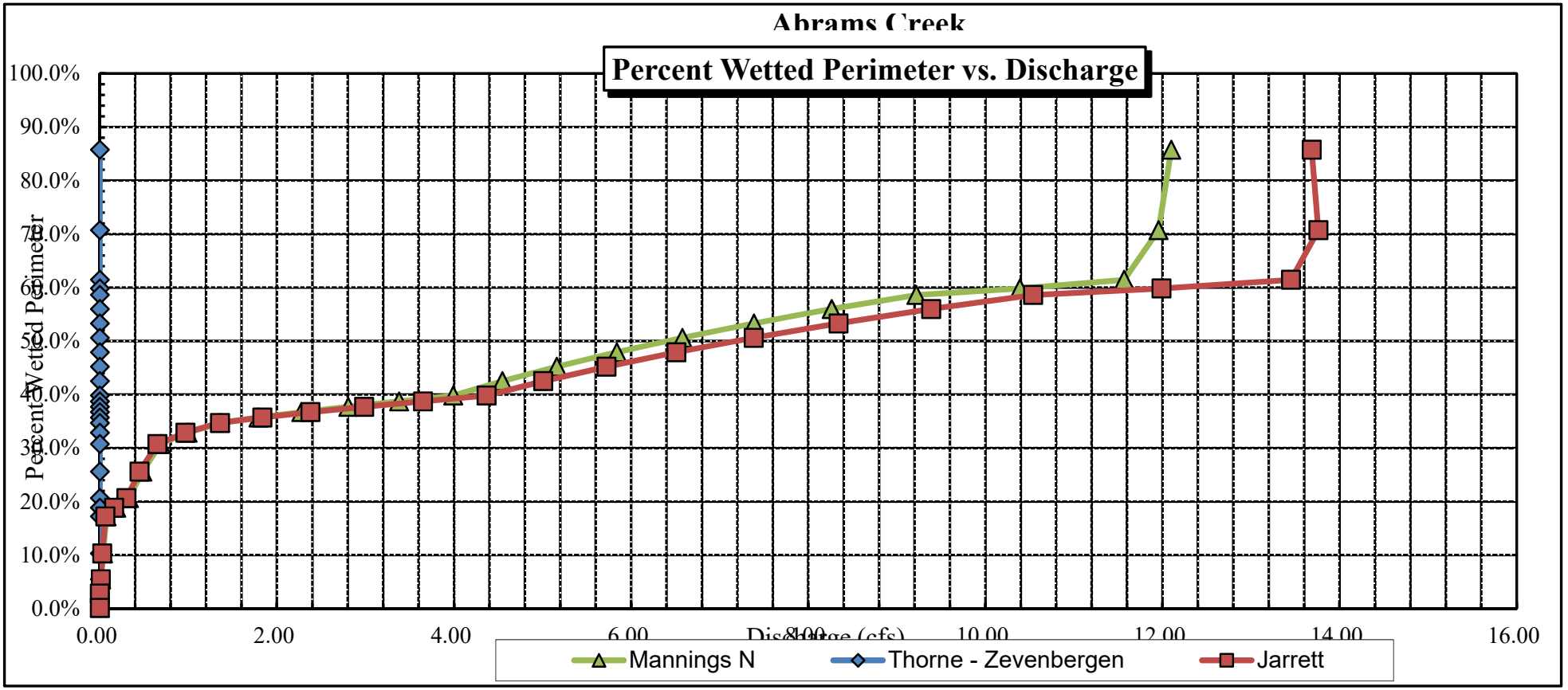
	DIST TO WATER (FT)	TOP WIDTH (FT)	AVG. DEPTH (FT)	MAX. DEPTH (FT)	AREA (SQ FT)	WETTED PERIM. (FT)	PERCENT WET PERIM (%)	HYDR RADIUS (FT)	FLOW (CFS)	AVG. VELOCITY (FT/SEC)
GL	6.00	13.04	0.52	1.35	6.82	13.87	100.0%	0.49	14.15	2.08
	6.05	11.10	0.56	1.30	6.24	11.90	85.8%	0.52	13.68	2.19
	6.10	9.06	0.63	1.25	5.74	9.81	70.7%	0.58	13.76	2.40
	6.15	7.82	0.68	1.20	5.32	8.52	61.4%	0.62	13.45	2.53
	6.20	7.63	0.65	1.15	4.93	8.30	59.8%	0.59	11.99	2.43
	6.25	7.51	0.61	1.10	4.56	8.13	58.6%	0.56	10.54	2.31
	6.30	7.16	0.58	1.05	4.19	7.77	56.0%	0.54	9.39	2.24
	6.35	6.80	0.56	1.00	3.84	7.39	53.3%	0.52	8.34	2.17
	6.40	6.45	0.54	0.95	3.51	7.02	50.6%	0.50	7.38	2.10
	6.45	6.09	0.52	0.90	3.19	6.64	47.9%	0.48	6.51	2.04
	6.50	5.73	0.51	0.85	2.90	6.27	45.2%	0.46	5.72	1.97
	6.55	5.38	0.49	0.80	2.62	5.90	42.5%	0.44	5.01	1.91
	6.60	5.02	0.47	0.75	2.36	5.52	39.8%	0.43	4.37	1.85
	6.65	4.91	0.43	0.70	2.11	5.37	38.7%	0.39	3.65	1.73
	6.70	4.81	0.39	0.65	1.87	5.23	37.7%	0.36	2.98	1.60
	6.75	4.72	0.35	0.60	1.63	5.09	36.7%	0.32	2.38	1.46
	6.80	4.62	0.30	0.55	1.40	4.95	35.7%	0.28	1.84	1.31
WL	6.85	4.52	0.26	0.50	1.17	4.81	34.7%	0.24	1.36	1.16
	6.90	4.30	0.22	0.45	0.95	4.56	32.9%	0.21	0.97	1.02
	6.95	4.02	0.18	0.40	0.74	4.27	30.8%	0.17	0.65	0.88
	7.00	3.34	0.17	0.35	0.56	3.55	25.6%	0.16	0.45	0.81
	7.05	2.69	0.15	0.30	0.41	2.86	20.6%	0.14	0.30	0.74
	7.10	2.47	0.11	0.25	0.28	2.62	18.9%	0.11	0.16	0.58
	7.15	2.28	0.07	0.20	0.16	2.39	17.2%	0.07	0.06	0.40
	7.20	1.35	0.06	0.15	0.08	1.43	10.3%	0.06	0.03	0.35
	7.25	0.70	0.05	0.10	0.04	0.76	5.5%	0.05	0.01	0.30
	7.30	0.36	0.03	0.05	0.01	0.39	2.8%	0.02	0.00	0.17
	7.35	0.02	0.00	0.00	0.00	0.02	0.1%	0.00	0.00	0.01


Abrams Creek
CROSS SECTION DATA ANALYSIS
S
G
W
W
G
S
-5.00
-5.50
-6.00
-6.50
-7.00
-7.50
VERTICAL DEPTH (FT)
0.00
5.00
10.00
15.00
20.00
25.00
DISTANCE FROM STAKE (FT)
Channel Bottom
Computed Water Line


Abrams Creek
Stage vs. Discharge
1.40
1.20
1.00
0.80
0.60
0.40
0.20
0.00
Stage - feet
0.00
2.00
4.00
6.00
8.00
10.00
12.00
14.00
16.00
Discharge (cfs)
Thorne - Zevenbergen
Jarrett


Abrams Creek
Average Depth vs. Discharge
Average Depth - Feet
0.80
0.70
0.60
0.50
0.40
0.30
0.20
0.10
0.00
0.00
2.00
4.00
6.00
8.00
10.00
12.00
14.00
16.00
Discharge (cfs)
Mannings N
Thorne - Zevenbergen
Jarrett


Abrams Creek
Velocity vs. Discharge
Velocity - ft/sec
3.00
2.50
2.00
1.50
1.00
0.50
0.00
0.00
2.00
4.00
6.00
8.00
10.00
12.00
14.00
16.00
Discharge (cfs)
Mannings N
Thorne - Zevenbergen
Jarrett


Abrams Creek
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
2.00
4.00
6.00
8.00
10.00
12.00
14.00
16.00
Discharge (cfs)
Mannings N
Thorne - Zevenbergen
Jarrett

Data Input & Proofing

STREAM NAME:	Abrams Creek
XS LOCATION:	0.6 miles downstream fr X-Sec #2
XS NUMBER:	3
DATE:	6/26/2014
OBSERVERS:	J. Skinner, D. Graf
1/4 SEC:	NE
SECTION:	20
TWP:	5S
RANGE:	84W
PM:	Sixth
COUNTY:	Eagle
WATERSHED:	Eagle
DIVISION:	5
DOW CODE:	23414
USGS MAP:	
USFS MAP:	
	Level and Rod Survey
TAPE WT:	0.0106 lbs / ft
TENSION:	99999 lbs
SLOPE:	0.027 ft / ft

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

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

Total Data Points = 20

GL=1	FEATURE	DIST	VERT DEPTH	WATER DEPTH	VEL	A	Q	Tape to Water
	S	5.50	5.65			0.00	0.00	0.00
		6.80	5.85			0.00	0.00	0.00
		7.10	6.45			0.00	0.00	0.00
1	G	7.80	6.80			0.00	0.00	0.00
	W	8.00	7.89	0.00	0.00	0.00	0.00	0.00
		8.10	8.20	0.30	0.00	0.05	0.00	7.90
		8.30	8.25	0.30	1.59	0.08	0.12	7.95
		8.60	8.20	0.35	1.35	0.11	0.14	7.85
		8.90	8.15	0.40	2.26	0.12	0.27	7.75
		9.20	8.20	0.35	2.45	0.11	0.26	7.85
		9.50	8.20	0.30	2.78	0.09	0.25	7.90
		9.80	8.20	0.35	2.99	0.11	0.31	7.85
		10.10	8.20	0.30	2.89	0.09	0.26	7.90
		10.40	8.10	0.25	2.43	0.05	0.12	7.85
	W	10.50	7.89	0.00	0.00	0.00	0.00	0.00
		10.60	6.65			0.00	0.00	0.00
		11.00	6.40			0.00	0.00	0.00
1	G	11.70	6.85			0.00	0.00	0.00
		12.20	5.80			0.00	0.00	0.00
	S	13.00	5.45			0.00	0.00	0.00

Totals	0.79	1.74

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

LOCATION INFORMATION

STREAM NAME:	Abrams Creek
XS LOCATION:	0.6 miles downstream fr X-Sec #2
XS NUMBER:	3
DATE:	26-Jun-14
OBSERVERS:	J. Skinner, D. Graf
1/4 SEC:	NE
SECTION:	20
TWP:	5S
RANGE:	84W
PM:	Sixth
COUNTY:	Eagle
WATERSHED:	Eagle
DIVISION:	5
DOW CODE:	23414
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:	0.027

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

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

STREAM NAME: Abrams Creek
XS LOCATION: 0.6 miles downstream fr X-Sec #2
XS NUMBER: 3

DATA POINTS= 20

VALUES COMPUTED FROM RAW FIELD DATA

FEATURE	DIST	VERT DEPTH	WATER DEPTH	VEL	WETTED PERIM.	WATER DEPTH	AREA (Am)	Q (Qm)	% Q CELL
S	5.50	5.65			0.00		0.00	0.00	0.0%
	6.80	5.85			0.00		0.00	0.00	0.0%
	7.10	6.45			0.00		0.00	0.00	0.0%
1 G	7.80	6.80			0.00		0.00	0.00	0.0%
W	8.00	7.89	0.00	0.00	0.00		0.00	0.00	0.0%
	8.10	8.20	0.30	0.00	0.33	0.30	0.05	0.00	0.0%
	8.30	8.25	0.30	1.59	0.21	0.30	0.08	0.12	6.9%
	8.60	8.20	0.35	1.35	0.30	0.35	0.11	0.14	8.2%
	8.90	8.15	0.40	2.26	0.30	0.40	0.12	0.27	15.6%
	9.20	8.20	0.35	2.45	0.30	0.35	0.11	0.26	14.8%
	9.50	8.20	0.30	2.78	0.30	0.30	0.09	0.25	14.4%
	9.80	8.20	0.35	2.99	0.30	0.35	0.11	0.31	18.1%
	10.10	8.20	0.30	2.89	0.30	0.30	0.09	0.26	15.0%
	10.40	8.10	0.25	2.43	0.32	0.25	0.05	0.12	7.0%
W	10.50	7.89	0.00	0.00	0.23		0.00	0.00	0.0%
	10.60	6.65			0.00		0.00	0.00	0.0%
	11.00	6.40			0.00		0.00	0.00	0.0%
1 G	11.70	6.85			0.00		0.00	0.00	0.0%
	12.20	5.80			0.00		0.00	0.00	0.0%
S	13.00	5.45			0.00		0.00	0.00	0.0%
TOTALS ----------					2.89	0.4 (Max.)	0.79	1.74	100.0%

Manning's n = 0.0463
Hydraulic Radius= 0.27133323

STREAM NAME: Abrams Creek
XS LOCATION: 0.6 miles downstream fr X-Sec #2
XS NUMBER: 3

WATER LINE COMPARISON TABLE

WATER LINE	MEAS AREA	COMP AREA	AREA ERROR
	0.79	0.72	-8.1%
7.64	0.79	1.35	72.6%
7.66	0.79	1.30	66.0%
7.68	0.79	1.25	59.5%
7.70	0.79	1.20	53.0%
7.72	0.79	1.15	46.5%
7.74	0.79	1.10	40.1%
7.76	0.79	1.05	33.6%
7.78	0.79	1.00	27.1%
7.80	0.79	0.95	20.7%
7.82	0.79	0.90	14.3%
7.84	0.79	0.85	7.9%
7.85	0.79	0.82	4.7%
7.86	0.79	0.80	1.5%
7.87	0.79	0.77	-1.7%
7.88	0.79	0.75	-4.9%
7.89	0.79	0.72	-8.1%
7.90	0.79	0.70	-11.3%
7.91	0.79	0.67	-14.4%
7.92	0.79	0.65	-17.6%
7.93	0.79	0.62	-20.7%
7.94	0.79	0.60	-23.9%
7.96	0.79	0.55	-30.1%
7.98	0.79	0.50	-36.3%
8.00	0.79	0.45	-42.5%
8.02	0.79	0.40	-48.6%
8.04	0.79	0.36	-54.7%
8.06	0.79	0.31	-60.8%
8.08	0.79	0.26	-66.8%
8.10	0.79	0.21	-72.7%
8.12	0.79	0.17	-78.6%
8.14	0.79	0.12	-84.3%

WATERLINE AT ZERO
AREA ERROR = 7.865

STREAM NAME: Abrams Creek
XS LOCATION: 0.6 miles downstream fr X-Sec #2
XS NUMBER: 3

Constant Manning's n

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

	DIST TO WATER (FT)	TOP WIDTH (FT)	AVG. DEPTH (FT)	MAX. DEPTH (FT)	AREA (SQ FT)	WETTED PERIM. (FT)	PERCENT WET PERIM (%)	HYDR RADIUS (FT)	FLOW (CFS)	AVG. VELOCITY (FT/SEC)
GL	6.85	2.77	1.25	1.40	3.46	4.99	100.0%	0.69	14.32	4.13
	6.86	2.77	1.24	1.39	3.42	4.96	99.4%	0.69	14.10	4.12
	6.91	2.76	1.19	1.34	3.29	4.86	97.4%	0.68	13.34	4.06
	6.96	2.74	1.15	1.29	3.15	4.76	95.4%	0.66	12.60	4.00
	7.01	2.73	1.10	1.24	3.01	4.66	93.3%	0.65	11.87	3.94
	7.06	2.72	1.06	1.19	2.87	4.56	91.3%	0.63	11.15	3.88
	7.11	2.70	1.01	1.14	2.74	4.46	89.3%	0.61	10.44	3.81
	7.16	2.69	0.97	1.09	2.60	4.36	87.3%	0.60	9.75	3.74
	7.21	2.68	0.92	1.04	2.47	4.26	85.3%	0.58	9.06	3.67
	7.26	2.67	0.88	0.99	2.34	4.16	83.2%	0.56	8.39	3.59
	7.31	2.65	0.83	0.94	2.20	4.06	81.2%	0.54	7.74	3.51
	7.36	2.64	0.78	0.89	2.07	3.95	79.2%	0.52	7.10	3.43
	7.41	2.63	0.74	0.84	1.94	3.85	77.2%	0.50	6.47	3.34
	7.46	2.61	0.69	0.79	1.81	3.75	75.1%	0.48	5.87	3.24
	7.51	2.60	0.65	0.74	1.68	3.65	73.1%	0.46	5.27	3.14
	7.56	2.59	0.60	0.69	1.55	3.55	71.1%	0.44	4.70	3.03
	7.61	2.57	0.55	0.64	1.42	3.45	69.1%	0.41	4.14	2.92
	7.66	2.56	0.50	0.59	1.29	3.35	67.0%	0.39	3.61	2.79
	7.71	2.55	0.46	0.54	1.16	3.25	65.0%	0.36	3.10	2.66
	7.76	2.53	0.41	0.49	1.04	3.15	63.0%	0.33	2.61	2.52
	7.81	2.52	0.36	0.44	0.91	3.05	61.0%	0.30	2.15	2.36
WL	7.86	2.51	0.31	0.39	0.78	2.94	59.0%	0.27	1.71	2.18
	7.91	2.48	0.27	0.34	0.66	2.84	56.9%	0.23	1.32	1.99
	7.96	2.44	0.22	0.29	0.54	2.73	54.7%	0.20	0.96	1.78
	8.01	2.40	0.17	0.24	0.42	2.62	52.5%	0.16	0.64	1.55
	8.06	2.36	0.13	0.19	0.30	2.52	50.4%	0.12	0.38	1.27
	8.11	2.28	0.08	0.14	0.18	2.38	47.6%	0.08	0.17	0.94
	8.16	1.94	0.04	0.09	0.07	1.99	39.8%	0.04	0.04	0.57
	8.21	0.35	0.02	0.04	0.01	0.36	7.2%	0.02	0.00	0.35

STREAM NAME: Abrams Creek
XS LOCATION: 0.6 miles downstream fr X-Sec #2
XS NUMBER: 3

SUMMARY SHEET

MEASURED FLOW (Qm)=	1.74	cfs
CALCULATED FLOW (Qc)=	1.71	cfs
(Qm-Qc)/Qm * 100 =	1.2	%
MEASURED WATERLINE (WLm)=	7.89	ft
CALCULATED WATERLINE (WLc)=	7.86	ft
(WLm-WLc)/WLm * 100 =	0.3	%
MAX MEASURED DEPTH (Dm)=	0.40	ft
MAX CALCULATED DEPTH (Dc)=	0.39	ft
(Dm-Dc)/Dm * 100	3.7	%
MEAN VELOCITY=	2.18	ft/sec
MANNING'S N=	0.046	
SLOPE=	0.027	ft/ft
.4 * Qm =	0.7	cfs
2.5 * Qm=	4.3	cfs

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

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

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

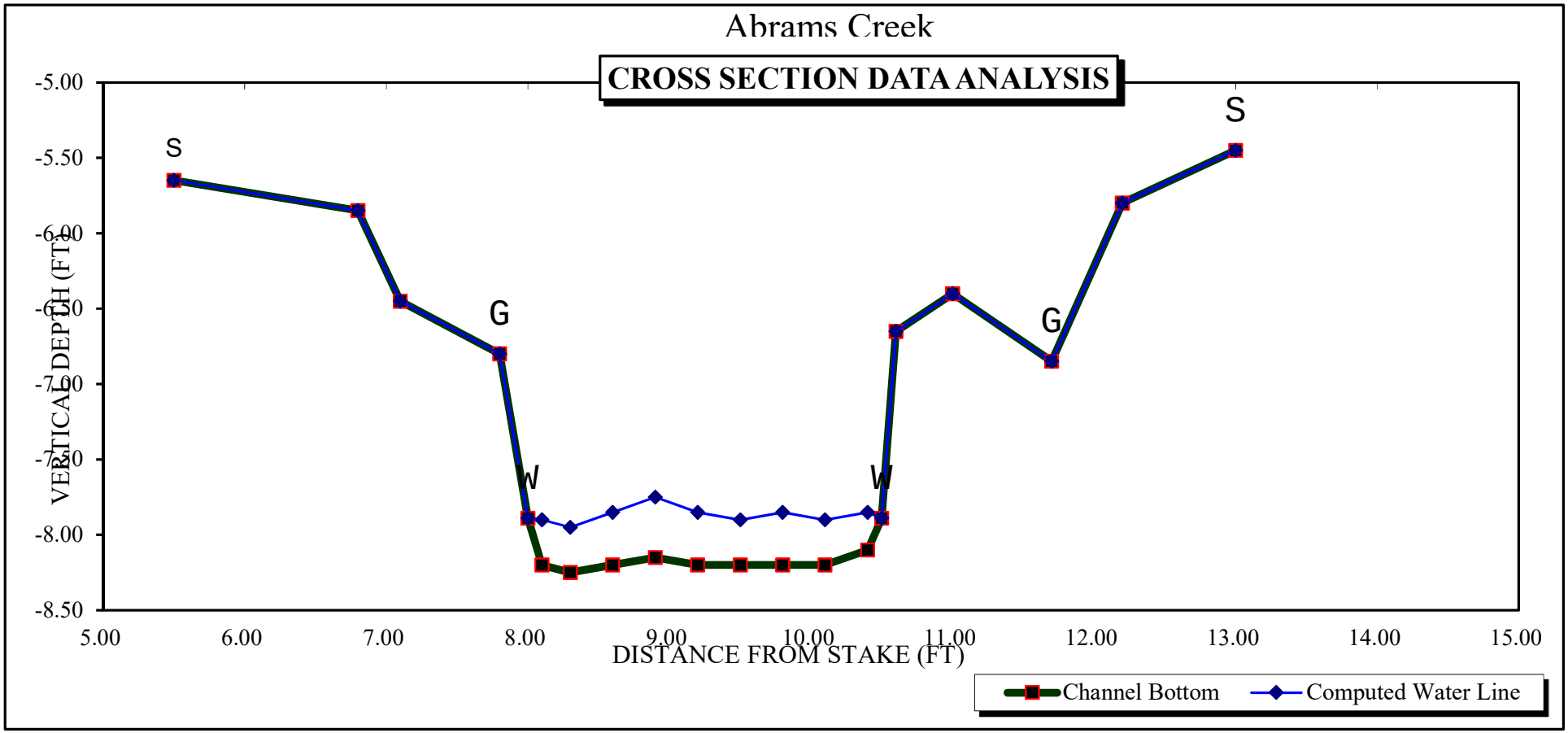
RECOMMENDATION BY: ..... AGENCY..... DATE:.....

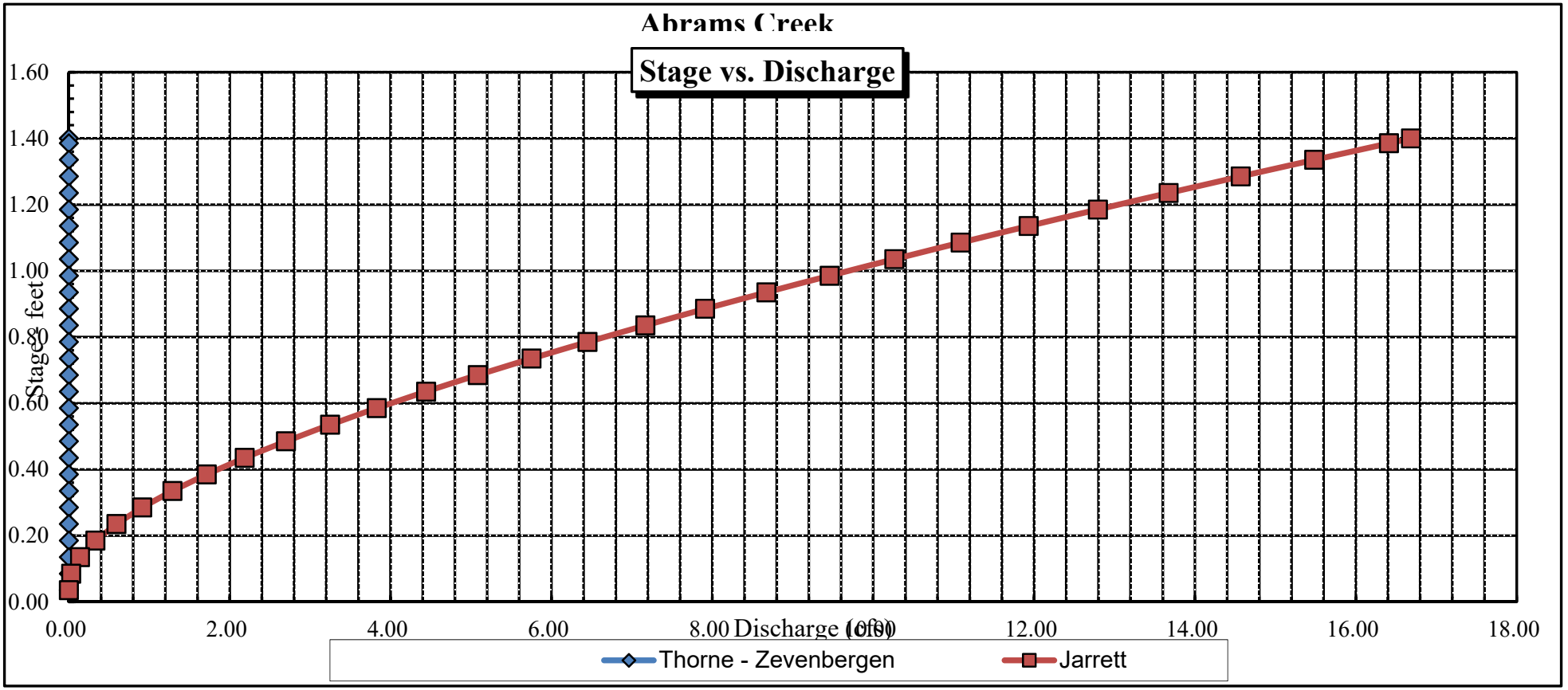
CWCB REVIEW BY: ..... DATE:.....

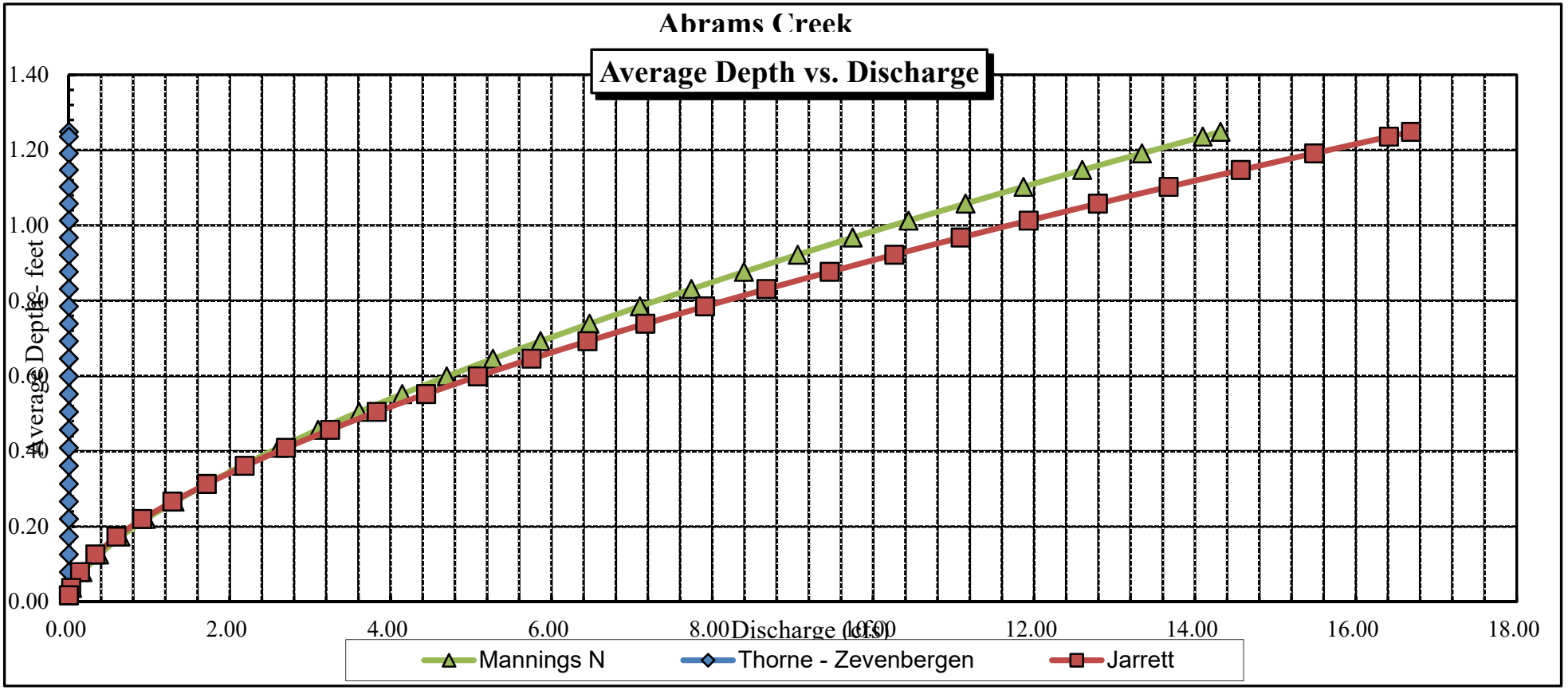
STREAM NAME: Abrams Creek
XS LOCATION: 0.6 miles downstream fr X-Sec #2
XS NUMBER: 3 Jarrett Variable Manning's n Correction Applied

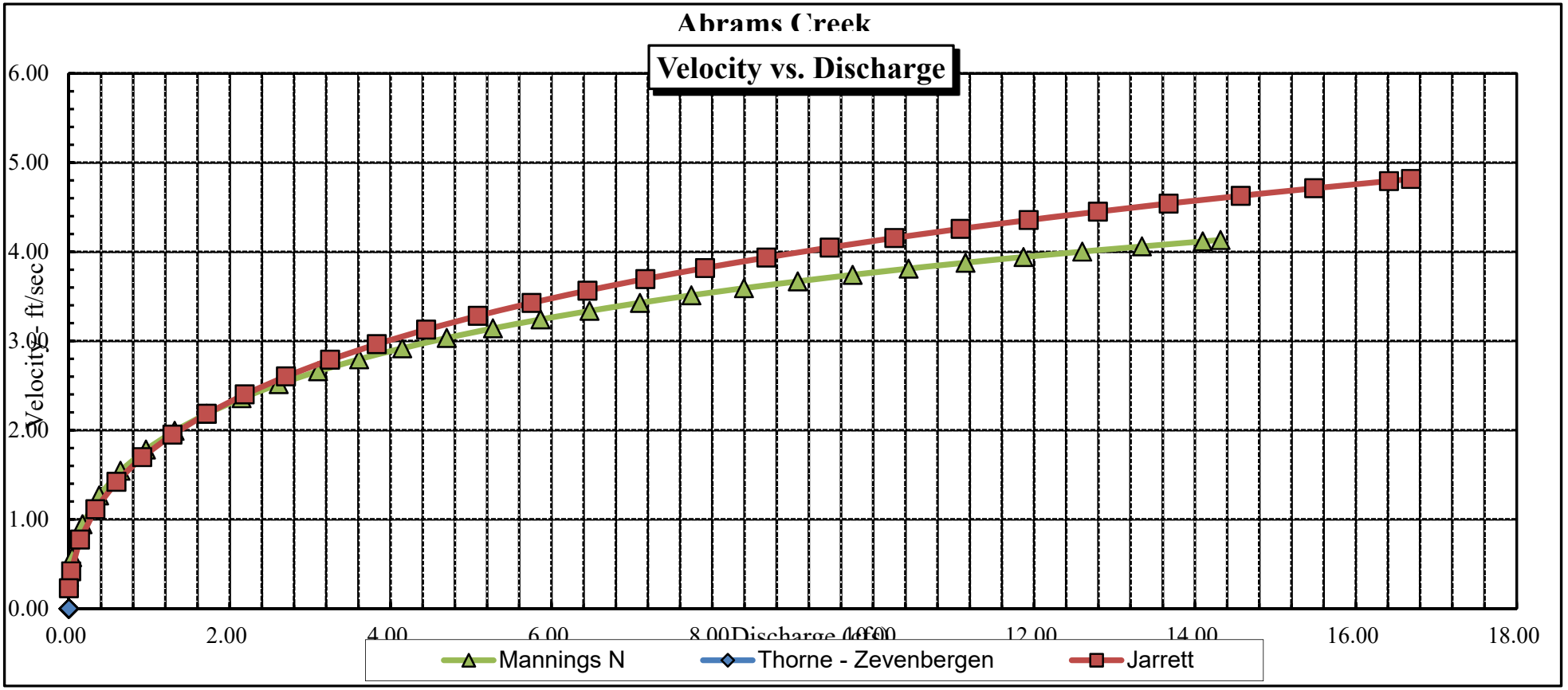
GL = lowest Grassline elevation corrected for sag
STAGING TABLE *WL* = Waterline corrected for variations in field measured water surface elevations and sag

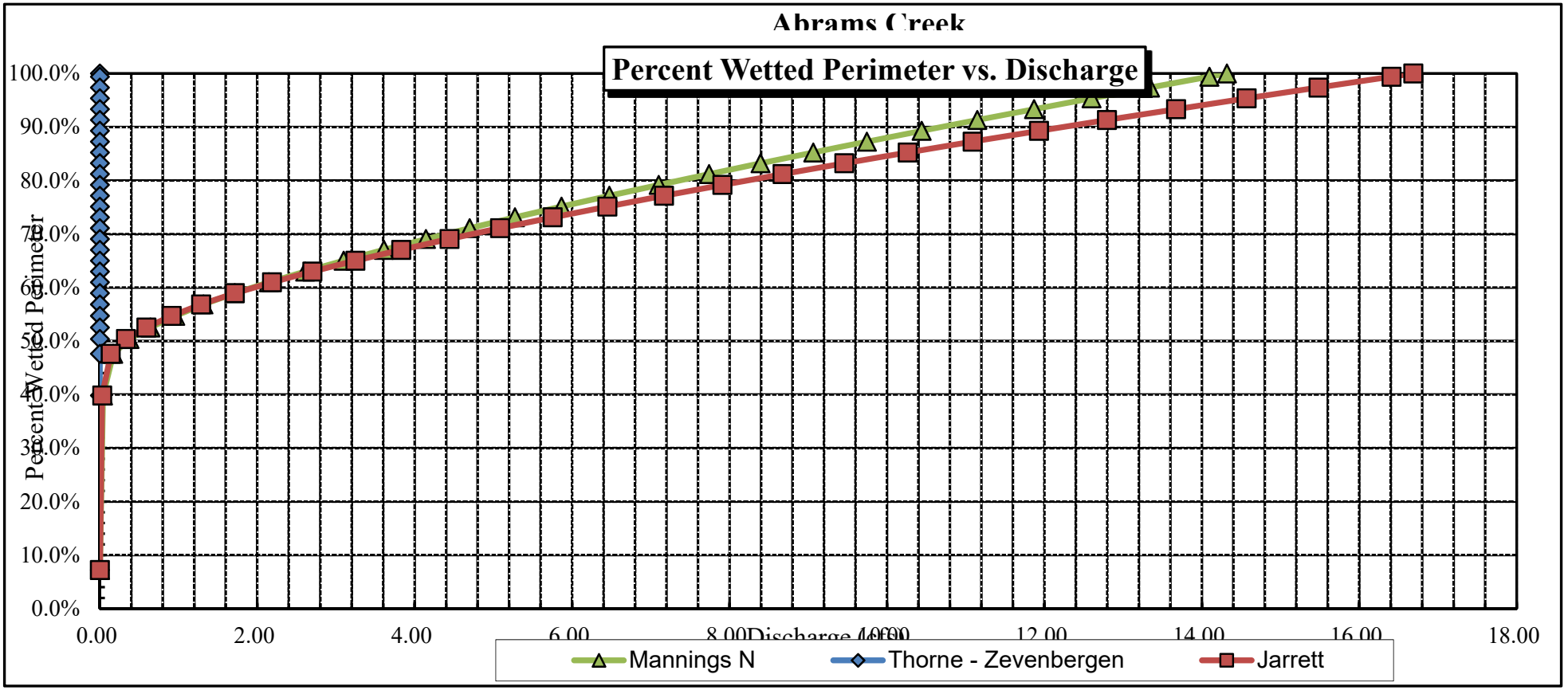
	DIST TO WATER (FT)	TOP WIDTH (FT)	AVG. DEPTH (FT)	MAX. DEPTH (FT)	AREA (SQ FT)	WETTED PERIM. (FT)	PERCENT WET PERIM (%)	HYDR RADIUS (FT)	FLOW (CFS)	AVG. VELOCITY (FT/SEC)
GL	6.85	2.77	1.25	1.40	3.46	4.99	100.0%	0.69	16.69	4.82
	6.86	2.77	1.24	1.39	3.42	4.96	99.4%	0.69	16.41	4.79
	6.91	2.76	1.19	1.34	3.29	4.86	97.4%	0.68	15.48	4.71
	6.96	2.74	1.15	1.29	3.15	4.76	95.4%	0.66	14.57	4.63
	7.01	2.73	1.10	1.24	3.01	4.66	93.3%	0.65	13.67	4.54
	7.06	2.72	1.06	1.19	2.87	4.56	91.3%	0.63	12.79	4.45
	7.11	2.70	1.01	1.14	2.74	4.46	89.3%	0.61	11.93	4.36
	7.16	2.69	0.97	1.09	2.60	4.36	87.3%	0.60	11.09	4.26
	7.21	2.68	0.92	1.04	2.47	4.26	85.3%	0.58	10.26	4.16
	7.26	2.67	0.88	0.99	2.34	4.16	83.2%	0.56	9.46	4.05
	7.31	2.65	0.83	0.94	2.20	4.06	81.2%	0.54	8.67	3.94
	7.36	2.64	0.78	0.89	2.07	3.95	79.2%	0.52	7.91	3.82
	7.41	2.63	0.74	0.84	1.94	3.85	77.2%	0.50	7.17	3.69
	7.46	2.61	0.69	0.79	1.81	3.75	75.1%	0.48	6.45	3.56
	7.51	2.60	0.65	0.74	1.68	3.65	73.1%	0.46	5.75	3.43
	7.56	2.59	0.60	0.69	1.55	3.55	71.1%	0.44	5.08	3.28
	7.61	2.57	0.55	0.64	1.42	3.45	69.1%	0.41	4.44	3.13
	7.66	2.56	0.50	0.59	1.29	3.35	67.0%	0.39	3.83	2.96
	7.71	2.55	0.46	0.54	1.16	3.25	65.0%	0.36	3.25	2.79
	7.76	2.53	0.41	0.49	1.04	3.15	63.0%	0.33	2.70	2.60
	7.81	2.52	0.36	0.44	0.91	3.05	61.0%	0.30	2.19	2.40
WL	7.86	2.51	0.31	0.39	0.78	2.94	59.0%	0.27	1.71	2.18
	7.91	2.48	0.27	0.34	0.66	2.84	56.9%	0.23	1.29	1.95
	7.96	2.44	0.22	0.29	0.54	2.73	54.7%	0.20	0.91	1.70
	8.01	2.40	0.17	0.24	0.42	2.62	52.5%	0.16	0.59	1.42
	8.06	2.36	0.13	0.19	0.30	2.52	50.4%	0.12	0.33	1.11
	8.11	2.28	0.08	0.14	0.18	2.38	47.6%	0.08	0.14	0.77
	8.16	1.94	0.04	0.09	0.07	1.99	39.8%	0.04	0.03	0.42
	8.21	0.35	0.02	0.04	0.01	0.36	7.2%	0.02	0.00	0.23


Abrams Creek
CROSS SECTION DATA ANALYSIS
VERTICAL DEPTH (FT)
-5.00
-5.50
-6.00
-6.50
-7.00
-7.50
-8.00
-8.50
S
S
G
G
W
W
5.00
6.00
7.00
8.00
9.00
10.00
11.00
12.00
13.00
14.00
15.00
DISTANCE FROM STAKE (FT)
Channel Bottom
Computed Water Line


Abrams Creek
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
2.00
4.00
6.00
8.00
12.00
14.00
16.00
18.00
Thorne - Zevenbergen
Jarrett


Abrams Creek
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
2.00
4.00
6.00
8.00
12.00
14.00
16.00
18.00
Mannings N
Thorne - Zevenbergen
Jarrett


Abrams Creek
Velocity vs. Discharge
Velocity- ft/sec
6.00
5.00
4.00
3.00
2.00
1.00
0.00
0.00
2.00
4.00
6.00
8.00
12.00
14.00
16.00
18.00
Mannings N
Thorne - Zevenbergen
Jarrett


Abrams Creek
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
2.00
4.00
6.00
8.00
12.00
14.00
16.00
18.00
Mannings N
Thorne - Zevenbergen
Jarrett

Data Input & Proofing

STREAM NAME:	Abrams Creek
XS LOCATION:	300' upstream from JPO Ditch headgate
XS NUMBER:	1
DATE:	7/1/2013
OBSERVERS:	R. Smith, P. Adams
1/4 SEC:	SW
SECTION:	30
TWP:	5S
RANGE:	84W
PM:	Sixth
COUNTY:	Eagle
WATERSHED:	Eagle River
DIVISION:	5
DOW CODE:	
USGS MAP:	
USFS MAP:	
	Level and Rod Survey
TAPE WT:	0.0106 lbs / ft
TENSION:	99999 lbs
SLOPE:	0.091 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 = 25					
	LS	0.00	2.98			0.00	0.00	0.00
		1.00	3.32			0.00	0.00	0.00
1	G	3.00	4.16			0.00	0.00	0.00
		4.00	4.47			0.00	0.00	0.00
	W	4.80	4.70	0.00	0.00	0.00	0.00	0.00
		5.10	4.95	0.25	0.22	0.08	0.02	4.70
		5.40	4.90	0.20	0.44	0.06	0.03	4.70
		5.70	4.95	0.25	0.54	0.08	0.04	4.70
		6.00	4.90	0.20	0.53	0.06	0.03	4.70
		6.30	4.90	0.20	0.83	0.06	0.05	4.70
		6.60	4.95	0.25	1.40	0.08	0.11	4.70
		6.90	4.95	0.25	1.47	0.08	0.11	4.70
		7.20	5.10	0.40	1.16	0.12	0.14	4.70
		7.50	4.95	0.25	1.07	0.08	0.08	4.70
		7.80	4.85	0.15	0.77	0.05	0.03	4.70
		8.10	5.05	0.35	0.42	0.11	0.04	4.70
		8.40	5.00	0.30	0.25	0.09	0.02	4.70
		8.70	5.05	0.35	1.24	0.11	0.13	4.70
		9.00	4.90	0.20	0.62	0.06	0.04	4.70
		9.30	4.70	0.00	0.00	0.00	0.00	0.00
		9.60	4.75	0.05	0.00	0.02	0.00	4.70
	W	10.00	4.70	0.00	0.00	0.00	0.00	0.00
1	G	10.20	4.10			0.00	0.00	0.00
		11.60	3.75			0.00	0.00	0.00
	RS	12.10	2.59			0.00	0.00	0.00
				Totals		1.10	0.87	

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

LOCATION INFORMATION

STREAM NAME:	Abrams Creek
XS LOCATION:	300' upstream from JPO Ditch headgate
XS NUMBER:	1
DATE:	1-Jul-13
OBSERVERS:	R. Smith, P. Adams
1/4 SEC:	SW
SECTION:	30
TWP:	5S
RANGE:	84W
PM:	Sixth
COUNTY:	Eagle
WATERSHED:	Eagle River
DIVISION:	5
DOW CODE:	0
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:	0.091

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

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

STREAM NAME: Abrams Creek
XS LOCATION: 300' upstream from JPO Ditch headgate
XS NUMBER: 1

WATER LINE COMPARISON TABLE

WATER LINE	MEAS AREA	COMP AREA	AREA ERROR
	1.10	1.10	0.0%
4.45	1.10	2.52	129.3%
4.47	1.10	2.39	118.2%
4.49	1.10	2.27	107.2%
4.51	1.10	2.15	96.3%
4.53	1.10	2.04	85.6%
4.55	1.10	1.92	75.0%
4.57	1.10	1.81	64.5%
4.59	1.10	1.69	54.2%
4.61	1.10	1.58	44.0%
4.63	1.10	1.47	34.0%
4.65	1.10	1.36	24.1%
4.66	1.10	1.31	19.2%
4.67	1.10	1.26	14.4%
4.68	1.10	1.20	9.5%
4.69	1.10	1.15	4.8%
4.70	1.10	1.10	0.0%
4.71	1.10	1.05	-4.7%
4.72	1.10	1.00	-9.2%
4.73	1.10	0.95	-13.5%
4.74	1.10	0.90	-17.7%
4.75	1.10	0.86	-21.8%
4.77	1.10	0.77	-29.7%
4.79	1.10	0.69	-37.5%
4.81	1.10	0.60	-45.2%
4.83	1.10	0.52	-52.8%
4.85	1.10	0.44	-60.3%
4.87	1.10	0.35	-67.7%
4.89	1.10	0.28	-74.7%
4.91	1.10	0.21	-81.2%
4.93	1.10	0.15	-86.3%
4.95	1.10	0.11	-90.2%

WATERLINE AT ZERO
AREA ERROR = 4.700

STREAM NAME: Abrams Creek
XS LOCATION: 300' upstream from JPO Ditch headgate
XS NUMBER: 1

DATA POINTS= 25

VALUES COMPUTED FROM RAW FIELD DATA

FEATURE	DIST	VERT DEPTH	WATER DEPTH	VEL	WETTED PERIM.	WATER DEPTH	AREA (Am)	Q (Qm)	% Q CELL
LS	0.00	2.98			0.00		0.00	0.00	0.0%
	1.00	3.32			0.00		0.00	0.00	0.0%
1 G	3.00	4.16			0.00		0.00	0.00	0.0%
	4.00	4.47			0.00		0.00	0.00	0.0%
W	4.80	4.70	0.00	0.00	0.00		0.00	0.00	0.0%
	5.10	4.95	0.25	0.22	0.39	0.25	0.08	0.02	1.9%
	5.40	4.90	0.20	0.44	0.30	0.20	0.06	0.03	3.0%
	5.70	4.95	0.25	0.54	0.30	0.25	0.08	0.04	4.7%
	6.00	4.90	0.20	0.53	0.30	0.20	0.06	0.03	3.7%
	6.30	4.90	0.20	0.83	0.30	0.20	0.06	0.05	5.7%
	6.60	4.95	0.25	1.40	0.30	0.25	0.08	0.11	12.1%
	6.90	4.95	0.25	1.47	0.30	0.25	0.08	0.11	12.7%
	7.20	5.10	0.40	1.16	0.34	0.40	0.12	0.14	16.0%
	7.50	4.95	0.25	1.07	0.34	0.25	0.08	0.08	9.2%
	7.80	4.85	0.15	0.77	0.32	0.15	0.05	0.03	4.0%
	8.10	5.05	0.35	0.42	0.36	0.35	0.11	0.04	5.1%
	8.40	5.00	0.30	0.25	0.30	0.30	0.09	0.02	2.6%
	8.70	5.05	0.35	1.24	0.30	0.35	0.11	0.13	15.0%
	9.00	4.90	0.20	0.62	0.34	0.20	0.06	0.04	4.3%
	9.30	4.70	0.00	0.00	0.36		0.00	0.00	0.0%
	9.60	4.75	0.05	0.00	0.30	0.05	0.02	0.00	0.0%
W	10.00	4.70	0.00	0.00	0.40		0.00	0.00	0.0%
1 G	10.20	4.10			0.00		0.00	0.00	0.0%
	11.60	3.75			0.00		0.00	0.00	0.0%
RS	12.10	2.59			0.00		0.00	0.00	0.0%
TOTALS ----------					5.57	0.4 (Max.)	1.10	0.87	100.0%

Manning's n = 0.1919
Hydraulic Radius= 0.1971736

STREAM NAME: Abrams Creek
XS LOCATION: 300' upstream from JPO Ditch headgate
XS NUMBER: 1

Constant Manning's n

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

	DIST TO WATER (FT)	TOP WIDTH (FT)	AVG. DEPTH (FT)	MAX. DEPTH (FT)	AREA (SQ FT)	WETTED PERIM. (FT)	PERCENT WET PERIM (%)	HYDR RADIUS (FT)	FLOW (CFS)	AVG. VELOCITY (FT/SEC)
GL	4.16	7.18	0.62	0.94	4.45	8.01	100.0%	0.56	7.02	1.58
	4.20	7.04	0.59	0.90	4.16	7.84	97.8%	0.53	6.38	1.53
	4.25	6.86	0.56	0.85	3.82	7.62	95.0%	0.50	5.63	1.47
	4.30	6.68	0.52	0.80	3.48	7.39	92.3%	0.47	4.91	1.41
	4.35	6.50	0.48	0.75	3.15	7.17	89.5%	0.44	4.25	1.35
	4.40	6.33	0.45	0.70	2.83	6.95	86.7%	0.41	3.63	1.28
	4.45	6.15	0.41	0.65	2.52	6.73	84.0%	0.37	3.05	1.21
	4.50	5.96	0.37	0.60	2.21	6.50	81.1%	0.34	2.52	1.14
	4.55	5.77	0.33	0.55	1.92	6.27	78.2%	0.31	2.04	1.06
	4.60	5.58	0.29	0.50	1.64	6.03	75.3%	0.27	1.60	0.98
	4.65	5.39	0.25	0.45	1.36	5.80	72.4%	0.23	1.21	0.89
WL	4.70	5.20	0.21	0.40	1.10	5.57	69.4%	0.20	0.87	0.79
	4.75	4.36	0.20	0.35	0.86	4.69	58.5%	0.18	0.65	0.75
	4.80	4.23	0.15	0.30	0.64	4.52	56.4%	0.14	0.41	0.64
	4.85	4.10	0.11	0.25	0.44	4.35	54.3%	0.10	0.22	0.50
	4.90	3.44	0.07	0.20	0.24	3.64	45.4%	0.07	0.09	0.38
	4.95	1.55	0.07	0.15	0.11	1.68	21.0%	0.06	0.04	0.37
	5.00	1.17	0.03	0.10	0.04	1.26	15.7%	0.03	0.01	0.23
	5.05	0.20	0.03	0.05	0.01	0.22	2.8%	0.02	0.00	0.19
	5.10	0.00	#DIV/0!	0.00	0.00	0.00	0.0%	#DIV/0!	#DIV/0!	#DIV/0!

STREAM NAME: Abrams Creek
XS LOCATION: 300' upstream from JPO Ditch headgate
XS NUMBER: 1

SUMMARY SHEET

MEASURED FLOW (Qm)=	0.87	cfs
CALCULATED FLOW (Qc)=	0.87	cfs
(Qm-Qc)/Qm * 100 =	0.0	%
MEASURED WATERLINE (WLm)=	4.70	ft
CALCULATED WATERLINE (WLc)=	4.70	ft
(WLm-WLc)/WLm * 100 =	0.0	%
MAX MEASURED DEPTH (Dm)=	0.40	ft
MAX CALCULATED DEPTH (Dc)=	0.40	ft
(Dm-Dc)/Dm * 100	0.0	%
MEAN VELOCITY=	0.79	ft/sec
MANNING'S N=	0.192	
SLOPE=	0.091	ft/ft
.4 * Qm =	0.3	cfs
2.5 * Qm=	2.2	cfs

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

FLOW (CFS)	PERIOD
___________________	___________________
___________________	___________________
___________________	___________________
___________________	___________________

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

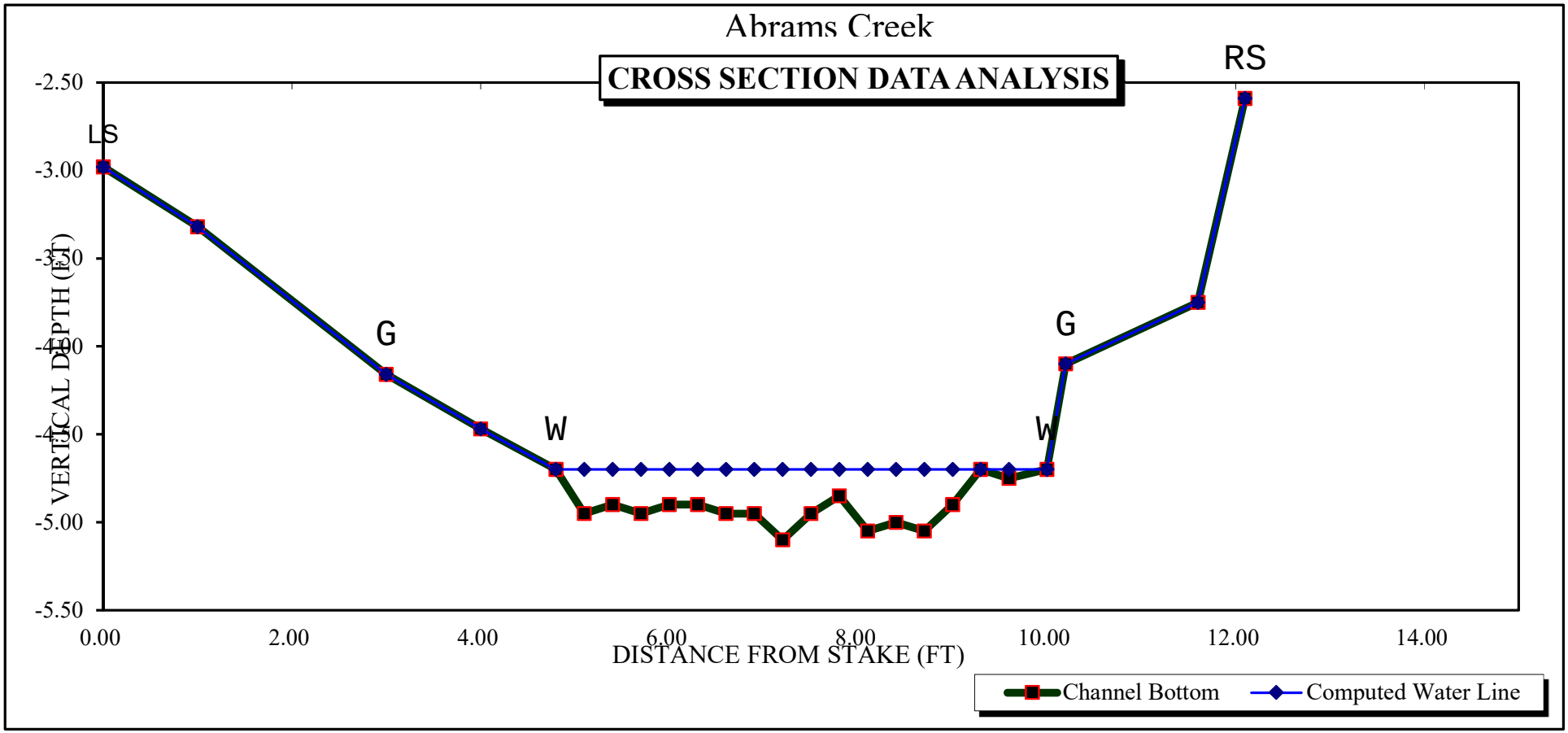
RECOMMENDATION BY: ……………………………………… AGENCY……………………………………… DATE:………………………

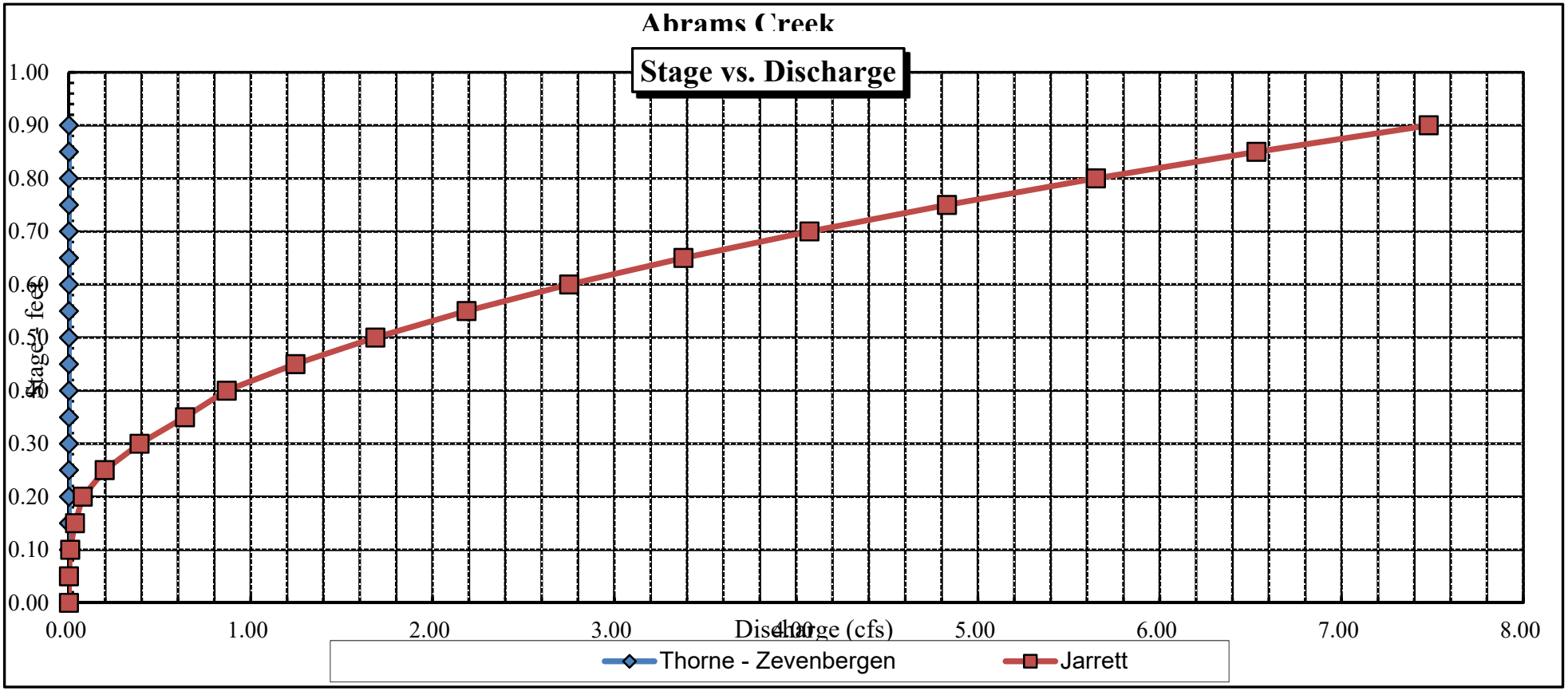
CWCB REVIEW BY: ……………………………………………………………………………… DATE:………………………

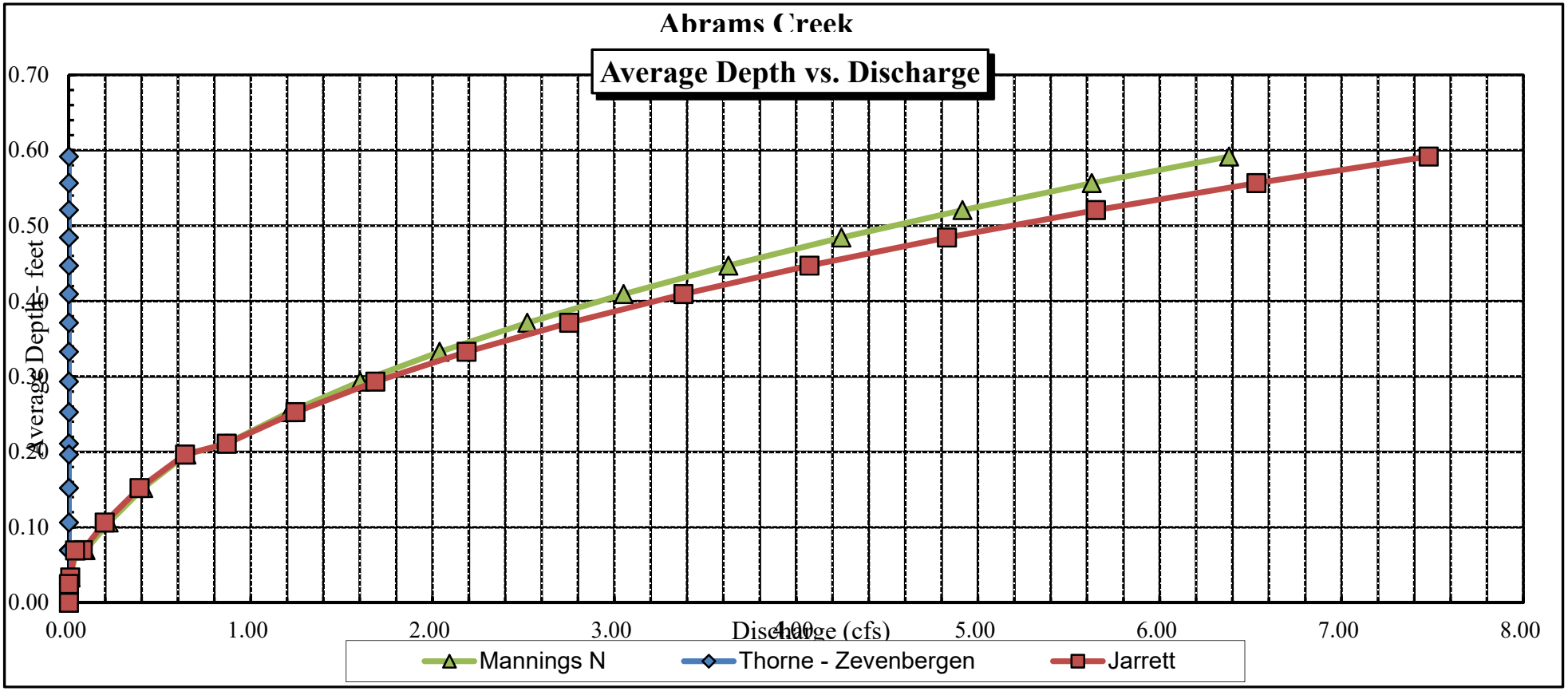
STREAM NAME: Abrams Creek
XS LOCATION: 300' upstream from JPO Ditch headgate
XS NUMBER: 1 Jarrett Variable Manning's n Correction Applied

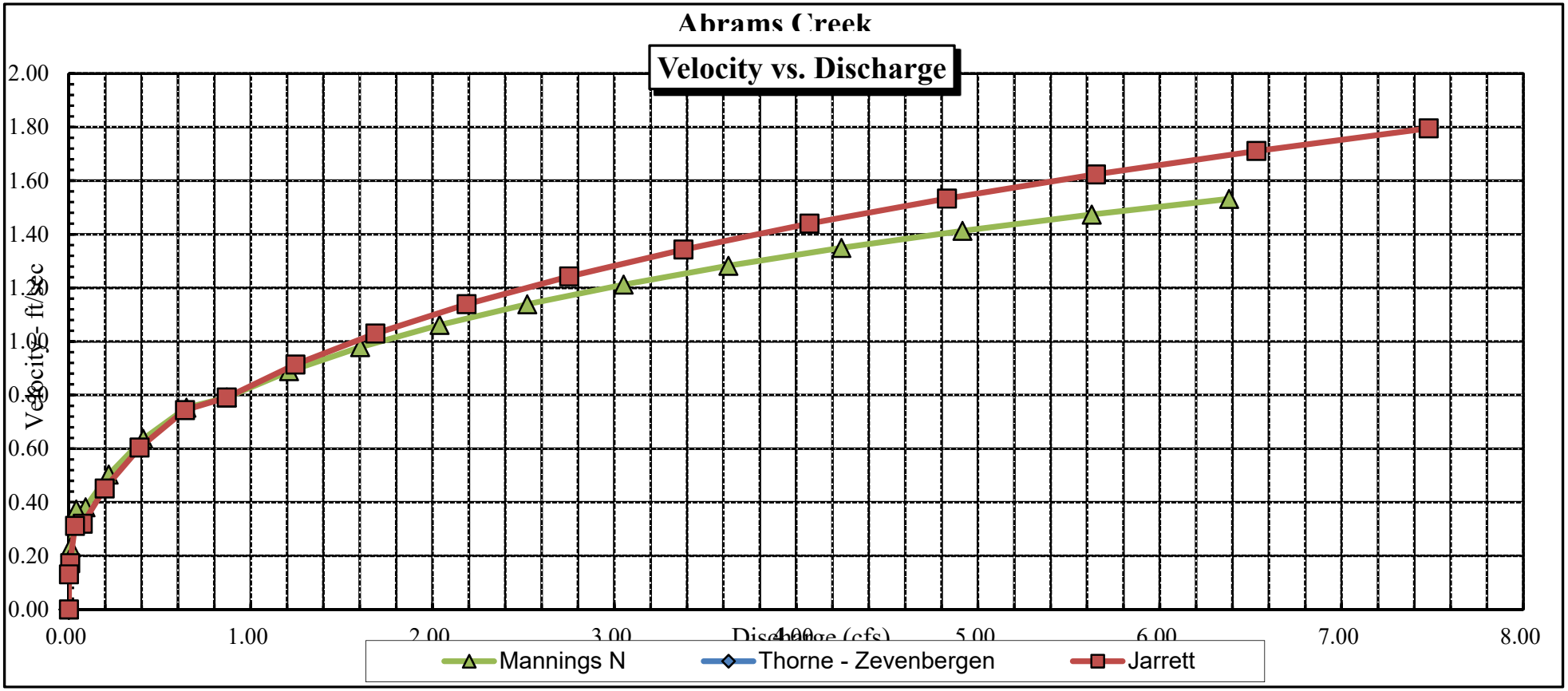
GL = lowest Grassline elevation corrected for sag
STAGING TABLE *WL* = Waterline corrected for variations in field measured water surface elevations and sag

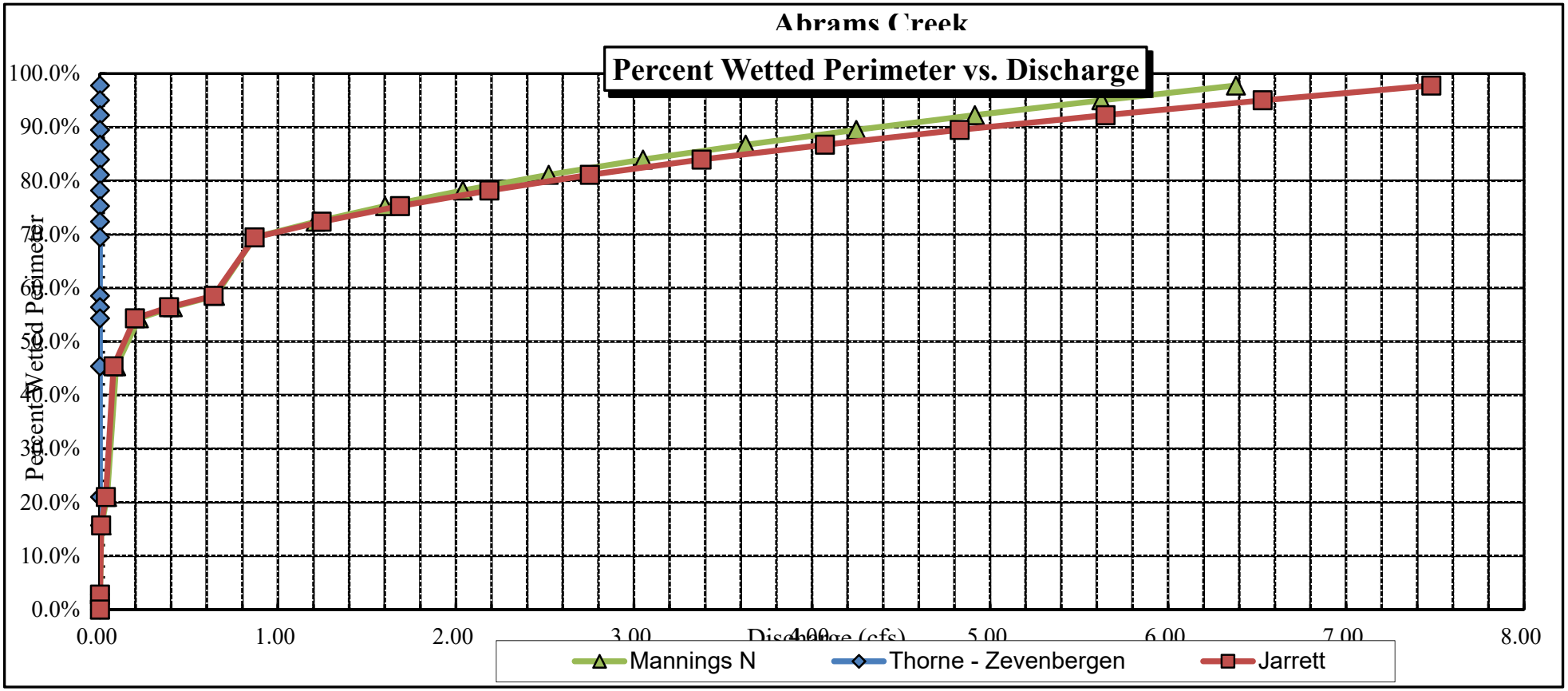
	DIST TO WATER (FT)	TOP WIDTH (FT)	AVG. DEPTH (FT)	MAX. DEPTH (FT)	AREA (SQ FT)	WETTED PERIM. (FT)	PERCENT WET PERIM (%)	HYDR RADIUS (FT)	FLOW (CFS)	AVG. VELOCITY (FT/SEC)
GL	4.16	7.18	0.62	0.94	4.45	8.01	100.0%	0.56	8.28	1.86
	4.20	7.04	0.59	0.90	4.16	7.84	97.8%	0.53	7.48	1.80
	4.25	6.86	0.56	0.85	3.82	7.62	95.0%	0.50	6.53	1.71
	4.30	6.68	0.52	0.80	3.48	7.39	92.3%	0.47	5.65	1.62
	4.35	6.50	0.48	0.75	3.15	7.17	89.5%	0.44	4.83	1.53
	4.40	6.33	0.45	0.70	2.83	6.95	86.7%	0.41	4.07	1.44
	4.45	6.15	0.41	0.65	2.52	6.73	84.0%	0.37	3.38	1.34
	4.50	5.96	0.37	0.60	2.21	6.50	81.1%	0.34	2.75	1.24
	4.55	5.77	0.33	0.55	1.92	6.27	78.2%	0.31	2.19	1.14
	4.60	5.58	0.29	0.50	1.64	6.03	75.3%	0.27	1.69	1.03
	4.65	5.39	0.25	0.45	1.36	5.80	72.4%	0.23	1.25	0.91
WL	4.70	5.20	0.21	0.40	1.10	5.57	69.4%	0.20	0.87	0.79
	4.75	4.36	0.20	0.35	0.86	4.69	58.5%	0.18	0.64	0.74
	4.80	4.23	0.15	0.30	0.64	4.52	56.4%	0.14	0.39	0.60
	4.85	4.10	0.11	0.25	0.44	4.35	54.3%	0.10	0.20	0.45
	4.90	3.44	0.07	0.20	0.24	3.64	45.4%	0.07	0.08	0.32
	4.95	1.55	0.07	0.15	0.11	1.68	21.0%	0.06	0.03	0.31
	5.00	1.17	0.03	0.10	0.04	1.26	15.7%	0.03	0.01	0.17
	5.05	0.20	0.03	0.05	0.01	0.22	2.8%	0.02	0.00	0.13
	5.10	0.00	#DIV/0!	0.00	0.00	0.00	0.0%	#DIV/0!	#DIV/0!	#DIV/0!


Abrams Creek
CROSS SECTION DATA ANALYSIS
LS
G
W
W
G
RS
-2.50
-3.00
-5.00
-5.50
0.00
2.00
4.00
6.00
8.00
10.00
12.00
14.00
VERTICAL DEPTH (FT)
DISTANCE FROM STAKE (FT)
Channel Bottom
Computed Water Line


Abrams Creek
Stage vs. Discharge
Stage, 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
1.00
2.00
3.00
4.00
5.00
6.00
7.00
8.00
Discharge (cfs)
Thorne - Zevenbergen
Jarrett


Abrams Creek
Average Depth vs. Discharge
Average Depth - feet
0.70
0.60
0.50
0.40
0.30
0.20
0.10
0.00
0.00
1.00
2.00
3.00
4.00
5.00
6.00
7.00
8.00
Discharge (cfs)
Mannings N
Thorne - Zevenbergen
Jarrett


Abrams Creek
Velocity vs. Discharge
Velocity - ft/sec
2.00
1.80
1.60
1.40
1.20
1.00
0.80
0.60
0.40
0.20
0.00
0.00
1.00
2.00
3.00
4.00
5.00
6.00
7.00
8.00
Discharge (cfs)
Mannings N
Thorne - Zevenbergen
Jarrett


Abrams Creek
Percent Wetted Perimeter vs. Discharge
100.0%
90.0%
80.0%
70.0%
60.0%
50.0%
40.0%
30.0%
20.0%
10.0%
0.0%
Percent Wetted Perimeter
0.00
1.00
2.00
3.00
4.00
5.00
6.00
7.00
8.00
Discharge (cfs)
Mannings N
Thorne - Zevenbergen
Jarrett

Data Input & Proofing

STREAM NAME:	Abrams Creek
XS LOCATION:	750' downstream from JPO Ditch headgate
XS NUMBER:	4
DATE:	7/1/2013
OBSERVERS:	R. Smith, P. Adams
1/4 SEC:	NW
SECTION:	30
TWP:	5S
RANGE:	84W
PM:	Sixth
COUNTY:	Eagle
WATERSHED:	Eagle River
DIVISION:	5
DOW CODE:	23414
USGS MAP:	
USFS MAP:	
	Level and Rod Survey
TAPE WT:	0.0106 lbs / ft
TENSION:	99999 lbs
SLOPE:	0.071 ft / ft

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

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

GL=1	FEATURE	DIST	VERT DEPTH	WATER DEPTH	VEL	A	Q	Tape to Water
			Total Data Points = 20					
	RS	0.00	5.34			0.00	0.00	0.00
1	G	0.50	6.14			0.00	0.00	0.00
		1.20	6.22			0.00	0.00	0.00
	W	1.30	6.75	0.00	0.00	0.00	0.00	0.00
		1.60	6.95	0.20	0.04	0.06	0.00	6.75
		1.90	6.95	0.20	0.92	0.06	0.06	6.75
		2.20	7.05	0.30	1.07	0.09	0.10	6.75
		2.50	7.05	0.30	1.07	0.09	0.10	6.75
		2.80	6.95	0.20	1.60	0.06	0.10	6.75
		3.10	6.95	0.20	0.86	0.06	0.05	6.75
		3.40	6.95	0.20	1.39	0.06	0.08	6.75
		3.70	6.95	0.20	0.00	0.06	0.00	6.75
		4.00	6.95	0.20	0.34	0.06	0.02	6.75
		4.30	7.00	0.25	0.65	0.08	0.05	6.75
		4.60	6.95	0.20	0.57	0.06	0.03	6.75
		4.90	6.90	0.15	0.21	0.04	0.01	6.75
	W	5.10	6.75	0.00	0.00	0.00	0.00	0.00
		5.20	6.30			0.00	0.00	0.00
1	G	5.60	6.22			0.00	0.00	0.00
	LS	9.00	6.00			0.00	0.00	0.00

Totals	0.77	0.59

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

LOCATION INFORMATION

STREAM NAME:	Abrams Creek
XS LOCATION:	750' downstream from JPO Ditch headgate
XS NUMBER:	4
DATE:	1-Jul-13
OBSERVERS:	R. Smith, P. Adams
1/4 SEC:	NW
SECTION:	30
TWP:	5S
RANGE:	84W
PM:	Sixth
COUNTY:	Eagle
WATERSHED:	Eagle River
DIVISION:	5
DOW CODE:	23414
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:	0.071

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

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

STREAM NAME: Abrams Creek
XS LOCATION: 750' downstream from JPO Ditch headgate
XS NUMBER: 4

WATER LINE COMPARISON TABLE

WATER LINE	MEAS AREA	COMP AREA	AREA ERROR
	0.77	0.77	0.0%
6.50	0.77	1.74	124.6%
6.52	0.77	1.66	114.5%
6.54	0.77	1.58	104.5%
6.56	0.77	1.50	94.4%
6.58	0.77	1.42	84.4%
6.60	0.77	1.35	74.4%
6.62	0.77	1.27	64.4%
6.64	0.77	1.19	54.4%
6.66	0.77	1.12	44.5%
6.68	0.77	1.04	34.6%
6.70	0.77	0.96	24.7%
6.71	0.77	0.92	19.7%
6.72	0.77	0.89	14.8%
6.73	0.77	0.85	9.8%
6.74	0.77	0.81	4.9%
6.75	0.77	0.77	0.0%
6.76	0.77	0.73	-4.9%
6.77	0.77	0.70	-9.8%
6.78	0.77	0.66	-14.6%
6.79	0.77	0.62	-19.4%
6.80	0.77	0.59	-24.1%
6.82	0.77	0.51	-33.5%
6.84	0.77	0.44	-42.8%
6.86	0.77	0.37	-51.9%
6.88	0.77	0.30	-60.8%
6.90	0.77	0.23	-69.7%
6.92	0.77	0.17	-78.2%
6.94	0.77	0.11	-86.4%
6.96	0.77	0.06	-92.1%
6.98	0.77	0.04	-95.1%
7.00	0.77	0.02	-97.1%

WATERLINE AT ZERO
AREA ERROR = 6.750

STREAM NAME: Abrams Creek
XS LOCATION: 750' downstream from JPO Ditch headgate
XS NUMBER: 4

Constant Manning's n

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

	DIST TO WATER (FT)	TOP WIDTH (FT)	AVG. DEPTH (FT)	MAX. DEPTH (FT)	AREA (SQ FT)	WETTED PERIM. (FT)	PERCENT WET PERIM (%)	HYDR RADIUS (FT)	FLOW (CFS)	AVG. VELOCITY (FT/SEC)
GL	6.22	4.40	0.65	0.83	2.86	5.36	100.0%	0.53	4.28	1.50
	6.25	4.24	0.64	0.80	2.73	5.18	96.6%	0.53	4.06	1.49
	6.30	3.98	0.63	0.75	2.52	4.87	90.9%	0.52	3.71	1.47
	6.35	3.96	0.59	0.70	2.33	4.77	89.0%	0.49	3.28	1.41
	6.40	3.94	0.54	0.65	2.13	4.67	87.1%	0.46	2.87	1.35
	6.45	3.92	0.49	0.60	1.93	4.57	85.2%	0.42	2.48	1.28
	6.50	3.90	0.44	0.55	1.74	4.47	83.3%	0.39	2.11	1.21
	6.55	3.88	0.40	0.50	1.54	4.36	81.4%	0.35	1.75	1.14
	6.60	3.86	0.35	0.45	1.35	4.26	79.5%	0.32	1.42	1.06
	6.65	3.84	0.30	0.40	1.15	4.16	77.6%	0.28	1.12	0.97
	6.70	3.82	0.25	0.35	0.96	4.06	75.6%	0.24	0.84	0.87
WL	6.75	3.80	0.20	0.30	0.77	3.96	73.7%	0.20	0.59	0.77
	6.80	3.66	0.16	0.25	0.59	3.78	70.5%	0.15	0.39	0.66
	6.85	3.52	0.12	0.20	0.41	3.61	67.3%	0.11	0.22	0.53
	6.90	3.38	0.07	0.15	0.23	3.44	64.0%	0.07	0.09	0.38
	6.95	1.50	0.05	0.10	0.08	1.54	28.7%	0.05	0.02	0.30
	7.00	0.60	0.04	0.05	0.02	0.62	11.5%	0.04	0.01	0.25

STREAM NAME: Abrams Creek
XS LOCATION: 750' downstream from JPO Ditch headgate
XS NUMBER: 4

SUMMARY SHEET

MEASURED FLOW (Qm)=	0.59	cfs
CALCULATED FLOW (Qc)=	0.59	cfs
(Qm-Qc)/Qm * 100 =	0.0	%
MEASURED WATERLINE (WLm)=	6.75	ft
CALCULATED WATERLINE (WLc)=	6.75	ft
(WLm-WLc)/WLm * 100 =	0.0	%
MAX MEASURED DEPTH (Dm)=	0.30	ft
MAX CALCULATED DEPTH (Dc)=	0.30	ft
(Dm-Dc)/Dm * 100	0.0	%
MEAN VELOCITY=	0.77	ft/sec
MANNING'S N=	0.174	
SLOPE=	0.071	ft/ft
.4 * Qm =	0.2	cfs
2.5 * Qm=	1.5	cfs

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

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

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

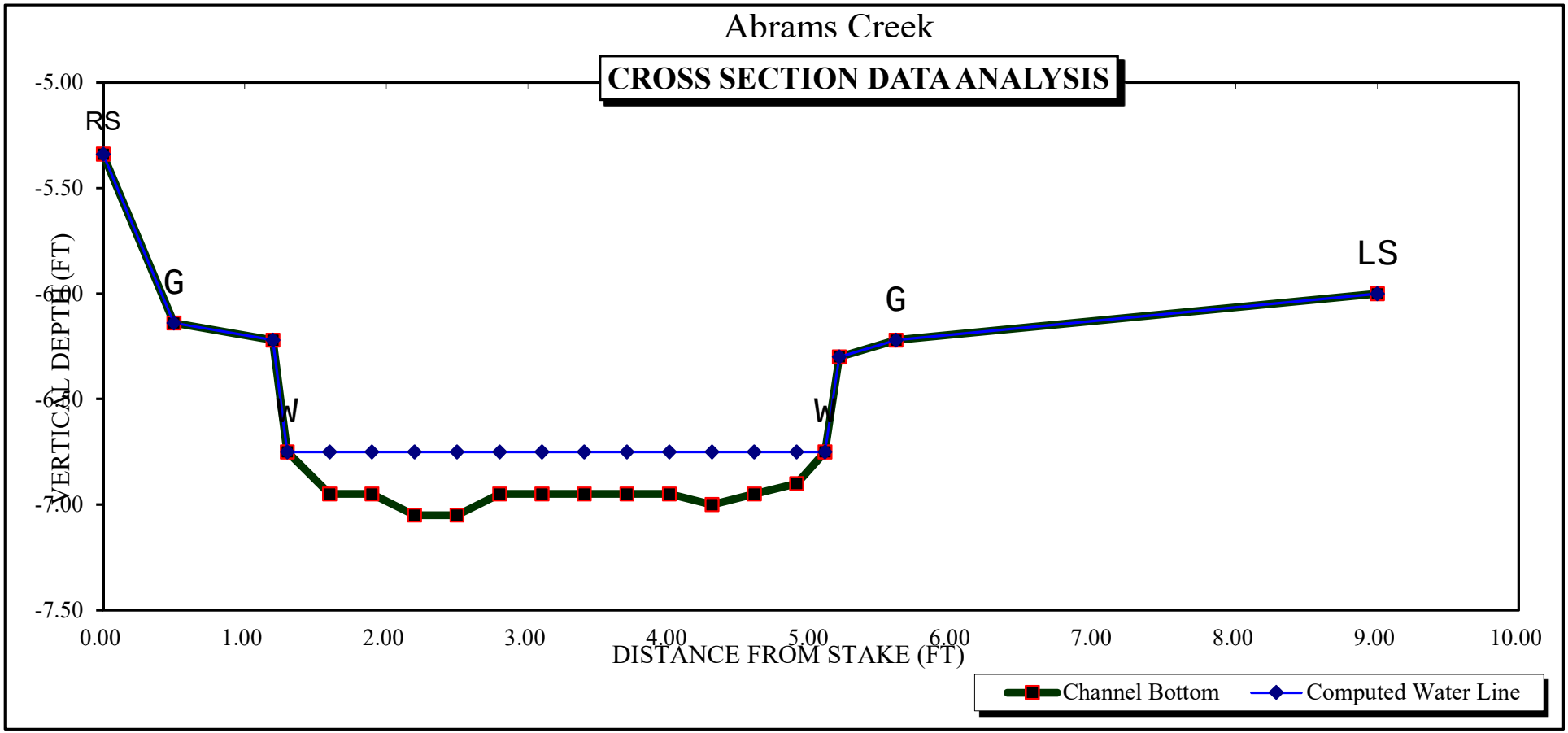
RECOMMENDATION BY: ………………...………..……............................... AGENCY..……………………......……....…....……...... DATE:......…...…......……………

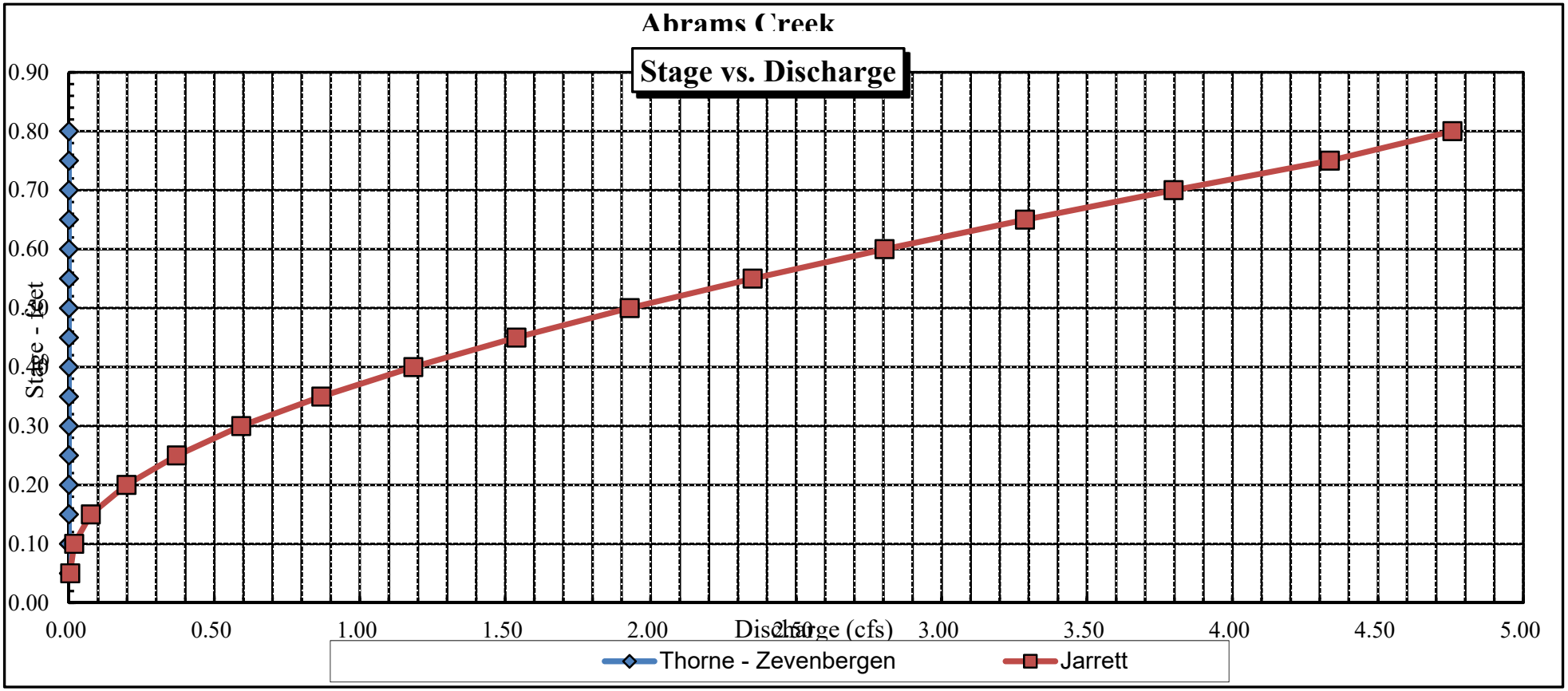
CWCB REVIEW BY: ..………………………....………………………………………………...…............. DATE:.................…………….....…

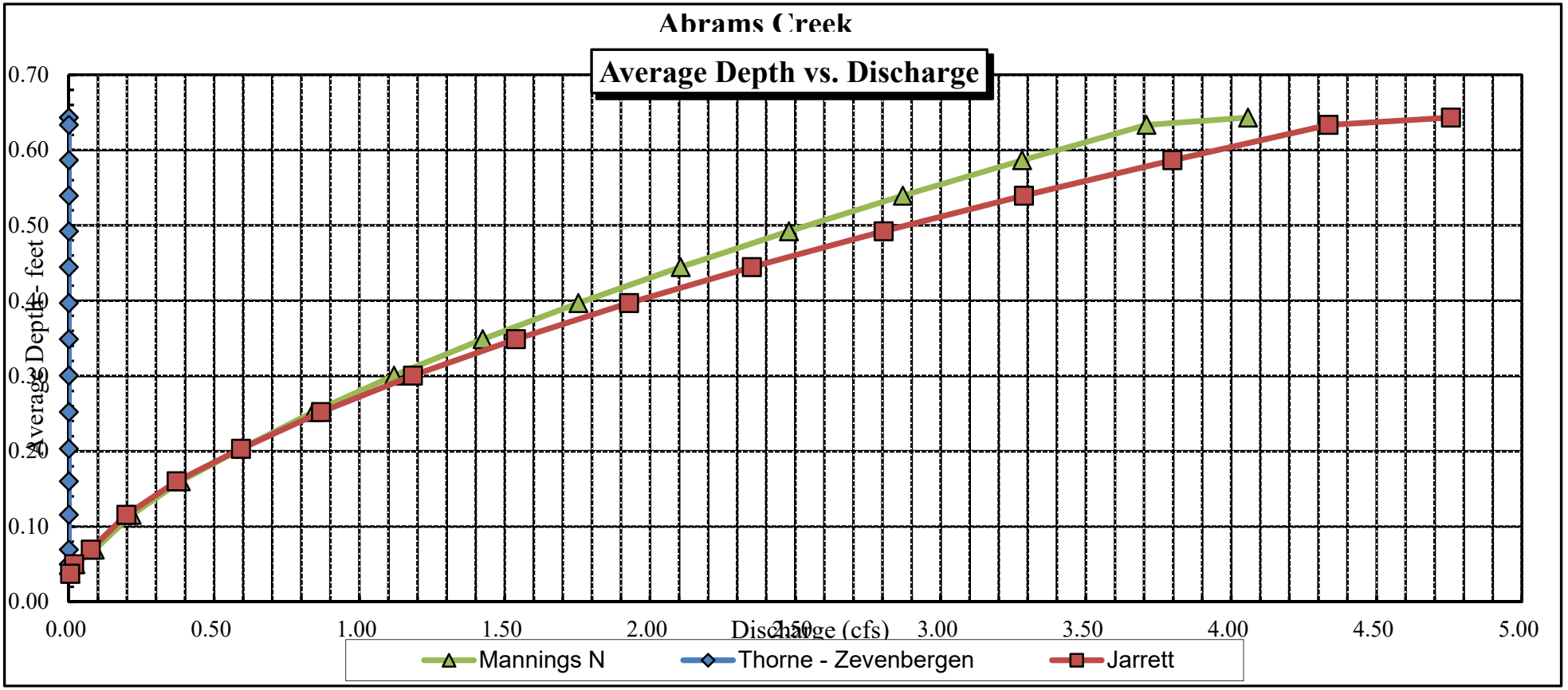
STREAM NAME: Abrams Creek
XS LOCATION: 750' downstream from JPO Ditch headgate
XS NUMBER: 4 Jarrett Variable Manning's n Correction Applied

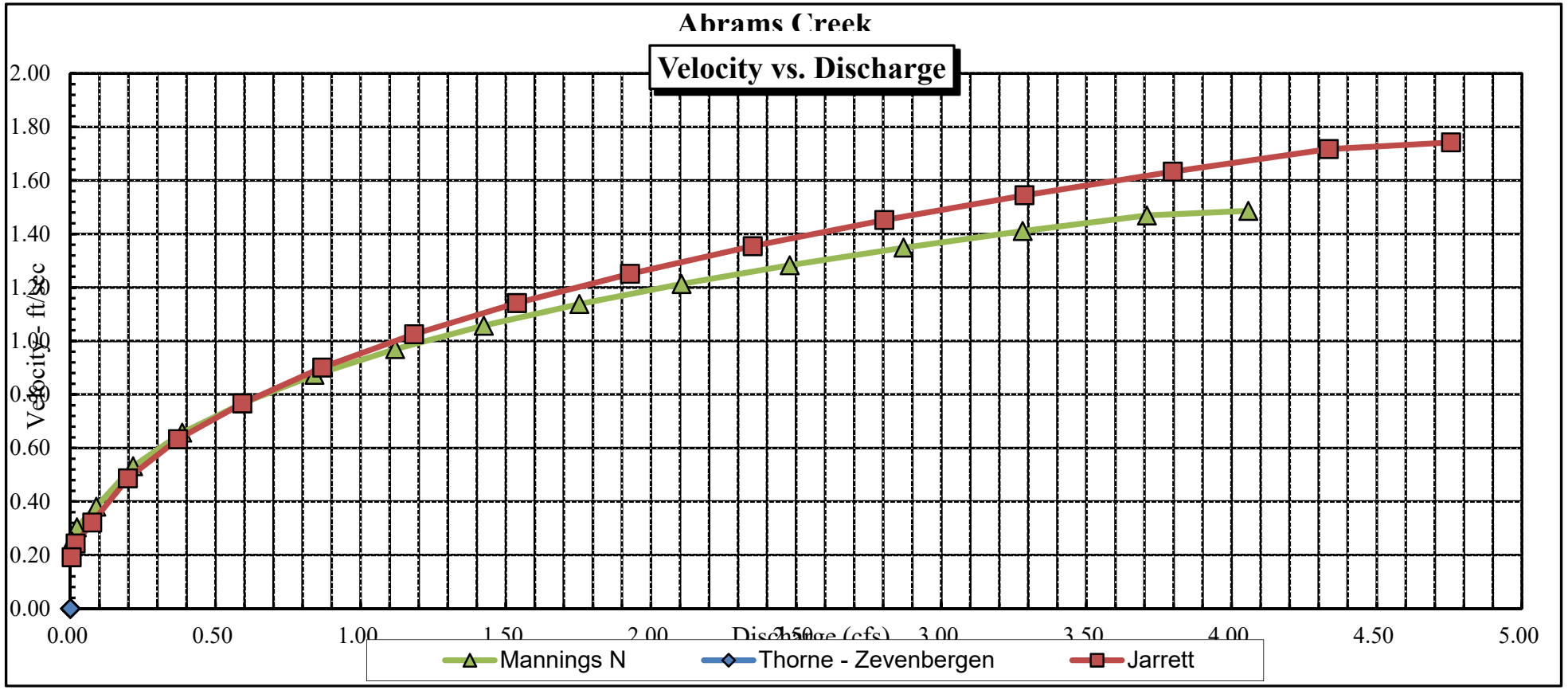
GL = lowest Grassline elevation corrected for sag
STAGING TABLE *WL* = Waterline corrected for variations in field measured water surface elevations and sag

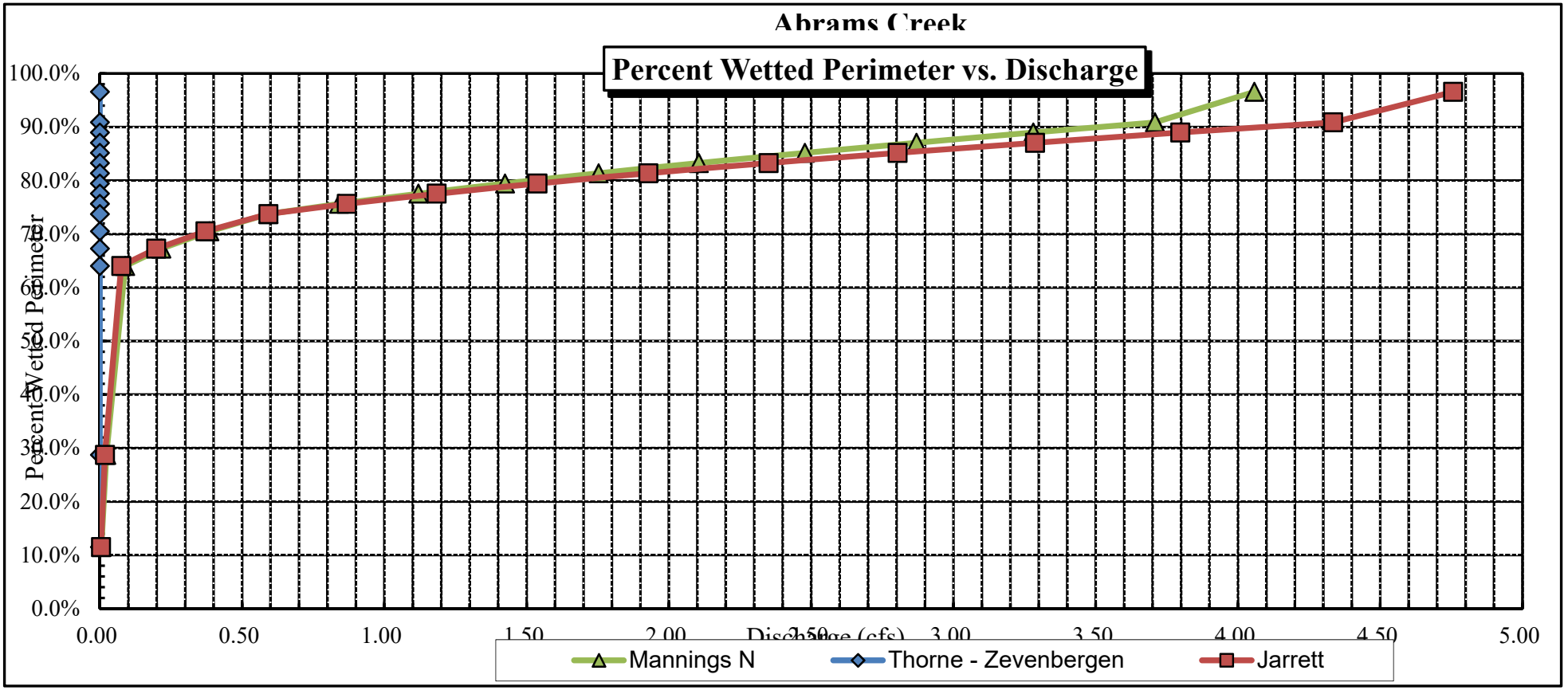
	DIST TO WATER (FT)	TOP WIDTH (FT)	AVG. DEPTH (FT)	MAX. DEPTH (FT)	AREA (SQ FT)	WETTED PERIM. (FT)	PERCENT WET PERIM (%)	HYDR RADIUS (FT)	FLOW (CFS)	AVG. VELOCITY (FT/SEC)
GL	6.22	4.40	0.65	0.83	2.86	5.36	100.0%	0.53	5.03	1.76
	6.25	4.24	0.64	0.80	2.73	5.18	96.6%	0.53	4.76	1.74
	6.30	3.98	0.63	0.75	2.52	4.87	90.9%	0.52	4.33	1.72
	6.35	3.96	0.59	0.70	2.33	4.77	89.0%	0.49	3.80	1.63
	6.40	3.94	0.54	0.65	2.13	4.67	87.1%	0.46	3.29	1.54
	6.45	3.92	0.49	0.60	1.93	4.57	85.2%	0.42	2.80	1.45
	6.50	3.90	0.44	0.55	1.74	4.47	83.3%	0.39	2.35	1.35
	6.55	3.88	0.40	0.50	1.54	4.36	81.4%	0.35	1.93	1.25
	6.60	3.86	0.35	0.45	1.35	4.26	79.5%	0.32	1.54	1.14
	6.65	3.84	0.30	0.40	1.15	4.16	77.6%	0.28	1.18	1.03
	6.70	3.82	0.25	0.35	0.96	4.06	75.6%	0.24	0.87	0.90
WL	6.75	3.80	0.20	0.30	0.77	3.96	73.7%	0.20	0.59	0.77
	6.80	3.66	0.16	0.25	0.59	3.78	70.5%	0.15	0.37	0.63
	6.85	3.52	0.12	0.20	0.41	3.61	67.3%	0.11	0.20	0.49
	6.90	3.38	0.07	0.15	0.23	3.44	64.0%	0.07	0.08	0.32
	6.95	1.50	0.05	0.10	0.08	1.54	28.7%	0.05	0.02	0.24
	7.00	0.60	0.04	0.05	0.02	0.62	11.5%	0.04	0.00	0.19


Abrams Creek
CROSS SECTION DATA ANALYSIS
RS
G
W
W
G
LS
-5.00
-5.50
-6.00
-6.50
-7.00
-7.50
VERTICAL DEPTH (FT)
0.00
1.00
2.00
3.00
4.00
5.00
6.00
7.00
8.00
9.00
10.00
DISTANCE FROM STAKE (FT)
Channel Bottom
Computed Water Line


Abrams Creek
Stage vs. Discharge
Stage - feet
0.90
0.80
0.70
0.60
0.50
0.40
0.30
0.20
0.10
0.00
0.00
0.50
1.00
1.50
2.00
2.50
3.00
3.50
4.00
4.50
5.00
Discharge (cfs)
Thorne - Zevenbergen
Jarrett


Abrams Creek
Average Depth vs. Discharge
Average Depth - feet
0.70
0.60
0.50
0.40
0.30
0.20
0.10
0.00
0.00
0.50
1.00
1.50
2.00
2.50
3.00
3.50
4.00
4.50
5.00
Discharge (cfs)
Mannings N
Thorne - Zevenbergen
Jarrett


Abrams Creek
Velocity vs. Discharge
Velocity - ft/sec
2.00
1.80
1.60
1.40
1.20
1.00
0.80
0.60
0.40
0.20
0.00
0.00
0.50
1.00
1.50
2.00
3.00
3.50
4.00
4.50
5.00
Mannings N
Thorne - Zevenbergen
Jarrett


Abrams Creek
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
0.50
1.00
1.50
2.00
2.50
3.00
3.50
4.00
4.50
5.00
Discharge (cfs)
Mannings N
Thorne - Zevenbergen
Jarrett

COLORADO WATER CONSERVATION BOARD

FIELD DATA FOR INSTREAM FLOW DETERMINATIONS

COLORADO DIVISION OF WILDLIFE

LOCATION INFORMATION

STREAM NAME: Abrams Creek					CROSS-SECTION NO.: 4	
CROSS-SECTION LOCATION: 750 ft. downstream from JPO Ditch Diversion						
DATE: 7-1-13	OBSERVERS: R. Smith, P. Adams					
LEGAL DESCRIPTION	¼ SECTION: NW	SECTION: 30	TOWNSHIP: 5 (N/S)	RANGE: 84 (E/W)	PM: Sixth	
COUNTY: Eagle	WATERSHED: Eagle River	WATER DIVISION: 5	DOW WATER CODE: 23414			
MAP(S): USGS:						
USFS:						

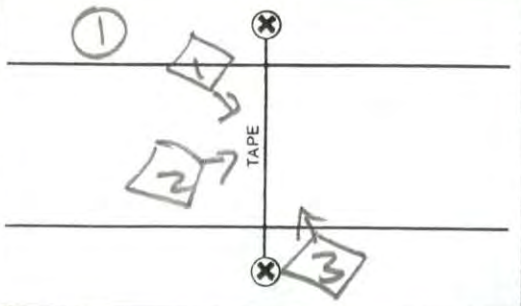
SUPPLEMENTAL DATA

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

CHANNEL PROFILE DATA

STATION	DISTANCE FROM TAPE (ft)	ROD READING (ft)
(X) Tape @ Stake LB	0.0	surveyed
(X) Tape @ Stake RB	0.0	surveyed
(1) WS @ Tape LB/RB 5.1 / 1.3	0.0	6.75 / 6.75
(2) WS Upstream	45.0	3.92
(3) WS Downstream	19.0	8.46
SLOPE	4.54 / 64.0 = .071	

SKETCH



LEGEND:
Stake (X)
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:
caddisfly, mayfly

COMMENTS

FORM #ISF FD 1-85

DISCHARGE/CROSS SECTION NOTES

STREAM NAME: Abrams Creek	CROSS-SECTION NO.: 4	DATE: 7-1-13	SHEET ___ OF ___
BEGINNING OF MEASUREMENT	EDGE OF WATER LOOKING DOWNSTREAM: (0.0 AT STAKE) LEFT / RIGHT	Gage Reading: _____ ft	TIME: 3:11 pm

Features: Stake (S) Grassline (G) Waterline (W) Rock (R)	Distance From Initial Point (ft)	Width (ft)	Total Vertical Depth From Tape/Inst (ft)	Water Depth (ft)	Depth of Observation (ft)	Revolutions	Time (sec)	Velocity (ft/sec) At Point	Velocity (ft/sec) Mean in Vertical	Area (ft^2)	Discharge (cfs)
RS	0.0		5.34								
G	0.5		6.14								
	1.2		6.22								
W	1.3		6.75								
	1.6		6.95	.2				.04			
	1.9		6.95	.2				.92			
	2.2		7.05	.3				1.07			
	2.5		7.05	.3				1.07			
	2.8		6.95	.2				1.60			
	3.1		6.95	.2				.86			
	3.4		6.95	.2				1.39			
	3.7		6.95	.2				Ø			
	4.0		6.95	.2				.34			
	4.3		7.00	.25				.65			
	4.6		6.95	.20				.57			
	4.9		6.90	.15				.21			
W	5.1		6.75								
	5.2		6.30								
G	5.6		6.22								
LS	9.0		6.00								
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: Abrams Creek						CROSS-SECTION NO.: 3	
CROSS-SECTION LOCATION: 700 ft. downstream from JPO Ditch Diversion							
DATE: 7-1-13	OBSERVERS: R. Smith, P. Adams						
LEGAL DESCRIPTION	¼ SECTION: NW	SECTION: 30	TOWNSHIP: 5 N/S	RANGE: 84 E/W	PM: Sixth		
COUNTY: Eagle	WATERSHED: Eagle River	WATER DIVISION: 5	DOW WATER CODE: 23414				
MAP(S): USGS:	GPS Zone 13 340407						
USFS:	4383857						

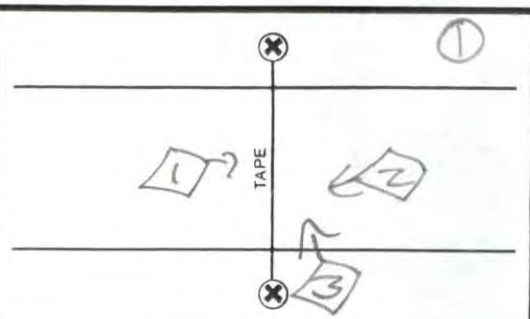
SUPPLEMENTAL DATA

SAG TAPE SECTION SAME AS DISCHARGE SECTION: YES / NO	METER TYPE: M-M			
METER NUMBER:	DATE RATED:	CALIB/SPIN: ____ sec	TAPE WEIGHT: surveyed ____ lbs/foot	TAPE TENSION: surveyed ____ lbs
CHANNEL BED MATERIAL SIZE RANGE: gravel to 8" cobbles	PHOTOGRAPHS TAKEN: YES/NO	NUMBER OF PHOTOGRAPHS: 3		

CHANNEL PROFILE DATA

STATION	DISTANCE FROM TAPE (ft)	ROD READING (ft)
⊗ Tape @ Stake LB	0.0	surveyed
⊗ Tape @ Stake RB	0.0	surveyed
① WS @ Tape LB/RB 19.70	0.0	5.30 / 5.30
② WS Upstream	25.0	3.92
③ WS Downstream	39.0	5.46
SLOPE	4.54 / 64.0 = .071	

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:
caddisfly, mayfly

COMMENTS

FORM #ISF FD 1-85

DISCHARGE/CROSS SECTION NOTES

STREAM NAME: Abrams Creek	CROSS-SECTION NO.:	DATE: 7-1-13	SHEET ___ OF ___
BEGINNING OF MEASUREMENT	EDGE OF WATER LOOKING DOWNSTREAM: (0.0 AT STAKE) LEFT / RIGHT	Gage Reading: _____ ft	TIME: 2:40 pm

Features: Stake (S) Grassline (G) Waterline (W) Rock (R)	Distance From Initial Point (ft)	Width (ft)	Total Vertical Depth From Tape/Inst (ft)	Water Depth (ft)	Depth of Observation (ft)	Revolutions	Time (sec)	Velocity (ft/sec) At Point	Velocity (ft/sec) Mean in Vertical	Area (ft^2)	Discharge (cfs)
LS	0.0		3.40								
	1.5		4.45								
G	1.8		4.85								
W	1.9		5.30								
	2.2		5.50	.2				Ø			
	2.5		5.50	.2				Ø			
	2.8		5.45	.15				Ø			
	3.1		5.45	.15				.16			
	3.4		5.45	.15				.67			
	3.7		5.50	.20				1.20			
	4.0		5.40	.10				.73			
	4.3		5.50	.20				.49			
	4.6		5.50	.20				.09			
	4.9		5.55	.25				1.54			
	5.2		5.55	.25				1.40			
	5.5		5.60	.30				.91			
	5.8		5.60	.30				.44			
	6.1		5.60	.30				.46			
	6.4		5.60	.30				.12			
	6.7		5.50	.20				Ø			
W	7.0		5.30								
G	7.1		4.70								
	10.0		4.64								
RS	15.6		3.60								
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: Abrams Creek						CROSS-SECTION NO.: 2	
CROSS-SECTION LOCATION: 200' upstream from IPO Ditch Diversion							
DATE: 7-1-13	OBSERVERS: R. Smith, P. Adams						
LEGAL DESCRIPTION	¼ SECTION: SW	SECTION: 30	TOWNSHIP: 5 (N/S)	RANGE: 84 (E/W)	PM: 6th		
COUNTY: Eagle	WATERSHED: Eagle River	WATER DIVISION: 5	DOW WATER CODE: 23414				
MAP(S): USGS:	GPS Zone 13 340193						
USFS:	4383458						

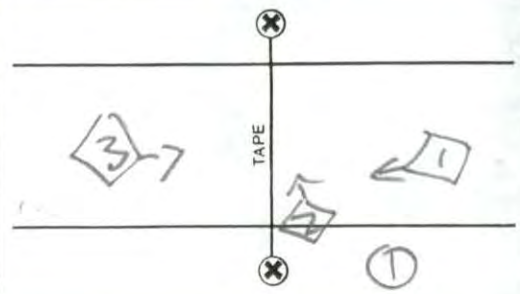
SUPPLEMENTAL DATA

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

CHANNEL PROFILE DATA

STATION	DISTANCE FROM TAPE (ft)	ROD READING (ft)
⊗ Tape @ Stake LB	0.0	surveyed
⊗ Tape @ Stake RB	0.0	surveyed
① WS @ Tape LB/RB 6/3/14	0.0	6.35 / 6.35
② WS Upstream	16.5	5.08
③ WS Downstream	35.5	8.50
SLOPE	3.42 / 52.0 = .066	

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

Riparian = Maple, Willow, Doug fir. - but mostly forbs & grasses

FORM #ICE FD 1-85

DISCHARGE/CROSS SECTION NOTES

STREAM NAME: Abrams Creek	CROSS-SECTION NO.: 2	DATE: 7-1-13	SHEET ___ OF ___
BEGINNING OF MEASUREMENT	EDGE OF WATER LOOKING DOWNSTREAM: (0.0 AT STAKE) LEFT / RIGHT	Gage Reading: _____ ft	TIME: 1:50 pm

Features: Stake (S) Grassline (G) Waterline (W) Rock (R)	Distance From Initial Point (ft)	Width (ft)	Total Vertical Depth From Tape/Inst (ft)	Water Depth (ft)	Depth of Observation (ft)	Revolutions	Time (sec)	Velocity (ft/sec) At Point	Velocity (ft/sec) Mean in Vertical	Area (ft^2)	Discharge (cfs)
LS	0.0		4.57								
	1.5		5.17								
G	2.7		5.84								
	4.0		6.15								
	5.5		6.12								
W	6.5		6.35								
	6.8		6.40	.05				ϕ			
	7.1		6.40	.05				ϕ			
	7.4		6.50	.15				ϕ			
	7.7		6.55	.20				ϕ			
	8.0		6.60	.25				ϕ			
	8.3		6.50	.15				.07			
	8.6		6.60	.25				.69			
	8.9		6.65	.30				1.63			
	9.2		6.65	.30				1.33			
	9.5		6.70	.35				.77			
	9.8		6.65	.30				1.07			
	10.1		6.65	.30				.62			
	10.4		6.65	.30				1.20			
	10.7		6.65	.30				.52			
	11.0		6.70	.35				.48			
	11.3		6.60	.25				.64			
	11.6		6.55	.20				1.20			
	11.9		6.65	.30				.54			
	12.2		6.55	.20				ϕ			
	12.5		6.50	.15				ϕ			
	12.8		6.40	.05				ϕ			
W	13.2		6.35								
G	13.9		5.78								
	15.0		5.00								
RS	16.8		3.85								
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: Abrams Creek						CROSS-SECTION NO.: 1	
CROSS-SECTION LOCATION: 300' upstream from IPO Ditch headgate.							
DATE: 7-1-13	OBSERVERS: R. Smith, P. Adams						
LEGAL DESCRIPTION	¼ SECTION: SW	SECTION: 30	TOWNSHIP: 5 N/S	RANGE: 84 E/W	PM: 6th		
COUNTY: Eagle	WATERSHED: Eagle R.	WATER DIVISION: 5	DOW WATER CODE: 23414				
MAP(S): USGS:	GPS Zone 13S 340163						
USFS:	4383411						

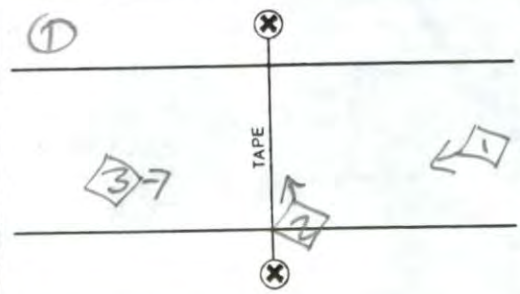
SUPPLEMENTAL DATA

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

CHANNEL PROFILE DATA

STATION	DISTANCE FROM TAPE (ft)	ROD READING (ft)
⊗ Tape @ Stake LB	0.0	surveyed
⊗ Tape @ Stake RB	0.0	surveyed
① WS @ Tape LB/RB (4.8)	0.0	4.70 / 4.70
② WS Upstream	22.0	1.54
③ WS Downstream	34.5	6.68
SLOPE	5.14/57.5 = .089	

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

pH =
Salinity = 182 µs
Temp = 11.1° C
Salinity = 0.1 ppt

DISCHARGE/CROSS SECTION NOTES

STREAM NAME: Abrams Creek	CROSS-SECTION NO: 1	DATE: 7-1-13	SHEET ___ OF ___
BEGINNING OF MEASUREMENT	EDGE OF WATER LOOKING DOWNSTREAM: (0.0 AT STAKE) LEFT / RIGHT	Gage Reading: _____ ft	TIME 1 pm

Features: Stake (S) Grassline (G) Waterline (W) Rock (R)	Distance From Initial Point (ft)	Width (ft)	Total Vertical Depth From Tape/Inst (ft)	Water Depth (ft)	Depth of Observation (ft)	Revolutions	Time (sec)	Velocity (ft/sec) At Point	Velocity (ft/sec) Mean in Vertical	Area (ft^2)	Discharge (cfs)
LS	0.0		2.98								
	1.0		3.32								
G	3.0		4.16								
	4.0		4.47								
W	4.8		4.70								
	5.1		4.95	.25				.22			
	5.4		4.90	.20				.44			
	5.7		4.95	.25				.54			
	6.0		4.90	.20				.53			
	6.3		4.90	.20				.83			
	6.6		4.95	.25				1.40			
	6.9		4.95	.25				1.47			
	7.2		5.10	.40				1.16			
	7.5		4.95	.25				1.07			
	7.8		4.85	.15				.77			
	8.1		5.05	.35				.42			
	8.4		5.00	.30				.25			
	8.7		5.05	.35				1.24			
	9.0		4.90	.20				.62			
	9.3		4.70	∅				∅			
	9.6		4.75	.05				∅			
W	10.0		4.70								
G	10.2		4.10								
	11.6		3.75								
RS	12.1		2.59								
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: ABRAMS						CROSS-SECTION NO.: 3	
CROSS-SECTION LOCATION: 0.4 MI DIS OF X-S #2							
DATE: 6-26-14	OBSERVERS: J. Skinner, D. Graf						
LEGAL DESCRIPTION	¼ SECTION: NE	SECTION: 20	TOWNSHIP: 5 N/S	RANGE: 84 E/W	PM: 6th		
COUNTY: Eagle	WATERSHED: Eagle	WATER DIVISION: 5	DOW WATER CODE:				
MAP(S): USGS:				N 4385642			
USFS:				E 342638			

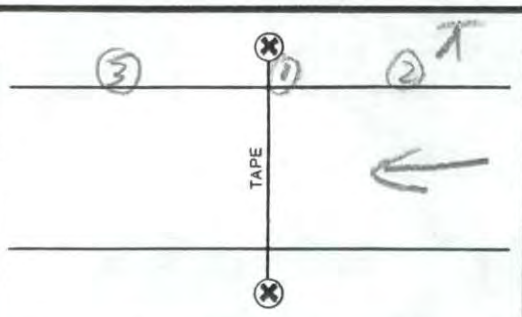
SUPPLEMENTAL DATA

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: 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	7.89
② WS Upstream	7.1	7.69
③ WS Downstream	7.4	8.08
SLOPE	0.39 / 14.5 = 0.029	

SKETCH



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

AQUATIC SAMPLING SUMMARY

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

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

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

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

COMMENTS

FORM #105-ED-1-85

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: 1400

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 (ft²)	Discharge (cfs)
5.5	S		5.65								
6.8			5.85								
7.1			6.45								
7.8	BF		6.80								
8	WL		7.89	0							
8.1			8.20	.3				0			
8.3			8.25	.3				1.59			
.6			8.20	.35				1.35			
.9			8.15	.4				2.26			
9.2			8.20	.35				2.45			
.5			8.20	.3				2.78			
.8			8.20	.35				2.99			
10.1			8.20	.3				2.89			
10.4			8.10	.25				2.43			
10.5	W		7.89	0							
10.6			6.65								
11			6.40								
11.7	BF		6.85								
12.2			5.80								
13			5.45								
TOTALS:											

3 Photos on Grf's Camera

End of Measurement | Time: 1415 | 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: ABRAMS 11 — CROSS-SECTION NO.: 2

CROSS-SECTION LOCATION: 2000' D/S ROAD XING

DATE: 6-26-14 — OBSERVERS: J. Skinner, D. Graf

LEGAL DESCRIPTION — ¼ SECTION: SW — SECTION: 20 — TOWNSHIP: 5 N/(S) — RANGE: 84 E/(W) — PM: 6th

COUNTY: Eagle — WATERSHED: Eagle — WATER DIVISION: 5 — DOW WATER CODE:

MAP(S): USGS: — USFS:

N 4385042.
E 341740.

SUPPLEMENTAL DATA

SAG TAPE SECTION SAME AS DISCHARGE SECTION: YES / NO — METER TYPE:

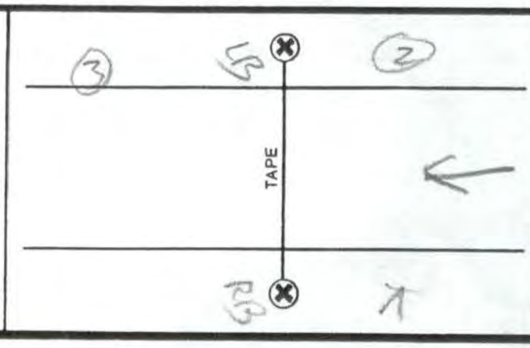
METER NUMBER: — DATE RATED: — CALIB/SPIN: ____ sec — TAPE WEIGHT: ____ lbs/foot — TAPE TENSION: ____ lbs

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	6.88/6.83
② WS Upstream	6.9	6.43
③ WS Downstream	6.5	7.30
SLOPE	0.87 / 13.9 = 0.063	

SKETCH



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

AQUATIC SAMPLING SUMMARY

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

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

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

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

COMMENTS

FORM #ISF FD 1-85

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: 1305

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 (ft²)	Discharge (cfs)
S	0		5.45								
	3.3		6.15								
	5.8		6.00								
GL	8.8		6.00								
	10.7		6.10								
	11.7		6.60								
WL	12		6.86	0							
	12.3		6.95	.15				2.91			
	.6		7.00	.2				2.73			
	.9		7.35	.5				1.27			
	13.2		7.30	.5				1.23			
	.5		7.25	.4				1.58			
	.8		7.20	.4				.68			
	14.1		7.20	.35				.56			
	.4		7.15	.2				.44			
	.7		7.15	.3				.85			
	15		7.15	.3				.88			
	.3		7.05	.25				.90			
	.6		6.95	.10				1.57			
	.9		7.05	.10				.2			
	16.2		7.00	.15				1.36			
WL	16.5		6.86	0							
	16.7		6.60								
	17.5		6.25								
	18.8		5.70								
GL	21.3		5.45								
S	23.3		5.15								
TOTALS:											

3 Photos on Grad Camera

End of Measurement	Time: 1325	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: ABRAMS						CROSS-SECTION NO.: 1	
CROSS-SECTION LOCATION: 60' D/S ROAD XING							
DATE: 26 JUL 14	OBSERVERS: ROBINSON SKINNER GRAF (JV)						
LEGAL DESCRIPTION	¼ SECTION: NW	SECTION: 30	TOWNSHIP: 5 N/S	RANGE: 84 E/W	PM: 6th		
COUNTY: Eagle	WATERSHED: Eagle		WATER DIVISION: 5		DOW WATER CODE:		
MAP(S):	USGS: 0			UTM: N 438392.65			
	USFS:			E 340515.06			

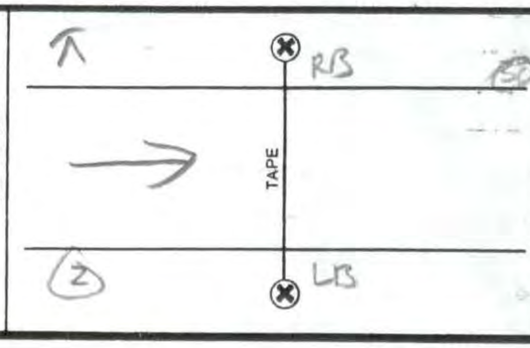
SUPPLEMENTAL DATA

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	6.46 / 6.68
② WS Upstream	11.6	5.61
③ WS Downstream	6.7	7.02
SLOPE	1.41 / 18.3 = 0.077	

SKETCH



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

AQUATIC SAMPLING SUMMARY

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

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

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

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

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: 1120

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 (ft²)	Discharge (cfs)
S GL	0		3.8								
	4.6		5.6								
	6.8		6.6								
	11.6		6.3								
WL	11.7		6.57	0							
	12		6.8	.15				.88			
	.3		6.8	.15				.78			
	.6		6.7	.1				.39			
	.9		6.75	.15				.88			
	13.2		6.75	.15				.03			
	.5		6.95	.25				1.48			
	.8		6.95	.2				2.52			
	14.1		6.95	.2				1.82			
	.4		6.9	.15				2.35			
	.7		7.05	.4				2.68			
	15		6.85	.3				2.36			
	.3		6.95	.3				1.93			
	.6		6.80	.25				1.06			
	.9		6.70	.1				0			
	16.2		6.70	.1				2.26			
WL	16.5		6.57	0							
	17.2		6.1								
	18.5		5.45								
	20.9		4.90								
	23		4.60								
S GL	27.5		3.65								
TOTALS:											

3 Photos on D Graf Camera

End of Measurement	Time: 1205	Gage Reading: ___ ft	CALCULATIONS PERFORMED BY:	CALCULATIONS CHECKED BY: