Survey Report for *Cambarus veteranus* (Guyandotte River Crayfish) and *Cambarus callainus* (Big Sandy Crayfish)

West Virginia Department of Transportations Coalfields Expressway WV16 to Welch

Prepared for:

West Virginia Division of Highways 1334 Smith Street Charleston, WV 25301

November 2017

Submitted by:

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Introduction

General Location and Description

West Virginia Division of Highways (WVDOH) contracted Mountain State Biosurveys, LLC (MSB) to perform surveys for the federally endangered *Cambarus veteranus* (Guyandotte River Crayfish) and for federally threatened *Cambarus callainus* (Big Sandy Crayfish) on the proposed Coalfields Expressway-WV16 to Welch (Project). The proposed Project contains approximately eight (8) miles of linear corridor beginning in Wyoming County at WV 16 northwest of the Federal Correctional Facility, and extending southwest past Welch, WV and ending at Premier, WV (McDowell County) (Figure 1).

Study Area and Available Habitat

The proposed Project is located within the Appalachian Plateau physiographic province at an approximate elevation between 1200 to 2000 feet above mean sea level within the Big Sandy River Watershed. It contains steep slopes with dense vegetation. Much of the area contains disturbances from past mining activity, timber removal, and natural gas extraction. The area has also been impacted by the town of Welch.

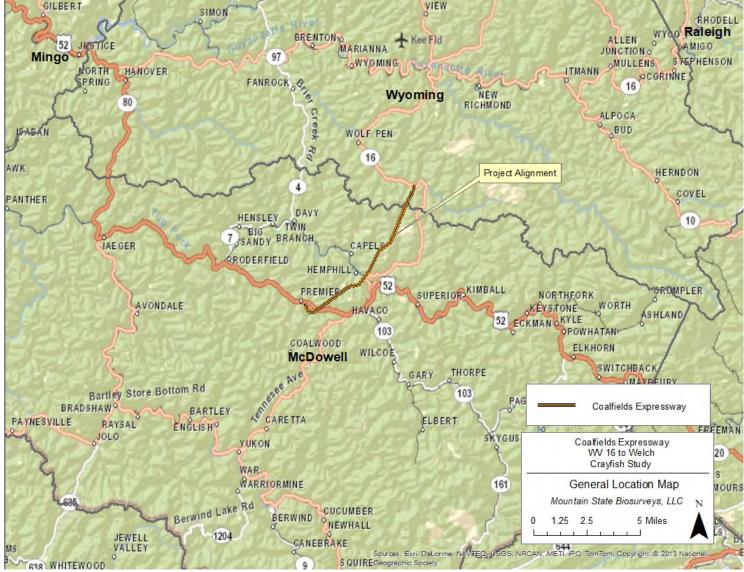


Figure 1. General location of Project area in McDowell and Wyoming Counties, West Virginia.

Methods

During the Fall of 2017, MSB teamed with Dr. Zachary Loughman of West Liberty University and his lab students to conduct surveys for federally protected crayfish associated with the Project. Before surveys began, a meeting took place on September 26, 2017 with USFWS, WVDOH, and MSB to define the upstream and downstream survey limits. Once these parameters were set, survey methodology followed the "Big Sandy and Guyandotte River Crayfish Survey Protocol" issued by the USFWS (Appendix E). Streams associated with the Project area were first assessed for suitable crayfish habitat (Figure 2). Surveys were only conducted in areas with potential habitat. The following is taken directly from the USFWS protocol:

"Each sampling reach should be approximately 125 meters (m) in length and include at least one riffle, run, or both riffle and run habitats. Crayfish sampling shall be performed using an 8'x4' seine, with double leads and double floats, and 1/8" netting. Sampling shall be performed by hauling a seine at a minimum of 10 locations within the 125m stream reach. Seine hauls will be completed by overturning every slab boulder (rocks approximately 1m wide x lm long; 5cm high) present per 2m linear upstream/downstream distance in riffles and runs. One to two slab boulders can be sampled per seine haul.

When sampling is completed, collectors are required to identify all captured crayfish to species, sex all captured crayfish (Form I, Form II, Female, Female Glair, Female-Ovig, Female- Attached Juveniles), and record total carapace length (TCL) in millimeters for each C. *callainus/C. veteranus* encountered using calipers. Data shall be recorded on the standardized WVDNR Crayfish Morphometric Datasheet. A photographic voucher is required for all *C. callainus, C. veteranus* captured prior to release; representatives of other crayfish species should also be photographed. Every effort should be undertaken to ensure animals are outside of water for the briefest period of time possible (5 minute maximum, but a shorter period is preferred). Following data collection, animals are to be returned to the stream bottom upstream of their home rocks and guided back to their rock or other substrate debris.

Collection of water quality and physical habitat metrics are required at each collection locale. At each sampling site, pH, temperature, percent dissolved oxygen, turbidity, and conductivity are to be measured. In addition to water quality, physical habitat will be evaluated through completion of a Qualitative Habitat Evaluation Index (QHEI; OEPA 2006)."

Results

There were two (2) streams sampled for a total of 21 sampling sites. Tug Fork, a tributary of Big Sandy River, known to have *C. callainus*, contained 11 sampling sites and Indian Creek, a tributary of Guyandotte River, which historically had a population of *C. veteranus*, contained 10 sites (Figure 3 and Figure 4). See Appendix A for data sheets and Appendix B for sample site pictures, Appendix C for *C. callainus* pictures, and Appendix D for scientific collecting permit.

All riffles within each tracts footprint were sampled. Riffles were chosen because they are the preferred habitats of both *C. veteranus* and *C. callainus*. Specifically, all cover objects within each riffle proper, and 25 meters upstream and downstream of the origin and terminance of each riffle were sampled. Slack waters, pools, and slow to moderate flowing runs were not sampled due to the lack of preference by each species for those habitats.

Tug Fork is a 3rd-4th order stream with riffle/run and pool sections. Width ranged from 10-18.9 meters and depths 0.25-1.0 meters at sampling sites. Cobble/boulder/slab substrate is present with sand, silt, and coalfines. Many areas contain concreted substrate. Anthropological impacts are present in most of the sampling reach. Large sections contain no canopy cover and are receiving nutrient loading resulting in algal blooms. Entire stream reach contains garbage. See Appendix A for additional information.

Indian Creek is a second order headwater stream with moderate gradient. Substrate is comprised of cobble, small boulder, and bedrock with sand and sediment in slack water. Widths range from 2 meters at upstream sampling site to 13 meters toward the lower sampling reach. Depths ranged from 0.2-0.75 meters. See Appendix A for more specifics.

Tug Fork had 11 sampling sites which produced three (3) crayfish species. Captures included *Cambarus hatfieldi* (n=150), *C. callainus* (n=8), and *Fraxonius cristivarius* (n=65) (Table 1). Water temperature ranged from 13-17.4 °C, specific conductance 339-679 (μS/cm), salinity 0.2-0.47 (ppt), and pH 8.28-8.4 (Table 2). The QHEI scores ranged from 49.5-72. No sampling was conducted between sites 10-11 due to lack of habitat.

Indian Creek had 10 sampling sites which produced two (2) crayfish species. Captures included *C. thepiensis* (n=169) and *F. cristivarius* (n=147) (Table 1). Water temperature ranged from 10.6-15.7 °C, specific conductance 303-603 (μ S/cm), salinity 0.2-0.7 (ppt), and pH 7.22-8.61 (Table 2). The QHEI scores ranged from 41.5-82.

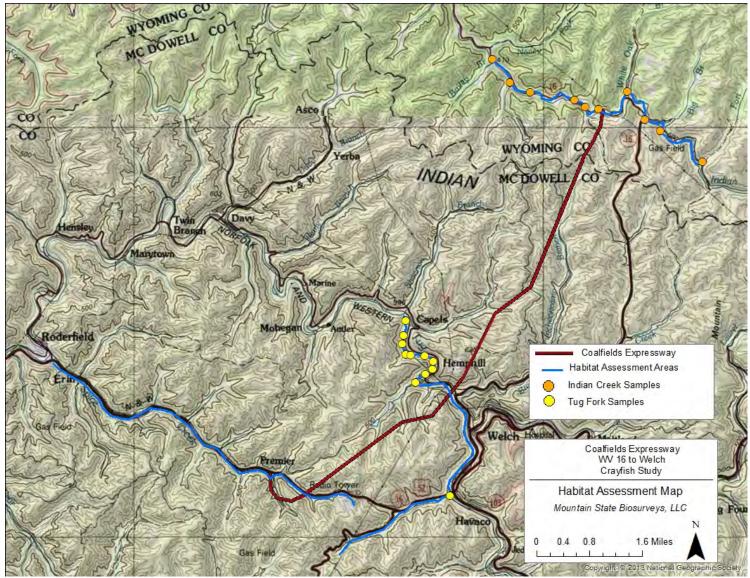


Figure 2. Habitat assessment areas.

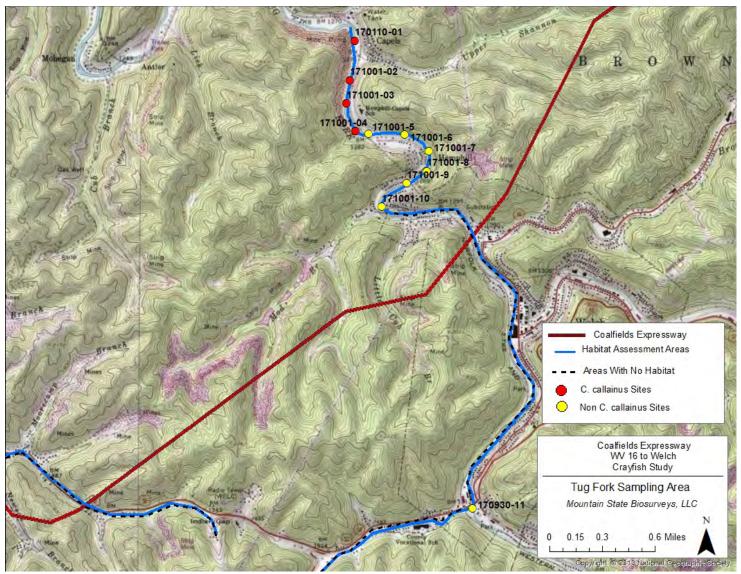


Figure 3. Tug Fork sampling locations.

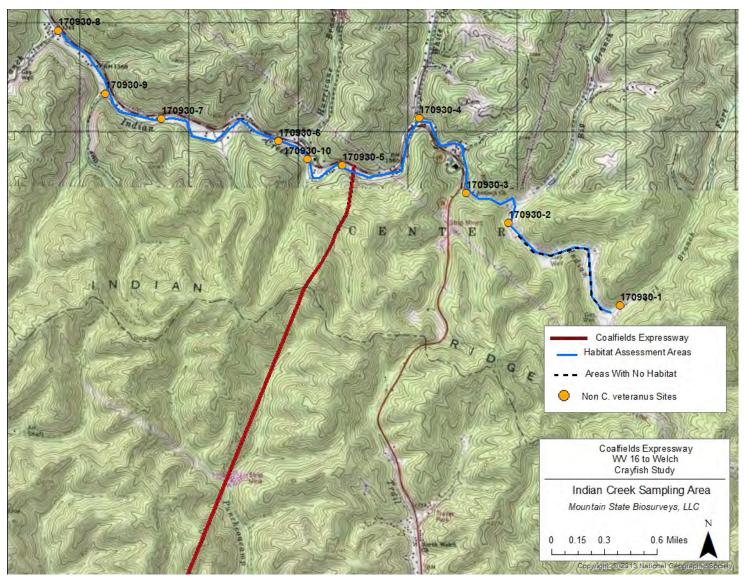


Figure 4. Indian Creek sampling locations.

 Table 1. Crayfish capture data.

Coalfields Expressway-WV 16 to Welch- 2017 Crayfish Capture Data

Date	Stream	Collection #	Latitude	Longitude	C. hatfieldi	C. callainus	C. thepiensis	C. veteranus	Faxonius cristivarious
10/1/2017	Tug Fork	170110-01	37.45504	-81.60264	29	1	0	NA	11
10/1/2017	Tug Fork	171001-02	37.45177	-81.6031	13	3	0	NA	3
10/1/2017	Tug Fork	171001-03	37.44987	-81.60351	11	2	0	NA	1
10/1/2017	Tug Fork	171001-4	37.44759	-81.6025	10	2	0	NA	0
10/1/2017	Tug Fork	171001-5	37.44736	-81.60116	9	0	0	NA	1
10/1/2017	Tug Fork	171001-6	37.4473	-81.5974	27	0	0	NA	1
10/1/2017	Tug Fork	171001-7	37.44596	-81.59491	15	0	0	NA	2
10/1/2017	Tug Fork	171001-8	37.44433	-81.5951	10	0	0	NA	3
10/1/2017	Tug Fork	171001-9	37.4433	-81.59717	13	0	0	NA	4
10/1/2017	Tug Fork	17001-10	37.44135	-81.59977	12	0	0	NA	3
9/30/2017	Tug Fork	170930-11	37.41652	-81.59016	1	0	0	NA	1
9/30/2017	Indian Cr.	170930-1	37.49042	-81.52083	0	NA	91	0	0
9/30/2017	Indian Cr.	170930-2	37.49717	-81.53249	0	NA	0	0	7
9/30/2017	Indian Cr.	170930-3	37.4996	-81.53688	0	NA	13	0	18
9/30/2017	Indian Cr.	170930-4	37.50577	-81.54182	0	NA	14	0	19
9/30/2017	Indian Cr.	170930-5	37.50181	-81.54971	0	NA	7	0	14
9/30/2017	Indian Cr.	170930-6	37.50381	-81.55634	0	NA	5	0	39
9/30/2017	Indian Cr.	170930-7	37.50557	-81.56852	0	NA	20	0	20
9/30/2017	Indian Cr.	170930-8	37.51281	-81.57926	0	NA	6	0	4
9/30/2017	Indian Cr.	170930-9	37.50764	-81.57432	0	NA	4	0	9
9/30/2017	Indian Cr.	170930-10	37.50233	-81.55334	0	NA	9	0	17

Cambarus callainus Captures

Table 2. Water data.

Coalfields Expressway-WV 16 to Welch 2017 Water Data

					Water Temp	Sp. Con	TDS	Sal		
Date	Stream	Collection#	Latitude	Longitude	С	(mS/cm)	(g/L)	(ppt)	pН	QHEI
10/1/2017	Tug Fork	170110-01	37.45504	-81.60264	13	531	-	0.3	8.28	66.5
10/1/2017	Tug Fork	171001-02	37.45177	-81.6031	12.9	556	-	0.4	8.39	67
10/1/2017	Tug Fork	171001-03	37.44987	-81.60351	13.1	456	-	0.3	8.33	72
10/1/2017	Tug Fork	171001-4	37.44759	-81.6025	13.7	565	-	0.4	8.33	71.5
10/1/2017	Tug Fork	171001-5	37.44736	-81.60116	14.1	572	-	0.4	8.36	72
10/1/2017	Tug Fork	171001-6	37.4473	-81.5974	15.1	563	-	0.3	8.36	-
10/1/2017	Tug Fork	171001-7	37.44596	-81.59491	-	-	-	-	-	60.5
10/1/2017	Tug Fork	171001-8	37.44433	-81.5951	17	339	-	0.2	8.3	57.5
10/1/2017	Tug Fork	171001-9	37.4433	-81.59717	16.6	565	-	0.3	8.4	60
10/1/2017	Tug Fork	17001-10	37.44135	-81.59977	16.4	606	-	0.4	8.34	71
9/30/2017	Tug Fork	170930-11	37.41652	-81.59016	17.4	679	-	0.47	8.37	49.5
9/30/2017	Indian Cr.	170930-1	37.49042	-81.52083	10.6	548	-	0.4	8.43	72
9/30/2017	Indian Cr.	170930-2	37.49717	-81.53249	12.6	573	-	0.4	8.32	41.5
9/30/2017	Indian Cr.	170930-3	37.4996	-81.53688	12.9	588	-	0.4	8.47	64.5
9/30/2017	Indian Cr.	170930-4	37.50577	-81.54182	13.5	529	-	0.3	8.51	64.5
9/30/2017	Indian Cr.	170930-5	37.50181	-81.54971	13.8	618	-	0.4	8.55	60
9/30/2017	Indian Cr.	170930-6	37.50381	-81.55634	15.1	517	-	0.3	8.56	82
9/30/2017	Indian Cr.	170930-7	37.50557	-81.56852	14.8	303	-	0.2	8.28	68.5
9/30/2017	Indian Cr.	170930-8	37.51281	-81.57926	14.8	350	-	0.7	8.54	58
9/30/2017	Indian Cr.	170930-9	37.50764	-81.57432	14	308	-	0.2	7.22	52.5

Cambarus callainus captures

Summary

West Virginia Division of Highways (WVDOH) contracted Mountain State Biosurveys, LLC (MSB) to perform surveys for federally protected *C. veteranus* (Guyandotte River Crayfish) and federally threatened *C. callainus* (Big Sandy Crayfish) in areas associated with Coalfields Expressway WV16 to Welch Project. MSB teamed with Dr. Zachary Loughman of West Liberty University in the Fall of 2017 and sampled two (2) streams, Tug Fork and Indian Creek, for a total of 21 sampling sites. A total of four (4) species were captured during the survey. Most importantly federally threatened *Cambarus callainus*, which was captured at four (4) of the 11 sampling sites in Tug Fork. No federally listed species were captured in Indian Creek.

Please contact MSB with any questions. Mountain State Biosurveys, LLC 9981 Gwinn Rd. Glenwood, WV 25520 (304)544-5404 kjohnson@mtnstatebio.net

Appendix A

Data Sheets

Tug Fork Data

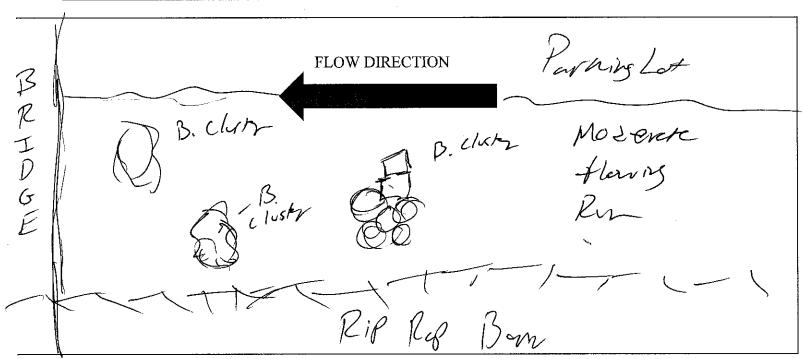
Date: 30 / 9 / 2017 Project Name: 00/H-Tug
Stream name: Tug River - 16/52/103 ; nt Collection #: 170930-11
Trib. of: Big Sarrey Basin: Tus Co: Mc Doue!
Town: Welch Geographic marker: 16/52/103 into
\bigcirc miles (NSEW) of $16/52/103$ int-Elevation: $13/0$ Stream Order: $3/4$
Road/bridge: 16/52 crossing Specific Location: Tug River at 52/1-
crossing at 16/52/103 intersection in Welch
Northing: 37. 4/657 Easting: -91. 59016 (NAD83, Zone 17)
Stream Width: 10-12 Stream Depth: -25-1.0 Total # Seine Hauls: 10
Investigators/Firm: WLU/ Mornten - Stete
Collectors: Loughner et al.
Temp(C) SpCon(mS/cm) TDS(g/L) Sal(ppt) pH Turb(NTU) %DO
17.4 679 - 47 8.37

Species Collected

Specie	S	$\mathrm{I}\mathcal{S}$	Пð	P	$\mathbf{B}_{+}^{\circlearrowleft}$	Juv.	Total
1.) Cambarus hat	(re/d)	-		1		-	1
1.) Cambares hatt 2.) foxonis cris	takerns		_	1	_		/
3.)	,						
4.)							
5.)							

Species	Number of Species Per Seine Haul									
operio	1	2	3	4	5	6	7 8	9	10	
O. cristivarius	1									
C. theepiensis										
C. hatfieldi	1									
C. callainus					* .					
C. veteranus										

Species	Sex	TCL	Species	Sex	TCL	Species	Sex	TCL
				,				
			-					
			······································					



Please attach a topographic map identifying survey sites (include photos of sites), photos of specimens.

Also attach any additional comments.

Qualitative Habitat Evaluation Index and Use Assessment Field Sheet

QHEI Score:

-352	San Vestigaa	Section 201	
	1.0	-	ì
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l U .S.	-/ <i>1</i> ·		ı

Stream & Location: 170930-11-Tug at 16/52/103 RM: Date:30/50/201	7
Scorers Full Name & Affiliation: River Code: - STORET #: Lat/Long.: 27 4 \ LE 8 590 Office verified	_
1] SUBSTRATE Check ONLYTwo substrate TYPE BOXES; estimate % or note every type present BEST TYPES POOL RIFFLE OTHER TYPES POOL RIFFLE ORIGIN ORIGIN OUALITY BLDR /SLABS [10]	nte
2] INSTREAM COVER Indicate presence 0 to 3: 0-Absent; 1-Very small amounts or if more common of marginal quality; 2-Moderate amounts, but not of highest quality or in small amounts of highest quality in moderate or greater amounts (e.g., very large boulders in deep or fast water, large diameter log that is stable, well developed rootwad in deep / fast water, or deep, well-defined, functional pools. UNDERCUT BANKS [1] OVERHANGING VEGETATION [1] ONOTWADS [1] ONOTWADS [1] ROOTMATS [1] COMMODERS [1] LOGS OR WOODLY DEBRIS [1] COVER MAXIMUM 20	
3] CHANNEL MORPHOLOGY Check ONE in each category (Or 2 & average) SINUOSITY DEVELOPMENT CHANNELIZATION STABILITY HIGH [4]	
4] BANK EROSION AND RIPARIAN ZONE Check ONE in each category for EACH BANK (Or 2 per bank & average) River right looking downstream RIPARIAN WIDTH FLOOD PLAIN QUALITY FOREST, SWAMP [3] SHRUB OR OLD FIELD [2] SHRUB OR OLD FIELD [2] SHRUB OR OLD FIELD [2] RESIDENTIAL, PARK, NEW FIELD [1] HEAVY / SEVERE [1] NONE [0] NONE [0] OPEN PASTURE, ROWCROP [0] Comments Comments	
5] POOL / GLIDE AND RIFFLE / RUN QUALITY MAXIMUM DEPTH CHANNEL WIDTH Check ONE (Only) Check ONE (ONLY!) Check ONE (Only!) Image: Contact of the contact	
Indicate for functional riffles; Best areas must be large enough to support a population of riffle-obligate species: Check ONE (Or 2 & average). RIFFLE DEPTH RUN DEPTH RIFFLE / RUN SUBSTRATE RIFFLE / RUN EMBEDDEDNESS BEST AREAS > 10cm [2] BEST AREAS 5-10cm [1] BEST AREAS 5-10cm [1] BEST AREAS < 5cm [metric=0] Comments MAXIMUM < 50cm [1] MOD. STABLE (e.g., Cobble, Boulder) [2] NONE [2] NONE [2] BEST AREAS < 5cm UNSTABLE (e.g., Fine Gravel, Sand) [0] MODERATE [0] Riffle Run Maximum Maxim	
6] GRADIENT (ft/mi) VERY LOW - LOW [2-4]	

cess directions, etc.	FJ MEASUREMENTS X width X depth max. depth X bankfull width bankfull X depth bankfull x depth wird ratio bankfull max. depth floodprone x² width entrench. ratio Legacy Tree:	
- ♀	EJ ISSUES WWTP / CSO / NPDES / INDUSTRY HARDENED / URBAN / DIRT&GRIME CONTAMINATED / LANDFILL BMPs-CONSTRUCTION-SEDIMENT LOGGING / IRRIGATION / COOLING BANK / EROSION / SURFACE FALSE BANK / MANUNE / LAGOON WASH H ₂ 0 / TILE / H ₂ 0 TABLE ACID / MINE / QUARRY / FLOW NATURAL / WETLAND / STAGNANT PARK / GOLF / LAWN / HOME ATMOSPHERE / DATA PAUCITY	
reach typical of steam?, Recreation/ Observed - Inferred, Other/ Sampling observations, Concerns, Cors steel of Least authory seems impast the formal of sections of the formal of the f	/ NA / Circle some & COMMENT / NA / NA / NA / NA / NA / NA / S S S S FED / NA / N	reem!
Son Steam?, Recri	DJ MAINTENANCE PUBLIC / PRIVATE / BOTH / NA ACTIVE / HISTORIC / BOTH / NA YOUNG-SUCCESSION-OLD SPRAY / SNAG / REMOVED MODIFIED / DIPPED OUT / NA LEVEED / ONE SIDED RELOCATED / CUTOFFS MOVING-BEDLOAD-STABLE ARMOURED / SLUMPS ISLANDS / SCOURED IMPOUNDED / DESICCATED FLOOD CONTROL / DRAINAGE	Lital Inclar C
Comment RE: Reach consistency/ Streem & estra Cheryne 1, 12, p thore & street	ARITY BJAESTHETICS Die pass 2nd	fan not the Lital Incian Creek!
AJ SAMPLED REACH Check ALL that apply METHOD STAGE DOAT (st -sample pass-2nd WADE DHIGH U. LINE DEMAL OTHER DEMAN	DISTANCE	Stream Drawing:

Date: 1 / Oct / 2017 Project Name: DOT- Tug #7
Stream name: Tug Fork River Collection #: 170/10-0/
Trib. of: BIG SAYOU Basin: Tug Fork River Co: Mc Dowell
Trib. of: Big Sardy Basin: The Fork River Co: Mc Dowell Town: 6000 Geographic marker: WH to Tug Fork, coming in from Capels
() Of miles (N S=E-W) of Capels Elevation: 1367 Stream Order: $\frac{379}{}$
Road/bridge: Pary Roderfield Road Specific Location: Tug Fork River adjacents to Railroad tracks along Davy Roderfield Fd./Pt. 7, 0.07 minum of Capels WV
to Railroad tracks along Davy Roderheld Rd./Kt. 7, 0.07 minu of Capels WV
Northing: 37.4550 Easting: -81.60264 (NAD83, Zone 17)
Stream Width: 34 Stream Depth: .73 Total # Seine Hauls: 39
Investigators/Firm: WW/Moonte: ~ State
Collectors: Loughwer et al.
Temp(C) SpCon(mS/cm) TDS(g/L) Sal(ppt) pH Turb(NTU) %DO
13.0 1531 - 3 8.28 -

Species Collected

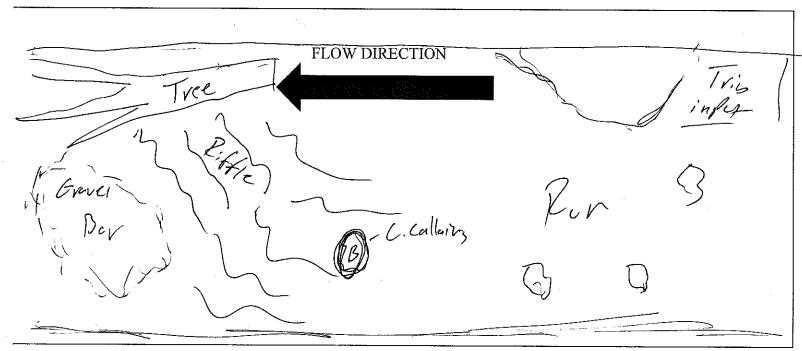
Species	$\mathbf{I}_{\mathcal{Q}_{i}}^{\mathcal{A}_{i}}$	Иð	Q	₽₽₽	Juv.	Total
1.) Cambans hetricldi	4	4	19		1	29
2.) Cambares callaines	 .;		1			Į į
3.) Faxonius cristivarius	4		\$ 5		2	11
4.)						
5.)						

6 .	Number of Species Per Seine Haul										
Species	1	2	3	4	5	6	7	8	9	10	
O. cristivarius	1	1	1	1	1	1	2	1			
C. theepiensis											
- C. hatfieldi	7	2	1	4	1	2	1	1	11		
7 C. ar Habitar	2	l	て	1	(<u>-</u> -t	<u>t</u>	1	1	1	
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Please attach a topographic map identifying survey sites (include photos of sites), photos of specimens.

Also attach any additional comments.

On EPA

Qualitative Habitat Evaluation Index and Use Assessment Field Sheet

QHEI Score: 66.5

Stream & Location: Tog	River - 171001 - 0		M:Date	:110412017
River Code:	Scorers STORET #:	Full Name & Affiliation: Lat./Long.:31.4550	181.6026	Office verified
11 SUBSTRATE Check ONLYT	wo substrate TYPE BOXES; note every type present FFLE OTHER TYPES	Check ONE ORIGIN LIMESTONE [1] TILLS [1] WETLANDS [0]	(Or 2 & average) QUAI HEAVY SILT MODER NORMA FREE [1 MODER MODER MODER NORMA	[-2] 7
quality; 3-Highest quality in modera	r; 2-Moderate amounts, but not of high ate or greater amounts (e.g., very lar reloped rootwad in deep / fast water, POOLS > 70cm [2] ON [1] ROOTWADS [1]	ghest quality or in small amounts of h ge boulders in deep or fast w ater, lar or deep, well-defined, functional poo	ighest check ONE (in the control of	E 25-75% [7]
3] CHANNEL MORPHOLOG SINUOSITY DEVELOP! HIGH [4]	MENT CHANNELIZATION T[7] NONE [6] RECOVERED [4] 7 \$	STABILITY HIGH [3] MODERATE [2] LOW [1]		Channel Maximum 20
EROSION	RIPARIAN WIDTH WIDE > 50m [4]	FLOOD PLAIN QUALITY DREST, SWAMP [3] HRUB OR OLD FIELD [2] SSIDENTIAL PARK, NEW FIELD [1]	CONSERVATION OF IN	STRUCTION [0]
□ > 1m [6] ₩ POO □ 0.7<1m [4] □ POO	CHANNEL WIDTH heck ONE (Or 2 & average) L WIDTH > RIFFLE WIDTH [2] L WIDTH = RIFFLE WIDTH [1] L WIDTH < RIFFLE WIDTH [0]	CURRENT VELOCITY Check ALL that apply TORRENTIAL [-1] SLOW [1] VERY FAST [1] INTERSTITIAL FAST [1] INTERMITTEN MODERATE [1] EDDIES [1] Indicate for reach - pools and riffles	Primary Seconda (circle one and c	n Potential c Contact ry Contact comment on back) Pool/ Current Maximum 12
of riffle-obligate specie RIFFLE DEPTH I BESTAREAS>10cm [2] 関M	S: Check ONE (I RUN DEPTH RIFFLE / AXIMUM > 50cm [2] TABLE (E AXIMUM < 50cm [1] MOD, STAE	.g., Cobble, Boulder) [2] BLE (e.g., Large Gravel) [1] (e.g., Fine Gravel, Sand) [0]	☐ NONE [2] ☐ LOW [1] ☐ MODERATE [0] ☐ EXTENSIVE [-1	RIFFLE [metric=0] EDNESS S Riffle / Run Maximum 8
DRAINAGE AREA	MODERATE [6-10] HIGH - VERY HIGH [10-6]		GLIDE: (-)	Gradient Maximum 10

tions, etc.	FJ MEASUREMENTS FJ MEASUREMENTS Xwidth X depth Max. depth X bankfull width bankfull X depth W//D ratio bankfull max. depth floodprone x² width floodprone x² width entrench ratio
Sess directions of the sessions of the session of the sessions of the session of the session of the session of the session of the ses	FJ MEAS X width X depth max. dept X bankfull Dankfull X WID ratio Dankfull I I floodpron entrench.
Comment RE: Reach consistency/ Is reach typical of steam? Recreation/Observed - Inferred, Other/Sampling observations, Concerns, Access directions, etc. Noty/Sect to four flow, Sithtings, Ferrest Content on Most of Sandays, in which are concerns, Access directions, etc. Rither concerns, Interest in the secretaries of Sith the More place, Allost interest of the four four forms.	DJ MAINTENANCE Circle some & COMMENT DJ MAINTENANCE Circle some & COMMENT DJ MAINTENANCE Circle some & COMMENT EJ ISSUES WWTP / CSO / NPDES / INDUSTRY WWTP / CSO / NPOES / INDUST
Swart greent Swart greent Foral (- 21) at a st 51,540 if e. (exupo	Circle some & COMMENT N N N
Flow Strans, Recreating the orders of the order of the orders of the ord	DJ MAINTENANCE PUBLIC / PRIVATE / BOTH / NA ACTIVE / HISTORIC / BOTH / NA YOUNG-SUCCESSION-OLD SPRAY / SNAG / REMOVED MODIFIED / DIPPED OUT / NA LEVEED / ONE SIDED RELOCATED / CUTOFFS MOVING-BEDLOAD-STABLE ARMOURED / SLUMPS ISLANDS / SCOURED IMPOUNDED / DESICCATED
Comment RE: Reach consistency Is Noteve R to Im Rith Concach Specs oblitions	AESTHETICS ANCE ALGAE SIVE MACROPHYTE ESS TURBIDITY OLORATION M/SCUM SHEN ANCE ODOR SHEN ANCE ODOR OGE DEPOSITS SISSOS/OUTFALLS AREA DEPTH >100000000000000000000000000000000000
	DISTANCE

Stréam Drawing:

VCambars Lettic ld/ your in this howing to dominant. Cambars hottic ld all fecent melts. Leveral lorse form IB tenen at conti

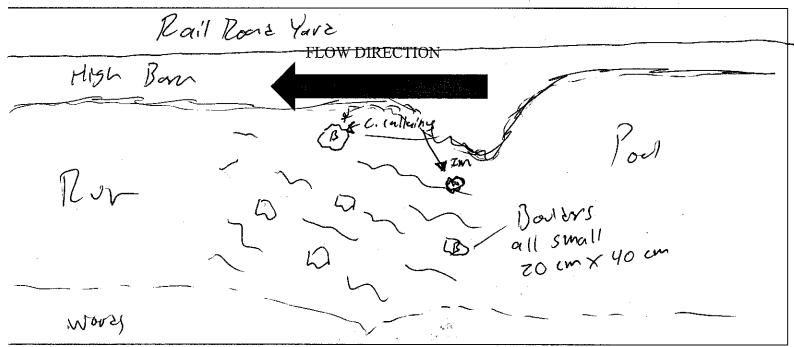
Date: 1 1 oct 1 2017 Project Name: 10 - Tug - 16:4fle #2
Stream name: Tyg Fork Collection #: 171001-Z
Trib. of: Big Endy Basin: Tug Fork River Co: McDavell
Town: Capels Geographic marker: Rail Road Chossing
O. 21 miles (N(S) E(W)) of April Elevation: $\frac{1291}{1291}$ Stream Order: $\frac{3/4}{1291}$
Road bridge: Davy Rodefield Rd. Highway Specific Location: Tug Fork River, 0.3 miles
From train tracks and 0.21 miles buth west of Capelson Davy
Rodewild Road Hwy T Northing: 37. 45177 Easting: -81. 6031 (NAD83, Zone 17)
Stream Width: 18,2 Stream Depth: 1275 Total # Seine Hauls: 21
Investigators/Firm: WLU/ Mountain State
Collectors: Laughman et. 911
Temp(C) SpCon(mS/cm) TDS(g/L) Sal(ppt) pH Turb(NTU) %DO
17.9 556 - 14 8.39

Species Collected

i i i i i i i i i i i i i i i i i i i	Species	Ιď	Πζ	7	$\mathbf{B}^{\updownarrow}_{\mathbb{Q}}$	Juv.	Total
1.) Camb	ears hatielli	1	1	11			13
2.) Cam	bavus rallelavis	1	· ·	1			3
3.) Faxan	NUS CYISTIVANIUS	1	/	1	-		3
4.)							
5.)							

Species			N	Number of Species Per Seine Haul						
Species	1	2	3	4	5	6	7	8	9	10
O. cristivarius	1	l								
C. theepieusis										
C. hatfieldi	1	1	(-	2	_	1	1	S	1	1
C. callainus	١	. \ . "								
C. veteranus				À						

	Sex	TCL	Species	Sex	TCL	Species	Sex	TCL
Cical	In Fallpre II o	39.7						
		₹ PM						
Col	7 Glove	37.6						
Cical	ITO	45.1						
		4						
							**	
								:
		-						
								-



Please attach a topographic map identifying survey sites (include photos of sites), photos of specimens.

Also attach any additional comments.

Chiefpa

Qualitative Habitat Evaluation Index and Use Assessment Field Sheet

HEI	Score:	67

Stream & Location:	171001-	て ~	Tug #2			_ RM: _	Date:	110412017
				ers Full N	ame & Affiliation.			066
River Code:		STORE		(NAD 83 -	Long.:37.45	18/E	<u> 6031 </u>	Office verified location
DECT TVDEC	YPES:	very type pr OTHE HAI HAI DET SIL SIC	esent R TYPES PORDPAN [4] PRITUS [3] PORT [2] PO	ool RIFFLE	ORIGIN LIMESTONE [1] TILLS [1] WETLANDS [0] HARDPAN [0] SANDSTONE [0] RIP/RAP [0]	SILT	Average) QUAL HEAVY [MODER/ NORMAI FREE [1] MEXITENS MODER/ NORMAI	2] 31.5 ATE [-1] Substrate
quality; 3-Highest quality in diameter log that is stable, oundercut banks over a shallows (in succession). Undercut banks over a shallows (in succession). It is comments	quality; 2-Mo i moderate or g well develope [1] GETATION [1]	greater amo greater amo d rootwad ir P	ounts, but not o ounts (e.g., very n deep / fast wa	r nignest qua r large boulde ater, or deep, [2]	iny or in small amount ers in deep or fast wa te	s of nignest er, large al pools. ERS [1] { YTES [1]	Check ONE (C EXTENSIVE MODERATE SPARSE 5- NEARLY AE	0r 2 & average) >75% [11] 25-75% [7]
☐ HIGH [4] ☐ E MODERATE [3]	OLOGY Che ELOPMEN' XCELLENT [7] OOD [5] AIR [3] OOR [1]	T CH Man NON Man REC □ REC	IANNELIZA'	TION 5	STABILITY HIGH [3] MODERATE [2] LOW [1]	1		Channel Maximum 20
4] BANK EROSION A River right looking downstrea EROSION NONE / LITTLE [3] MODERATE [2] HEAVY / SEVERE [1] Comments	" RIPA □ WIDE □ MODE W NARR	ARIAN W > 50m [4] ERATE 10-5 ROW 5-10m NARROW	IDTH	FLO FOREST, S SHRUB OF RESIDENT FENCED P	OD PLAIN QUAL SWAMP [3]	ITY	CONSERVATION URBAN OR IN MINING / CON: te predominant I 00m riparian.	STRUCTION [0]
5] POOL / GLIDE AND MAXIMUM DEPTH Check ONE (ONLY!) > 1m [6] 0.7-<1m [4] 0.4-<0.7m [2] 0.2-<0.4m [1] < 0.2m [0] Comments	CHA	ANNEL W ONE (Or 2 & OTH > RIFFL OTH = RIFFL	/IDTH Laverage) LE WIDTH [2] LE WIDTH [1] LE WIDTH [0]	C TORREN VERY FA FAST [1] MODERA	RENT VELOCITY heck ALL that apply TIAL [-1] SLOW [1 ST [1] INTERST INTERMI TE [1] EDDIES for reach - pools and] TIAL [-1] TTENT [-2] 1]	Primary Secondar	n Potential Contact ry Contact omment on back) Pool / Current Maximum 12
Indicate for function of riffle-obligate in RIFFLE DEPTH BEST AREAS > 10cm [2] BEST AREAS 5-10cm [1] BEST AREAS < 5cm [metric=0] Comments 6] GRADIENT	species: RUN i ⊡MAXIMU i ■MAXIMU	DEPTH JM > 50cm JM < 50cm	Check ON RIFFL [2] █ STABLI [1] ☐ MOD. S	√E (Or Ž & av .E / RUN S E (e.g., Cobl STABLE (e.g.	rerage).	FLE / RU	IN EMBEDD NONE [2] OW [1] MODERATE [0] EXTENSIVE [-1]	Riffle /
DRAINAGE AREA	N N	IODERATE			%RUN: (20)%RIFFL		Maximum 10

Comment RE: Reach consistency/ Is reach typical of steam?, Recreation/ Observed - Inferred, Other/ Sampling observations, Concerns, Access directions, etc. She Ils J Shert 1:4 fee 1200 125-30 m 1000. Small 5/4 brock Metrod or a be sond sond sond sond sond sond sond sond	RMAL	
SH Color of the co	L LINE	

Stream Drawing:

yas & tran prefert.

Date: 1 / Oct / Zo17 Project Name: 17100/-3-101 - lug for le
Stream name: Tug Fork #3 Collection #: 171001-03
Trib of: Bia Sandy Basin: The Fork River Co: McDevel
Town: Capels Geographic marker: Copper Ridge Landfill
Distribution: 1309 Stream Order: 379
Road/bridge: Hickraau + Davylderfield & Specific Execution: Tug Fork Kiver, 0.08 mi 54
of int. of Huy. 7/Old Indian Pidge Rd, 0.34 mi Sw of Capels, WV
Northing: 37. 44987 Easting: -81. 6035/ (NAD83, Zone 17)
Stream Width: 16.0 r Stream Depth: Total # Seine Hauls: $\frac{\partial V}{\partial r}$
Investigators/Firm: WLU / Maintain State
Collectors: Laphman et all
Temp(C) SpCon(mS/cm) TDS(g/L) Sal(ppt) pH Turb(NTU) %DO
31.1 456 - 0.3 4.23

Species Collected

Species	I3	Πζ	Ŷ.	B♀	Juv.	Total
1.) Cambans callaines	1		ŧ			2
2.) Faxonius cristivarius	-					1
3.) Cambans hatfieldi	a	1	8	_		11
4.)						
5.)		:				

21 total hauls

Emocies	Number of Species Per Seine Haul									
Species	1	2	3		5	6	7	8	9	10
O. cristivarius	1									
C. theepiensis				ļ						
C. hatfieldi	1	2	1	1	/		(1	2	
C. callainus	1	1								
C. veteranus			:				<u></u>			

Species	Sex	1CL	Species	Sex	TCL	Species	Sex	TCL
C.cal	I.J.	37.0 mm						
C.C=1	.\$	40-0m						
			•		,	:		
	:							
				``				
	<u> </u>				-			
					:			
			1				1	1
Mish	Gratient		FLOW I	PRECTION	N	Grevel By	<i>]</i> :)
			4			Bw	// 	
+	_			The segretary and the				
12:4/10							/are/ 5	sneity.
			Nainus			\sim		
	-	ι.υ	callainus Ro	_			2:He	
		B				_		\\ \tag{'}
	,		Fast Wor	ving				1
_								
	<i>C</i> \					~	ノ	//
your	3~		1	•				

Please attach a topographic map identifying survey sites (include photos of sites), photos of specimens.

Also attach any additional comments.



Qualitative Habitat Evaluation Index and Use Assessment Field Sheet

QHEI Score:

•	72	
	Common Assessed	-

Stream & Location: 1710c	91-3 - Tus	River	RM:	Date: 1 Oct 17
	Scorer	s Full Name & Affiliation:		
River Code:	_STORET #:	Lat./Long.37.449	18/81.603	5 Office verified location □
1] SUBSTRATE Check ONLYTwo sestimate % or note BEST TYPES POOL RIFFLI BLDR/SLABS [10]	every type present	Check C ORIGIN □ LIMESTONE [1]) QUALITY AVY [-2] — \$\land S
BOULDER [9] COBBLE [8] COBBLE [7] COBBLE [7] COBBLE [7] COBBLE [8]	DETRITUS [3] MUCK [2] SILT [2] ARTIFICIAL [0] (Score natural substration more [2] sludge from poir 3 or less [0]	☐ TILLS [1] ☐ WETLANDS [0] ☐ ☐ HARDPAN [0] ☐ SANDSTONE [0] ☐ ALCUSTURINE [0] ☐ SHALE [-1] ☐ COAL FINES [-2]	SILT MOMENTS M	DERATE [-1] Substrate
2] /NSTREAM COVER indicate pre	acence 0 to 3: 0 Absent: 1 Ven	v email amounts or if more commo	n of marginal	AMOUNT
quality; 3-Highest quality in moderate or diameter log that is stable, well develop UNDERCUT BANKS [1] UNDERCUT BANKS [1] OVERHANGING VEGETATION [1] SHALLOWS (IN SLOW WATER) ROOTMATS [1]	/oderate amounts, but not of h greater amounts (e.g., very la ed rootwad in deep / fast water POOLS > 70cm [2 1] POOTWADS [1]	ighest quality or in small amounts rge boulders in deep or fast water	of highest Check C pools.	AMOUNT DNE (Or 2 & average) NSIVE >75% [11] PRATE 25-75% [7] SE 5-<25% [3] LY ABSENT <5% [1]
Comments	,			Cover Maximum 20
3] CHANNEL MORPHOLOGY CHANNEL MO	IT CHANNELIZATION	ON STABILITY		
■ HIGH [4] — 3.5 □ EXCELLENT [■ MODERATE [3] ■ GOOD [5] □ LOW [2] □ FAIR [3] □ NONE [1] □ POOR [1] Comments	7] NONE [6] RECOVERED [4] RECOVERING [3] RECENT OR NO REC	HIGH [3] MODERATE [2] LOW [1] COVERY [1]		Channel Maximum 20
4] BANK EROSION AND RIPAR				de)
EROSION WIDI	ERATE 10-50m [3] S ROW 5-10m [2] F Y NARROW < 5m [1]	FLOOD PLAIN QUALI OREST, SWAMP [3] SHRUB OR OLD FIELD [2] — [1] RESIDENTIAL, PARK, NEW FIELD ENCED PASTURE [1] OPEN PASTURE, ROWCROP [0]	CONSER URBAN (VATION TILLAGE [1] OR INDUSTRIAL [0] CONSTRUCTION [0] inant land use(s) ian. Riparian
Comments	The same of the sa		,	Maximum 7
Check ONE (ONLY!) Check □ > 1m [6] □ POOL WI □ 0.7-<1m [4] ■ POOL WI	ANNEL WIDTH ONE (Or 2 & average) DTH > RIFFLE WIDTH [2] DTH = RIFFLE WIDTH [1] DTH < RIFFLE WIDTH [0]	CURRENT VELOCITY Check ALL that apply TORRENTIAL [-1] SLOW [1] VERY FAST [1] INTERSIT FAST [1] INTERMIT MODERATE [1] EDDIES [1 Indicate for reach - pools and rif	Print Secon (circle or TENT [-2]	eation Potential mary Contact and Comment on back) Pool / Current Maximum 12
Indicate for functional riffle of riffle-obligate species: RIFFLE DEPTH RUN	Check ONE	(Or 2 & average).	a population	□NO RIFFLE [metric=0] EDDEDNESS
BEST AREAS > 10cm [2] MAXIM	UM > 50cm [2] ■ STABLE (4 UM < 50cm [1] □ MOD. STA	e.g., Cobble, Boulder) [2]	☐ NONE [2] ☐ LOW [1] ☑ MODERA	
DRAINAGE AREA	VERY LOW - LOW [2-4] WODERATE [6-10] - 8 HIGH - VERY HIGH [10-6]	%POOL: ✓ %RUN: (3 ᠔)	%GLIDE:(%RIFFLE:(ك	Gradient Maximum

omment RE. Reach consistency/ Is reach typical of steam?, Recreation/Observed - Inferred, Other/Sampling observations, Concerns, Access directions, etc. Very large vitte, bene et citte. Further, Les in mental desperiments of the man in the defence of the first of the man. Fore singling wither in mental fines to the man.	WWTP / CSO / NPDES / INDUSTRY HARDENED / URBAN / DIRT&GRIME CONTAMINATED / LANDFILL BMPs-CONSTRUCTION-SEDIMENT COGGING / IRRIGATION / COOLING BANK / EROSION / SURFACE BANK / MANURE / LAGOON WASH H20 / TILE / H20 TABLE ACID / MINE / QUARRY / FLOW NATURAL / WETLAND / STAGNANT PARK / GOLF / LAWN / HOME ATMOSPHERE / DATA PAUCITY HARD STAGNANT Equacy Tree: Legacy Tree:
Comment RE. Reach consistency/ Is reach typical of steam? Recreation/ Observed - Inferred, Other/ Sampling observations, Concerns, Access directions, etc. Very Large Vittle, here of cityles Frith. Two freshy maybes C. Calloines collectes to with define Le lee. Stepped Sanding Lister his how the first of file mun. fore single Le lee. Stepped Sanding Lister to his to there or mars. All fresh missing	DJ MAINTENANCE Circle some & COMMENT PUBLIC / PRIVATE / BOTH / NA ACTIVE / HISTORIC / BOTH / NA ACTIVE / HISTORIC / BOTH / NA YOUNG-SUCCESSION-OLD SPRAY / SNAG / REMOVED MODIFIED / DIPPED OUT / NA LEUSEED / ONE SIDED RELOCATED / CUTOFFS MOVING-BEDLOAD-STABLE ARMOURED / SCOURED IMPOUNDED / DESICCATED FLOOD CONTROL / DRAINAGE
Comment RE Very Ly /vry	BJAESTHETICS □ NUISANCE ALGAE □ INVASIVE MACROPHYTES □ EXCESS TURBIDITY □ DISCOLORATION □ FOAM / SCUM □ OIL SHEEN □ TRASH / LITTER □ NUISANCE ODORR □ SLUDGE DEPOSITS □ CSOS/SSOS/OUTFALLS
AJ SAMPLED REACH Check ALL that apply METHOD STAGE BOAT 1st sample pass-2nd WADE ULINE UP CLINE UP COTHER UOW DISTANCE UDW	0.5 Km

Stream Drawing:

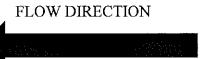
Date: 1 / Oct / Zo17 Project Name: Tus - Do7
Stream name: 105 Foru # 4 Collection #: 17/001-4
Trib. of: Big Sandy Basin: Tug Fork River Co: McDouel
Town: Hemphill Geographic marker: Kail Road Cholling
O.4 miles (N S E (W)) of Homphill Elevation: 1279 Stream Order: 3/4
Road/bridge: PAVY Roderfield Road Specific Location: Tug Fork O.1 miles from the train tracks and 0.4 miles North west of
from the train tracks and 0.4 miles worth west of
Hemphill, W Northing: 37.44759 Easting: -81. 60250 (NAD83, Zone 17)
Stream Width: 16.0 Stream Depth: 12-5 Total # Seine Hauls: 10
Investigators/Firm: WLU / MOUNTAIN PETE
Collectors: Loushner et a/.
Temp(C) SpCon(mS/cm) TDS(g/L) Sal(ppt) pH Turb(NTU) %DO
13.7 565 - 0.4 8.33 -

Species Collected

Species	Ið	ΠQ	4	B ♀	Juv.	Total
1.) Comparus collains	1		/			2
2.) Cambarus callains 2.) Cambarus Lather;	/		9	_		10
3.)						
4.)						
5.)						

Species				Number	of Speci	ies Per S	eine Hau			
Species	1	2	3	4	5	6	7	8.	9	10
O. cristivarius	, 									
C. theepiensis										
C. hatfieldi	/	.3	2	3						
C. callainus	/	1								
C. veteranus					<u> </u>	_		· · · · · ·		

Species	Sex	TCL	Species	Sex	TCL	Species	Sex	TCL
C. cal	15°	39.5						
C.cai	400	44.3						
:						:		
	!							
					:			,
		1						
	-							



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Qualitative Habitat Evaluation Index and Use Assessment Field Sheet

QHEI :	Score:	71.5

Stream & Location: 17 10	01-4 - TUS FE	n	RM:Da	te: 1000 / 2017
River Code:	Scorers	s Full Name & Affiliation:_ Lat./ Long.2-1- /\(\lambda\)	15 /81 · 60 25	Office verified
1] SUBSTRATE Check ONLY cestimate % or BEST TYPES POOL R BLDR/SLABS [10] BOULDER [9]	wo substrate TYPE BOXES; note every type present OTHER TYPES POO HARDPAN [4] DETRITUS [3]	Check C	ONE (Or 2 & average) QU	ALITY Y [-2] 5 RATE [-1] Substrate
COBBLE [8] GRAVEL [7] SAND [6] BEDROCK [5] NUMBER OF BEST TYPES Comments	/ MUCK [2]	HARDPAN [0] SANDSTONE [0] ates; ignore Private [0] Lacusturine [0] SHALE [-1] COAL FINES [-2]	☐ FREE # MODE NORE	[1] [6.5] NSIVE [-2] ERATE [-1] MAL [0] Maximum 20
auglity: 3.Highest quality in moder	y; z-Moderate amounts, but not of radie or greater amounts (e.g., very la veloped rootwad in deep / fast water POOLS > 70cm [2 ON [1]	rae boulders in deep or fast water	r, large Check ONI r, large EXTENS I pools. EXTENS ERS [1] MODER TES [1] SPARSE	MOUNT E (Or 2 & average) IVE > 75% [11] ATE 25-75% [7] 5-<25% [3] ABSENT < 5% [1] Cover Maximum 20
3] CHANNEL MORPHOLOGISINUOSITY DEVELOP HIGH [4]—73.5 EXCELL MODERATE [3] GOOD [6] LOW [2] FAIR [3] NONE [1] POOR [1]	ENT [7] NONE [6] NONE [6] RECOVERED [4] RECOVERING [3]	ON STABILITY HIGH [3] -72 MODERATE [2] LOW [1]	2.5	Channel Maximum 20
River right looking downstream REROSION NONE / LITTLE [3] MODERATE [2] HEAVY / SEVERE [1]	MODERATE 10-50m [3] □ □ S NARROW 5-10m [2] ■ 2 VERY NARROW < 5m [1] □ □ F	each category for EACH BANK (C FLOOD PLAIN QUALI FOREST, SWAMP [3] SHRUB OR OLD FIELD [2] RESIDENTIAL, PARK, NEW FIELD ENCED PASTURE [1] DPEN PASTURE, ROWCROP [0]	ITY	ATION TILLAGE [1] R INDUSTRIAL [0] ONSTRUCTION [0] ant land use(s) C. Riparian Maximum
	CHANNEL WIDTH Check ONE (Or 2 & average)	CURRENT VELOCITY Check ALL that apply TORRENTIAL [-1] MASLOW [1]	Prima	tion Potential ary Contact
☐ 0.7-<1m [4] 图 PO	OL WIDTH = RIFFLE WIDTH [1] D OL WIDTH < RIFFLE WIDTH [0] 12	VERY FAST [1] INTERSTI FAST [1] INTERMIT MODERATE [1] INTERMIT Indicate for reach - pools and r	ITIAL [-1] ITENT [-2] 1]	Adary Contact and comment on back) Pool / Current Maximum 12
of riffle-obligate speci RIFFLE DEPTH ■ BEST AREAS > 10cm [2]	RUN DEPTH RIFFLE **AXIMUM > 50cm [2] ** **AXIMUM < 50cm [1] ** **MAXIMUM < 50cm [1] ** **MOD. STA	(Or 2 & average). / RUN SUBSTRATE RIF (e.g., Cobble, Boulder) [2]	FLE / RUN EMBE NONE [2] LOW [1] MODERATE	
6] GRADIENT (ft/mi) DRAINAGE AREA (mi²)	MODERATE [6-10] 7	%POOL:) %GLIDE:	Gradient Maximum 10

Comment RE: Reach consistency Is reach typical of steam?, Recreation Observed - Inferred, Other Sampling observations, Concerns, Access directions, etc. Another Stallow 1/4/10 years similar to see six prenary that I was least to see anywer forms. Very lasse in collings that they have a fable.	Effort collect all wooder. Segment - nother landing fregent. Both.	Circle some & COMMENT WWYTP / CSO / NPDES / INDUSTRY HARDENED / URBÁN / DIRT&ĞRÎME CONTAMINATED / LANDFILL BMPS-CONSTRUCTION-SEDÎMENT COGGING / IRRIGATION / COOLING BANK / EROSION / SURFACE FALSE BANK / MANURE / LAGON WASH H ₂ 0 / TILE / H ₂ 0 TABLE ACID / MINE / QUARRY / FLOW NATURAL / WETLAND / STAGNANT PARK / GOLF / LAWN / HOME LEGACY Tree: ATMOSPHERE / DATA PAUCITY
Is reach typical of steam?, Recreation/Obs Little Very Simm Chen Sed fings end From Control	C. collains undy	DJ MAINTENANCE PUBLIC / PRIVATE / BOTH / NA ACTIVE / HISTORIC / BOTH / NA YOUNG-SUCCESSION-OLD SPRAY / SNAG / REMOVED MODIFIED / DIPPED OUT / NA LEVEED / ONE SIDED RELOCATED / CUTOFFS MOVING-BEDLOAD-STABLE ARMOURED / SLUMPS ISLANDS / SCOURED IMPOUNDED / DESICCATED FLOOD CONTROL / DRAINAGE
C. C. Comme	Egener Carles	
AJ SAMPLED REACH CheckALL that apply METHOD STAGE BOAT 1st-sample pass-2nd WADE HIGH	DISTANCE DRY	0.5 Km

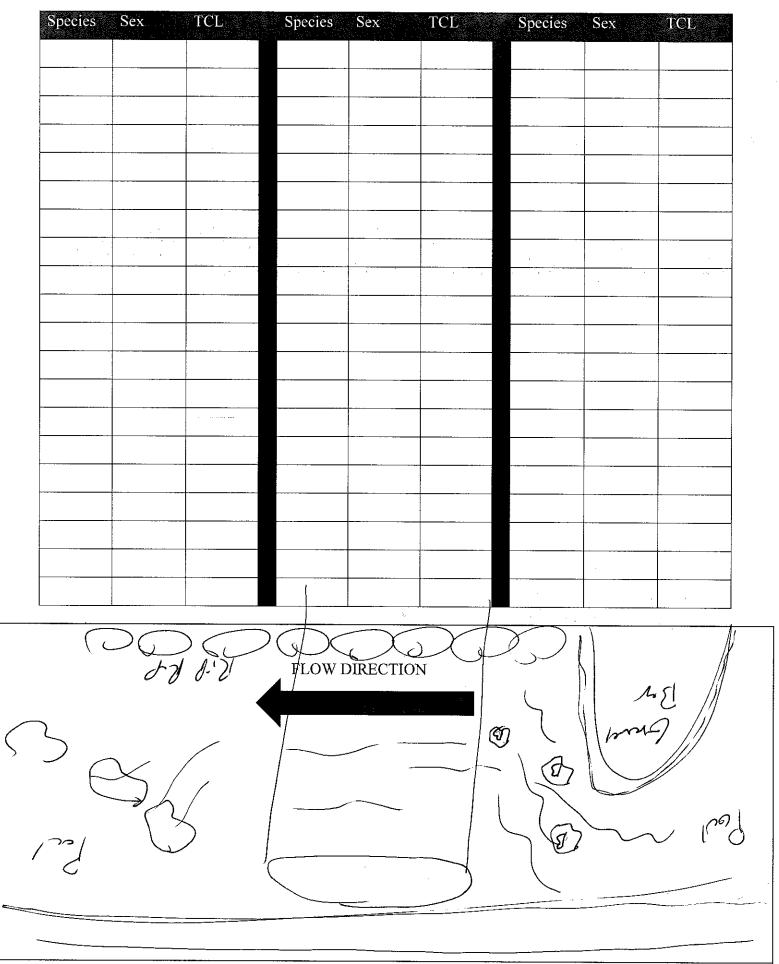
Stream Drawing:

Date:/
Stream name: Collection #: 171001-5
Trib. of: Big Grdy Basin: TUG Fork River Co: McDavel
Trib. of: Big sandy Basin: The Fork River Co: McDavel Town: Hemphil Geographic marker: Law road Crossing
O. 6 miles (N) S E W) of Homphil Elevation: 1335 Stream Order: 3/4
Road/bridge: My Ruderied Road Specific Location: Tug Fork Liver at 1
Railroad bridge crossing, adjacent to Davy Roderfild Rd, O.6 mi NW of
Railroad bridge crossing, adjacent to Davy Roder fild Rd, 0.6 mi NW of Hemphull, WV Northing: 37.44736 Easting: 81.601/6 (NAD83, Zone 17)
Stream Width: 18.6 Stream Depth: 02-0.5 Total # Seine Hauls: 20
Investigators/Firm: WW/ Montain Ask
Collectors: Loughman et al.
Temp(C) SpCon(mS/cm) TDS(g/L) Sal(ppt) pH Turb(NTU) %DO
14.1 0.572 - 0.40 8.36

Species Collected

	Species	$\mathbf{I}_{\mathbb{Q}_{i}}$	ΠQ	· . ♀	в♀	Juv.	Total
1.)	Faxonius evidavarius			l			1
2.)	Cambarus hatfieldi	2 \$	1	6		_	9
3.)							
4.)							
5.)							

Species	****	Number of Species Per Seine Haul							7 A.74 24 3 1	
	1	2			5				9	10
O. cristivarius	- 1									
C. theepiensis										
C. hatfieldi	1	2	2	3	1					
C. callainus										
C. veteranus										



Please attach a topographic map identifying survey sites (include photos of sites), photos of specimens.

Also attach any additional comments.

OhioEPA

Qualitative Habitat Evaluation Index and Use Assessment Field Sheet

QHEI	Score:	(72)
QHEI	Score:	

Stream & Location:	171001-5	RM	1:Date: 01 10ct 1 17
River Code:		ers Full Name & Affiliation: Lat./ Long.27 AA72	Office verified
BEST TYPES POOD BEDR/SLABS [10] BOULDER [9] GRAVEL [7] SAND [6] BEDROCK [5] NUMBER OF BEST TYP Comments 2] INSTREAM COVER In	HARDPAN [4] DETRITUS [3] DETRITUS [3] SILT [2] SILT [2] Score natural subsets: A or more [2] sludge from page 3 or less [0] Details and including the subsets of the subsets	Check ONE (CORIGIN CIMESTONE [1] TILLS [1] WETLANDS [0] HARDPAN [0] Strates; ignore RIP/RAP [0] CIMESTONE [1] AND STONE [0] STANDSTONE [0] STANDSTONE [0] STANDSTONE [0] COAL FINES [-2] Very small amounts or if more common of more flightest quality or in small amounts of highest quality or in small amounts or in small amounts of highest quality or in small amounts or in small	Or 2 & average) QUALITY HEAVY [-2] — 5 MODERATE [-1] Substrate MODERATE [-1] Substrate EXTENSIVE [-2] Maximum NORMAL [0] — 5 NORMAL [0] — 5 NORMAL [0] — 5 NONE [1]
quality; 3-Highest quality in modiameter log that is stable, well of undercut banks [1] OVERHANGING VEGE SHALLOWS (IN SLOW OROTMATS [1] Comments	oderáte or greater amounts (e.g., very il developed rootwad in deep / fast wa POOLS>70cm TATION [1] O ROOTWADS [1]	valarge boulders in deep or fast water, large ater, or deep, well-defined, functional pools [2] / OXBOWS, BACKWATERS [1]	EXTENSIVE >75% [11] 79 MODERATE 25-75% [7] SPARSE 5-<25% [3]
☐ HIGH [4] EXCE	ELLENT [7]	 HIGH [3] — 2.5 MODERATE [2] LOW [1] 	Channel Maximum 20
4] BANK EROSION AND River right looking downstream EROSION NONE / LITTLE [3] M M MODERATE [2] HEAVY / SEVERE [1] Comments	RIPARIAN WIDTH WIDE > 50m [4]	SHRUB OR OLD FIELD [2]	CONSERVATION TILLAGE [1]
🖺 0.7-<1m [4]	CHANNEL WIDTH Check ONE (Or 2 & average) POOL WIDTH > RIFFLE WIDTH [2] POOL WIDTH = RIFFLE WIDTH [1] POOL WIDTH < RIFFLE WIDTH [0]	CURRENT VELOCITY Check ALL that apply TORRENTIAL [-1] SLOW [1] VERY FAST [1] INTERSTITIAL FAST [1] INTERMITTENT MODERATE [1] EDDIES [1] Indicate for reach - pools and riffles.	Recreation Potential Primary Contact Secondary Contact (circle one and comment on back)
of riffle-obligate spe RIFFLE DEPTH BESTAREAS > 10cm [2]	Check ON RUN DEPTH RIFFL MAXIMUM > 50cm [2] STABL MAXIMUM < 50cm [1] MOD S	E (e.g., Cobble, Boulder) [2]	Population NO RIFFLE [metric=0] / RUN EMBEDDEDNESS NONE [2] LOW [1] MODERATE [0] Run Run Run Run Run Run Run Run Run Ru
DRAINAGE AREA	/mi)		FFLE: 30 Gradient Ameximum 10

AJ SAMPLED REACH	Comment RE: Reach consistency Is	Comment RE: Reach consistency Is reach typical of steam?, Recreation/ Observed - Inferred, Other/ Sampling observations, Concerns, Access directions, etc.	rved - Inferred, Other/S	ampling observations, Concerns, Acce	ess directions, etc.
KALL IIII	Jacob Services	The second second			
METROD STAGE	anthoporene	antwopping obtects and as cover high velocity	(050 L	Sh Velocia	4
BOAL ST-Seniple pass-1212		4 12000	1871 6	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	
	141 BY 088	Kick of Wich	MARKET		
OTHER NORMAL	Con reted here	Con retes here confered to or 1100 Sited. Sedinor Bres also	- 1100 S. Ye	J. Ladinery 18	ンカム カクo
Щ	more severe				
J	BI A ESTUETICS	DIMAINTENAMOR	TANAMACA C	SHISSILE	FI MFASIIRFMFNTS
	סלוקנוסו			2700017	
1stsample pass	2nd □ NUISANCE ALGAE	PUBLIC / PRIVATE / BOTH / NA		WWTP / CSO / NPDES / INDUSTRY	×width
	☐ INVASIVE MACROPHYTES	ACTIVE / HISTORIC / BOTH / NA	_	HARDENED/URBAN/DIRT&GRIME	⊼depth
	☐ EXCESS TURBIDITY	YOUNG-SUCCESSION-OLD	N.	CONTAMINATED / LANDFILL	max depth
	☐ □ DISCOLORATION	SPRAY / SNAG / REMOVED	ш	BMPs-CONSTRUCTION-SEDIMENT	V bankfull width
☐ > 70 cm/ CTB	- ☐ FOAM / SCUM	MODIFIED / DIPPED OUT / NA	_	LOGGING / IRRIGATION / COOLING	
meters SECCHI DEPTH		LEVEED / ONE SIDED		BANK / EROSION / SURFACE	Dankfull x deptin
,, Yq.	cm ∏TRASH/LITTER	RELOCATED / CUTOFFS	_	FALSE BANK / MANURE / LAGOON	W/D ratio
ខ្លីនទ		MOVING-BEDLOAD-STABLE		WASH H ₂ 0 / TILE / H ₂ 0 TABLE	bankfull max, depth
ed } Z U	IЦ	ARMOURED / SLUMPS		ACID / MINE / QUARRY / FLOW	floodprone x width
Zug	CIII ☐ CSOS/SSOS/OUTFALLS	ISLANDS / SCOURED		NATURAL / WETLAND / STAGNANT	entrench, ratio
	TOTOLOGY VALUE AND A DECEMBER OF THE PROPERTY	IMPOUNDED / DESICCATED		PARK / GOLF / LAWN / HOME	Legacy Tree:
☐ 10%-530%	FATION AND DETTI	FLOOD CONTROL / DRAINAGE		ATMOSPHERE / DATA PAUCITY	
0.4.0					

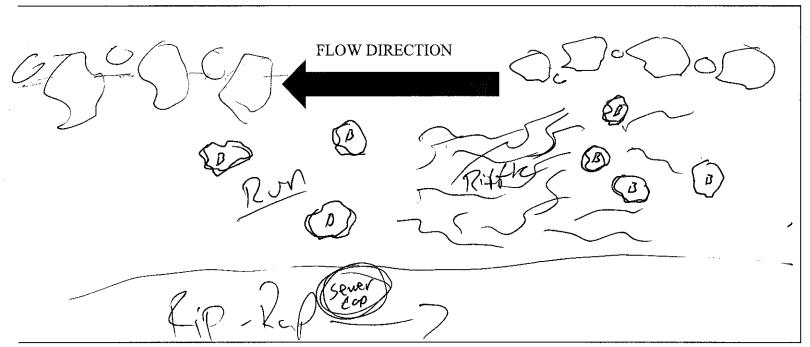
Stream Drawing:

Date: 1 /Oct / Zo17 Project Name: DOT - Tug							
Stream name: Tus Forn = #6 Collection #: 1710 01 - 6							
Trib. of: Big Sandy Basin: Tug Fork River Co: McDowell							
Town: Henghill Geographic marker: ~ 330 m upstream from pailroad Cro	35,00						
Road/bridge: DWy Roderfield Road Specific Location: Tug Fork Liver ~ 3	30m						
upstream from railroad crossing, adjacent to Davy Roderfield Rd, O.21 mi N	Wof						
Hemphill Northing: 37. 44730 Easting: -81. 59740 (NAD83, Z	Zone 17)						
Stream Width: 12.3 Stream Depth: Total # Seine Hauls: 29							
Investigators/Firm: WLW/ Mountain Acte							
Collectors: Loughman et all							
	DO						
15.1 563 - 0-3 8.36 -	_						

	Species	Ið	II3	\mathcal{P} \mathbf{B}	Juv. Total
1.)	Cambans hortfield:	5	2	70	27
2.)	Faxnirs cristivans				1
3.)					
4.)					
5.)					

Species			1	Number	of Speci	es Per So	eine Hau	1		
opecies	1	2	3	4	5	6	7	8	9	10
O. cristivarius	t									
C. theepiensis										
C. hatfieldi	3	Z	1	(ι	ī	ı	ι	7	1
C. callainus	\	١	Į.	l	2	1	2	Į	1	
C. veteranus										

Species	Sex	TCL	Species	Sex	TCL	Species	Sex	TCL
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		1						



Please attach a topographic map identifying survey sites (include photos of sites), photos of specimens.

Also attach any additional comments.



QHEI Score:	
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Stream & Location:	171001-06		RM:	Date: [Oct 17
		corers Full Name & Affiliation:		Office verified
River Code:	STORET #:	(NAD 63 - decilial)	<u>3/8L</u>	10cation
DECT TVDEC	or note every type present L RIFFLE OTHER TYPE HARDPAN [4' DETRITUS [3' MUCK [2] SILT [2] ARTIFICIAL [(Score natura	S POOL RIFFLE ORIGIN LIMESTONE [1] TILLS [1] WETLANDS [0]	SILT	A average) QUALITY HEAVY [-2] MODERATE [-1] Substrate OFREE [1] EXTENSIVE [-2] MODERATE [-1] MONE [1]
quality: 3-Highest quality in mo	Jality; 2-Moderate amounts, but iderate or greater amounts (e.g., I developed rootwad in deep / fa POOLS > 7 [ATION [1] ROOTWAD	S [1] AQUATIC MACROPHYT	large loools. RS [1]	AMOUNT Check ONE (Or 2 & average) EXTENSIVE >75% [11] MODERATE 25-75% [7] SPARSE 5-<25% [3] NEARLY ABSENT <5% [1] Cover Maximum 20
	OPMENT CHANNEL LLENT [7] NONE [6] D [5] RECOVERED [3] RECOVERING	IZATION STABILITY HIGH [3] MODERATE [2]	•	Channel Maximum 20
River right looking downstream EROSION NONE 7 LITTLE [3] MODERATE [2]	RIPARIAN WIDTH WIDE > 50m [4] MODERATE 10-50m [3] NARROW 5-10m [2] VERY NARROW < 5m [1]	ONE in each category for EACH BANK (OR FLOOD PLAIN QUALIT R FOREST, SWAMP [3] SHRUB OR OLD FIELD [2] RESIDENTIAL, PARK, NEW FIELD FENCED PASTURE [1] OPEN PASTURE, ROWCROP [0]	「Y 	k & average) CONSERVATION TILLAGE [1] URBAN OR INDUSTRIAL [0] MINING / CONSTRUCTION [0] te predominant land use(s) 00m riparian. Riparian Maximum 10
□ 0.7-<1m [4] □	RIFFLE / RUN QUALITY CHANNEL WIDTH Check ONE (Or 2 & average) POOL WIDTH > RIFFLE WIDTH POOL WIDTH = RIFFLE WIDTH POOL WIDTH < RIFFLE WIDTH	[2] ☐ TORRENTIAL [-1] ☐ SLOW [1] [1] ☐ VERY FAST [1] ☐ INTERSTIT	ΓΕΝΤ [-2] 	Recreation Potential Primary Contact Secondary Contact (circle one and comment on back) Pool/ Current Maximum 12
of riffle-obligate spe RIFFLE DEPTH ☐ BESTAREAS > 10cm [2]	ecies: Chec RUN DEPTH RI □ MAXIMUM > 50cm [2] □ ST □ MAXIMUM < 50cm [1] □ MC	ust be large enough to support and the content of t	LE / RU	IND RIFFLE [metric=0] IN EMBEDDEDNESS NONE [2] LOW [1] MODERATE [0] EXTENSIVE [-1] MAXimum 8
DRAINAGE AREA	/mi)		%GLID %RIFFL	

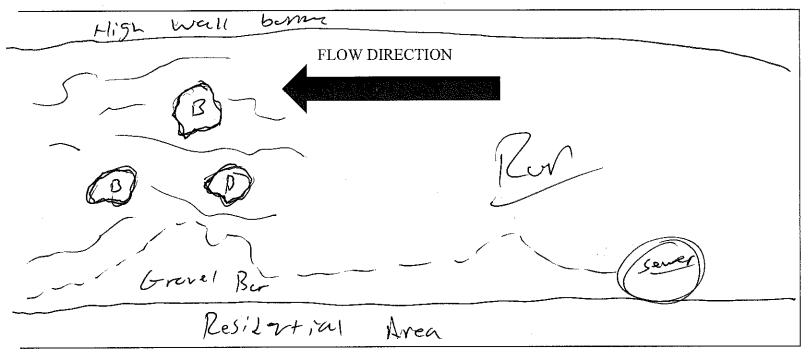
Stream Drawing:

Date: 1 Oct / Zo17 Project Name: Tug
Stream name: Tug - Possibly at crossing Collection #: 171001-7
Trib. of: Big Sardy Basin: Tyg Fork River Co: Mo Dowell
Trib. of: Big Sardy Basin: Tyg Fork River Co: MD Dowell Town: Hemphill Geographic marker: ~110m SE of int. of River Rd + Candy Ln.
OLL miles (NSB) W) of Hemphil Elevation: 1241 Stream Order: 3
Road bridge: Piver Road Specific Location: Tug Fork by neighbor hood
~ 110 m SE of intersection of River Rd. and Cardy Lave, 0.21 mi NE of Heuphill
Northing: 37, 44596Easting: -81.59491 (NAD83, Zone 17)
Stream Width: 18.9 Stream Depth: 12-1.0 Total # Seine Hauls: 25
Investigators/Firm: WW IMWWAIN State
Collectors: Laughman et all
Temp(C) SpCon(mS/cm) TDS(g/L) Sal(ppt) pH Turb(NTU) %DO

Species	IQ	· II♂	P	\mathbf{B}	Juv.	Total .
1.) Faxonius cristavarius	1	(1	-		2
2.) Cambars hatty 12:	3.		B12			15
3.)						
4.)						
5.)						

Species			A.B.				_	_	_	
	1	2	3	4	5	6	7	8	9	10
O. cristivarius	ι	1 +18								
C. theepiensis	1	Z	3	1	1	1	ł	2	l	ı
C. hatfieldi	Shat.									
C. callainus		·								

Species	Sex	TCL	Species	Sex	TCL	Species	Sex	TCL
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ChioEFA

Qualitative Habitat Evaluation Index and Use Assessment Field Sheet

QHEI Score: 60.5

Stream & Location:_/	171001	-7 - Tug	Forn		RM:	Date:)	100/12017
River Code: -		Sc STORET #:		ame & Affiliation: Long.:23 AAC	a 101 eta	<u> "Ла</u>	Office verified
1] SUBSTRATE Check			(NAD 83 -		1 /81 .50	171	location □
estima	te % or note every cool RIFFLE	ry type present OTHER TYPE:	oj	ORIGIN LIMESTONE [1] TILLS [1] WETLANDS [0]	SILT	QUALI HEAVY [-2 MODERAT NORMAL]	E [-1] Substrate
quality; 3-Highest quality in diameter log that is stable, UNDERCUT BANKS OVERHANGING VEC SHALLOWS (IN SLC ROOTMATS [1] Comments	quality; 2-Mode moderate or gre well developed r [1] GETATION [1]	erate amounts, but reater amounts (e.g., ootwad in deep / fas	not of highest qua very large boulde st water, or deep, licm [2]	lity or in small amounts o ers in deep or fast water, l	f highest arge Che cols. □ E) (S [1]	(TENSIVE > ODERATE 2 PARSE 5-<2 EARLY ABS	2 & average) 75% [11] 25-75% [7]
HIGH [4] EX MODERATE [3] GO GO LOW [2] FA	OLOGY Check ELOPMENT (CELLENT[7] OOD [5] JIR [3] OOR [1]	CHANNELI NONE [6] RECOVERED RECOVERING	ZATION [4]	STABILITY HIGH [3] MODERATE [2] LOW [1]			Channel laximum 20
4] BANK EROSION A River right looking downstream REROSION NONE / LITTLE [3] MODERATE [2] 1,5	RIPAR RIPAR D WIDE> D MODER	EIAN WIDTH 50m [4]	FLO POREST, S FOREST, S SHRUB OR RESIDENTI	OD PLAIN QUALIT WAMP [3] t OLD FIELD [2]	Y R CON 5 CON 1] MINII	SERVATION AN OR INDI NG / CONST dominant lan iparian. ,	
□ 0.7-<1m [4]	CHAN Check ON POOL WIDTH POOL WIDTH	UN QUALITY INEL WIDTH E (Or 2 & average) 1> RIFFLE WIDTH [: 1= RIFFLE WIDTH [: 1< RIFFLE WIDTH [:	CI 2]	RENT VELOCITY heck ALL that apply FIAL [-1] SLOW [1] ST [1] INTERSTITE INTERMITTE TE [1] DEDDIES [1] for reach - pools and riffle	AL [-1] ENT [-2]		Contact Contact
of riffle-obligate s RIFFLE DEPTH BESTAREAS > 10cm [2] BESTAREAS 5-10cm [1] BEST AREAS < 5cm [metric=0] Comments	species: RUN D ∰MAXIMUM MAXIMUM	Check EPTH RIF > 50cm [2] Ø STA < 50cm [1] ☐ MOI ☐ UNS	ONE (Or Ž & aw FLE / RUN S BLE (e.g., Cobb D. STABLE (e.g., TABLE (e.g., Fin	UBSTRATE RIFFI le, Boulder) [2] Large Gravel) [1] le Gravel, Sand) [0]	LE / RUN EI NONE LOW [MODE	<u>⊔no R</u> MBEDDE [2]	IFFLE [metric=0] DNESS 0.5 Riffle /
6] GRADIENT (DRAINAGE AREA	MOI	RY LOW - LOW [2-4] DERATE [6-10] H - VERY HIGH [10-		=	%GLIDE:(- %RIFFLE:((Gradient T

1	اه	,	A L	نې اک	TS	la v										ı
al of steam?, Recreation/ Observed - Inferred, Other/ Sampling observations, Concerns, Access directions, etc.	now some les metato amont very high now. Alsak	, ų	piffles. Sumples 250 m. Conss eve at offer weigh of	Campers hasticles sloved -> Serval Id? / g fair of frontes site.	F] MEASUREMENTS				145	11111	<u> </u>		ix. depth	x ^c width	atio	
directions,	1.	Carpet acres substate. Intrishial spaces abserce	Mex	30	MEÁSU	xwidth	⊼ deoth	max denth	Table Copen	A Dallhiull Wideli Bankfull V danth		W/U ratio	banktull max. depth	floodprone x ^e width	entrench, ratio	Legacy Tree:
Access (75	્તું ઇ	the	ζ,	FJ	*22****	en Alpi	244	Value 1	5% <u>in</u>	riter.	12567	. TENEV	A GOOD	10101	
Concerns	. 7 ×	SPa	3	40	Š	/INDUS	DIRT&GR	ANDFILI	N-SEDIM	N / COOL	SURFACI	R/LAGO	1 ₂ 0 TABLI	RY / FLO	/STAGN/	/N / HOM 'A PAUCI'
ervations,	1 41	12.4	to 2	XON/	EJ ISSUES) / NPDES	URBAN/	NATED /	TRUCTIO	RIGATIO	SOSION /	C/MANUE)/TILE/	E / QUAR	VETLAND	OLF / LAV
npling obs	/en/	ysk	2	120	7	WWTP / CSO / NPDES / INDUSTRY	HARDENED/URBAN/DIRT&GRIME	CONTAMINATED / LANDFILL	BMPs-CONSTRUCTION-SEDIMENT	LOGGING / IRRIGATION / COOLING	BANK / EROSION / SURFACE	FALSE BANK / MANURE / LAGOON	WASH H20 / TILE / H20 TABLE	ACID / MINE / QUARRY / FLOW	NATURAL / WETLAND / STAGNANT	PARK / GOLF / LAWN / HOME ATMOSPHERE / DATA PAUCITY
Other/San	4	Inj	6012	, sev	ENT	₹	Ŧ		8 8	Š		FAI		⋖	₹	Α.Α
Inferred,	2	k.	, 2	1	Circle some & COMMENT											
Dbserved -	4	لمحر طان	052	Ster	Vircle some											
creation/C	erte	كي ستاية	47	6,512,		I / NA	H/NA	ב	<u>@</u>	/NA	_	S:	BLE	S	.	TED VAGE
eam?, Re	2, c 6, 7, c	ac f	Jung	tack	DJ MAINTENANCE	PUBLIC / PRIVATE / BOTH / NA	ACTIVE / HISTORIC / BOTH / NA	YOUNG-SUCCESSION-OLD	SPRAY / SNAG / REMOVED	MODIFIED / DIPPED OUT / NA	LEVEED / ONE SIDED	RELOCATED / CUTOFFS	MOVING-BEDLOAD-STABLE	ARMOURED / SLUMPS	ISLANDS / SCOURED	IMPOUNDED / DESICCATED FLOOD CONTROL / DRAINAGE
ypical of st	ė.	J. Det	، - ک	2 moder	I MAINT	C / PRIVA:	E/HISTOF	NG-SUCC	AY / SNAG	TED / DIP	:VEED / O	OCATED.	NG-BEDL	MOURED	LANDS /	UNDED /
Is reach to	\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \		799	Can	D	PUBLIK	ACTIVE	You	SPR/	MODIF	"	RE	MOVI	AR	S	IMPOUND FLOOD CO
Comment RE: Reach consistency/ Is reach typical of steam?, Recreation/Observed - Inferred, Other/Sampling observations, Concerns, Access directions, etc. げんかれてこれをようかのなるようでしていませんが、アンプロイン・インサントロイトのピート・アン・アン・アン・ア	}	+ 5.17 manin	الم الم	Sawilling remen. C	SOL	Щ	PHYTES	Ě					~	LS	FALLS	н 3ft
Reach co.		77	7 1	19 10	BJ AESTHETICS	NUISANCE ALGAE	NVASIVE MACROPHYTES	EXCESS TURBIDITY	DISCOLORATION	SCUM	EN	TRASH / LITTER	NUISANCE ODOR	SLUDGE DEPOSITS	SOs/OUT	REA DEPT 00ft2□>.
ment RE:	Canaly	FIS	VXCO JA	VIII.V	BJA] NUISAN] INVASIV] EXCES] DISCOL] FOAM / SCUM] OIL SHEEN] TRASH] NUISAN] SLUDG	CSOS/SSOS/OUTFALLS	CJ RECREATION AREA DEPTH POOL: □>100ft²□>3ft
Com		, ,	3 			- 2nd		⊔ □[⊔][⊔ ⊒⊑	뒫	E E		Ę		CREAT
: ACH	STAGE		NORMAL	LOW JDRY	CLARITY	stsample pass] < 20 cm]20-<40 ст		> 70 cm/ CTB	J SECCHI DEPTHI			. 10		CJ RE
AMPLED REACH Check ALL that apply			⊥ ∟ !		Suct seems	- L	_	_		;	ĨS □)PY 1st	SEL	֓֞֞֜֜֜֞֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֡֓֓֡֓֓֓֓֓֡֓֜֜֜֓֓֡֓֡֓֡֓֡֓֡֓֡֓֡֓֡֡֓֡		LOSED
AJ SAMPLED REACH Check ALL that apply	METHOD	□ BOAT □ WADE		DISTANCE	0.5 Km]	2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	DINTHER	i)		meters	CANOPY	N=GO 7%S ► L		7 30%-<55% 7 30%-<55%	☐ 10%-<30% ☐ <10%- CLOSED

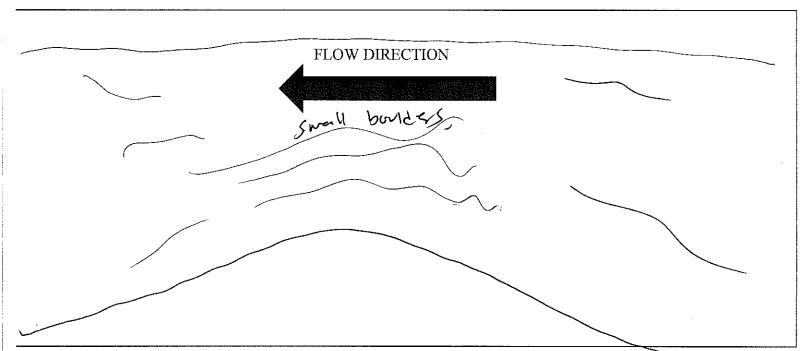
Stream Drawing:

Date: 1 /oct /Zo17 Project Name: DOT-Tug
Stream name: Tug Form - Negar crossing Collection #: 1001-8
Trib. of: Big Carry Basin: Tug Fork River Co: Mc Powell Town: Henfl: 11 Geographic marker: ~140 m downstream from railroad Gossing
Town: Henfl:11 Geographic marker: ~140 m downstream from railroad Gossing
O.04_miles (N (SE) W) of Homphill Elevation: 1225 Stream Order: 3
Road/bridge: River Road Specific Location: Tug Fork ~ 140m
downstream from vailroad bridge crossing, 0.04 mi SE of Hemphill
Northing: 37. 44433 Easting: -81.59510 (NAD83, Zone 17)
Stream Width: 14 m Stream Depth: Total # Seine Hauls: 10
Investigators/Firm: WLU MOUNTAIN State
Collectors: Laugh man et 911
Temp(C) SpCon(mS/cm) TDS(g/L) Sal(ppt) pH Turb(NTU) %DO
17.0 339 12 8.3

Species	$\mathrm{I}_{\circlearrowleft}^{\wedge}$	Иð	<u> </u>	BĢ	Juv.	Total
1.) Faxonius cristaverius	2	1	5	-	-	3
1.) faxanius cristaveris 2.) Compans botterelei	_	-	10	<u>-</u>	_	10
3.)						
4.)						
5.)	-					

Species	Number of Species Per Seine Haul										
Opecies	1	2	3	4	5	6	7	8	9	10	
O. cristivarius	1	2									
C. theepiensis					,						
C. hatfieldi	١	z	١	2	l	l	1	1			
C. callainus C. veteranus								, , , , , , , , , , , , , , , , , , ,			

Species	Sex	TCL	Species	Sex	TCL	Species	Sex	TCL
		-						
			2			:		
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			<u> </u>			<u></u>		
:								
			<i>3</i>					
						5 2 -		



Please attach a topographic map identifying survey sites (include photos of sites), photos of specimens.

Also attach any additional comments.

QHEI Score: 57.5

Stream & Location: 171001-8- 71	My	RM: _	Date:	100 2017
River Code: STORET #:	Scorers Full Name & Affiliation:_ Lat./ Long. & 1 A A A	2 (0)	-ae I	Office verified
11 SUBSTRATE Check ONLY Two substrate TYPE BC	Lat./ Long.87 · 444 OXES;	<u>3 /81</u> .	2721	location □
estimate % or note every type presen BEST TYPES POOL RIFFLE OTHER TO BLDR/SLABS [10]	YPES POOL RIFFLE ORIGIN AN [4] US [3] TILLS [1] DESCRIPTION OF THE POOL OF T	SILT	Average) QUALITY HEAVY [-2] MODERATE NORMAL [0] FREE [1] EXTENSIVE MODERATE NORMAL [0] NORMAL [0]	[-1] Substrate
quality; 3-Highest quality in moderate or greater amounts diameter log that is stable, well developed rootwad in dee OUNDERCUT BANKS [1] OVERHANGING VEGETATION [1] OROOT	, but not of highest quality or in small amounts α (e.g., very large boulders in deep or fast water.	of highest large pools. RS [1]	Check ONE (Or 2 of the control of th	& average) 5% [11] 75% [7] 6 [3]
HIGH [4] EXCELLENT [7] NONE [6] MODERATE [3] GOOD [5] RECOVE LOW [2] FAIR [3] RECOVE	NELIZATION STABILITY			annel
4] BANK EROSION AND RIPARIAN ZONE CHRIVER right looking downstream RIPARIAN WIDTH RIPARIAN WIDTH WIDE > 50m [4] WIDE > 50m [4] MODERATE 10-50m [4] MODERATE [2] MODERATE [2] WIDE > 10m [2	FLOOD PLAIN QUALIT FOREST, SWAMP [3] SHRUB OR OLD FIELD [2] RESIDENTIAL PARK NEW FIELD	TY	CONSERVATION T URBAN OR INDUS MINING / CONSTRI e predominant land (Om riparian. Rip	TRIAL [0] JCTION [0]
5] POOL / GLIDE AND RIFFLE / RUN QUALITY MAXIMUM DEPTH CHANNEL WIDT Check ONE (ONLY!) Check ONE (Or 2 & averous area of the control of the	H CURRENT VELOCITY rage) Check ALL that apply DTH [2] TORRENTIAL [-1] SLOW [1] DTH [1] VERY FAST [1] INTERSTIT	ENT [-2]	Cı	ntact Contact
RIFFLE DEPTH RUN DEPTH BEST AREAS > 10cm [2] MAXIMUM > 50cm [2] MAXIMUM < 50cm [1] MAXIMUM < 50cm [1]	Check ONE (Or 2 & average).	LE/RU	N EMBEDDEDI ONE [2] OW [1] ODERATE [0] ONE [4]	
6] GRADIENT (ft/mi) □ VERY LOW - LOW	7,1002	%GLIDI %RIFFLI	<u> </u>	adient 7

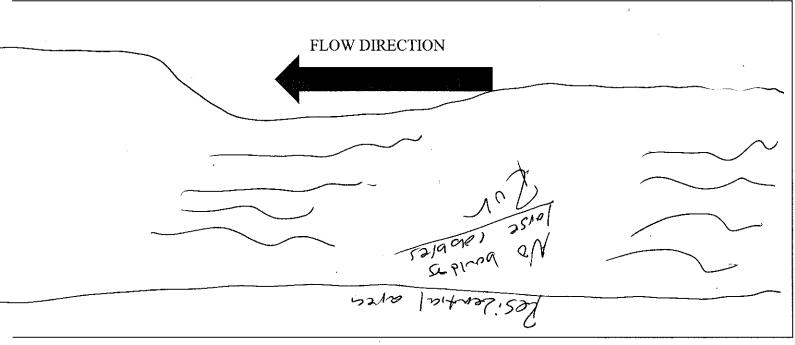
, Concerns, Access directions, etc.	Some consition			F] MEASUREMENTS	X width	X depth	max, deptin X bankfull width	bankfull x depth	W/D ratio	floodprone x² width	entrench, ratio	Legacy Tree:	
SL.	47,56 - Save	2		EJ ISSUES	WWTP / CSO / NPDES / INDUSTRY	HARDENED / URBAN / DIRT&GRIME CONTAMINATED / LANDFILL	BMPs-CONSTRUCTION-SEDIMENT	LOGGING / IRRIGATION / COULING BANK / EROSION / SURFACE	FALSE BANK / MANURE / LAGOON	WASH H ₂ 0 / TILE / H ₂ 0 TABLE ACID / MINE / QUARRY / FLOW	NATURAL/WETLAND/STAGNANT	PARK / GOLF / LAWN / HOME ATMOSPHERE / DATA PAUCITY	
of steam?, Recreation/ Observed - Inferred, Other/ Sampling observatio	L- 26, here - Mysicate hist.			Circle some & COMMENT		×							
/s reach typical of steam?, Recreation				DJ MAINTENANCE	PUBLIC / PRIVATE / BOTH / NA	ACTIVE / HISTORIC / BOTH / NA YOUNG-SUCCESSION-OLD	SPRAY / SNAG / REMOVED	MODIFIED / DIPPED OUT / NA LEVEED / ONE SIDED	RELOCATED / CUTOFFS	MOVING-BEDLOAD-STABLE ARMOURED / SLUMPS	ISLANDS / SCOURED	IMPOUNDED / DESICCATED FLOOD CONTROL / DRAINAGE	
Comment RE: Reach consistency/ Is	med (as previous so		BJ AESTHETICS	☐ NUISANCE ALGAE	☐ INVASIVE MACROPHYTES ☐ EXCESS TURBIDITY	DISCOLORATION	☐ FUAM / SCUM		☐ NUISANCE ODOR ☐ SLUDGE DEPOSITS	☐ CSOs/SSOs/OUTFALLS	ATION AREA DEPTH POOL: □>100ft²□>3ft	
AJ SAMPLED REACH Check ALL that apply	METHOD STAGE	WADE HIGH OTHER OTHER OTHER OTHER OTHER OTHER	DISTANCE DRY	CLARITY	₩ _		1 40-70 cm	seccHi DEPTH□	CANOPY 1st cm	ssed c		☐ 10%-<30%	Stream Drawing:

Date://_	Oct / 2017	Project Na	me: <u>Tug Fø</u>	in-101		
Stream name: _	Tug Form	z#9		Collection #:	17/001-9	
Trib. of: Blg	Sandy	Basin: Tu	A FORK R	<u>iver</u> Co:	UcDavel	•
Town: Welc	ん Geo	graphic marke	er: Just ins	ize Wéle	h city 1	imits.
0.13 miles (N	1 (3 E (0)) of ∐	emphill	Elevation:	1320	Stream Orde	r: <u>3</u>
Road/bridge: _	Rail Road (DroSJing	Specific L	ocation: Tuo	Fork 004	miles
Suthwest	of the vail	victors body	ng and	0.13 mile	s south w	litof
	<u>WV.</u> 1					
Stream Width	:Stre	eam Depth:	Total	# Seine Hau	ls: 24	
Investigators/l	Firm: WU4/M	suntain Sta	te			
	zugh man			· · · · · · · · · · · · · · · · · · ·		
Temp(C)	SpCon(mS/cm)	TDS(g/L)	Sal(ppt)	pН	Turb(NTU)	%DO
16.6	565	0.3	0.3	8.4	-	

W. 5 (4) 4 (4) 20 (4)	Species	$\mathbf{I}_{Q_{\boldsymbol{y}}}$	Πζ	φ φ	$\mathbf{B} \diamondsuit$	Juv.	Total	
1.) Faxon	his cristivanis			23			24	
2.) Camp	arus hatelieldi	1	2	10			3	
3.)								
4.)								
5.)								

Spacias				Number	of Spec	ies Per S	eine Ha	ul		
Species	1	2	3	4	5 .	6	7	8	9	10
Q. cristivarius	ŀ	ŀ	(l						
C. theepiensis										
C. hatfieldi	Z	į į	ι	.1	2	ع	2	l	1	
C. callainus						,		-		
C. veteranus		-								

Species	Sex	TCL	Species	Sex	TCL	Species	Sex	TCL
							·	
,								
							·	
		:						



Please attach a topographic map identifying survey sites (include photos of sites), photos of specimens.

Also attach any additional comments.

Onto EPA

Qualitative Habitat Evaluation Index and Use Assessment Field Sheet

Stream & Location:	ig Forn -	171001-9		RM:	Date <u>:</u> (10ct 2d/2
River Code: -	STOR	Scorer RET #:	s Full Name & Affiliation: Lat./Long.:2-3 44 วิ	2/81.1	E 6 2 H	Office verified
1] SUBSTRATE Check Cestimate	ONLYTwo substrate: What was a substrate of the substrate	POOD TO STAND THE POOD TO STAND THE POOD TO STAND THE POOD THE POO	Check CORIGIN LIMESTONE [1] LIMESTONE [1]	NE (Or 2 & a	average) QUALI HEAVY [-2 MODERAL FREE [-1] EXTENSIV MODERAT NONE [-1]	7 - 6.5 E [-1] Substrate 0]
quality; 3-Highest quality in	quality; 2-Moderate noderate or greater avell developed rootward [1]	amounts, but not of h amounts (e.g., very la	y small amounts or if more commo ighest quality or in small amounts rge boulders in deep or fast water, or deep, well-defined, functional OXBOWS, BACKWATE AQUATIC MACROPHY LOGS OR WOODY DEE	of highest large Copools. The Copools	Check ONE (Or EXTENSIVE > MODERATE 2 SPARSE 5-<2 NEARLY ABS	2 & average) 75% [11] 25-75% [7] 7 5% [3]
☐ HIGH [4] ☐ EX	LOPMENT CELLENT [7] OD [5] R [3]	E in each category (O. CHANNELIZATION NONE [6] RECOVERED [4] RECOVERING [3] RECENT OR NO REC	ON STABILITY HIGH [3] MÖDERATE [2] LOW [1]	>1.5		Channel 10.5
River right looking downstream EROSION NONE / LITTLE [3] MODERATE [2] HEAVY / SEVERE [1]	RIPARIAN	WIDTH [4]	each category for EACH BANK (O) FLOOD PLAIN QUALI FOREST, SWAMP [3] SHRUB OR OLD FIELD [2] RESIDENTIAL, PARK, NEW FIELD FENCED PASTURE [1] DPEN PASTURE, ROWCROP [0]	TY R CO	ONSERVATION RBAN OR INDI INING / CONST predominant lar m riparian.	JSTRIAL [0] RUCTION [0]
□ 0.7-<1m [4] [RIFFLE / RUN (CHANNEL Check ONE (Or POOL WIDTH > RI POOL WIDTH = RI POOL WIDTH < RI	_ WIDTH - 2 & average) FFLE WIDTH [2] □ FFLE WIDTH [1] □ FFLE WIDTH [0] ■	CURRENT VELOCITY Check ALL that apply TORRENTIAL [-1] SLOW [1] VERY FAST [1] INTERSITI FAST [1] INTERMIT MODERATE [1] EDDIES [1] Indicate for reach - pools and rif	IAL [-1] [ENT [-2]	Recreation Primary C Secondary (circle one and con	Contact Contact
of riffle-obligate s RIFFLE DEPTH ■ BEST AREAS > 10cm [2] □ BEST AREAS 5-10cm [1] □ BEST AREAS < 5cm [metric=0] Comments	pecies: RUN DEPT MAXIMUM > 50 □ MAXIMUM < 50	Check ONE H RIFFLE cm [2] □ STABLE (i cm [1] ■ MOD, STA □ UNSTABL	e.g., Cobble, Boulder) [2] BLE (e.g., Large Gravel) [1] E (e.g., Fine Gravel, Sand) [0]	FLE / RUN	EMBEDDE NE [2] W [1] DERATE [0] TENSIVE [-1]	Riffle /
DRAINAGE AREA	MODERA MODERA	W - LOW [2-4] TE [6-10] ERY HIGH [10-6]	%POOL:(1り) %RUN: (カ <u>ク</u>)	%GLIDE: %RIFFLE:		Gradient Jaximum 10

ioncerns, Access directions, etc. Access directions, etc. Anthrow, Channelle Common	F] MEASUREMENTS X width X depth max. depth X bankfull width bankfull X depth WID ratio bankfull max. depth floodprone x² width entrench ratio Legacy Tree:	
Comment RE: Reach consistency is reach typical of steam? Recreation/Observed - Inferred, Other/Sampling observations, Concerns, Access directions, etc. Large 1. After Conduct Conduction of School and Single Conductions, Cheramy Low benefit to the low of the Conduction of Conduction of Conductions. Law benefit to the low of the Conduction of Conductions.	EJ ISSUES WWTP / CSO / NPDES / INDUSTRY HARDENED / URBAN / DIRT&GRIME CONTAMINATED / LANDFILL BMPS-CONSTRUCTION-SEDIMENT LOGGING / IRRIGATION / COOLING BANK / EROSION / SURFACE FALSE BANK / MANURE / LAGON WASH H20 / TILE / H20 TABLE ACID / MINE / QUARRY / FLOW NATURAL / WETLAND / STAGNANT PARK / GOLF / LAWN / HOME ATMOSPHERE / DATA PAUCITY	
acks to State of the Sampling observations, Condacks of States of Condacks of Sampling observations, Condacks of Condacks of Condacks of Condacks of Condacks.	Circle some & COMMENT N N	
Reach consistency/ Is reach typical of steam?, Recreation/Observed - Inferred, Other/Sampling observations, Caffle conflex; Bould's & Stabs of ony 5:20 Reserved. Bone, Streen infants to confire for conductions.) Social fires (Grey H20 for confert, Not conducted) The Harles of redoctors for the for conducted.	DJ MAINTENANCE PUBLIC / PRIVATE / BOTH / NA ACTIVE / HISTORIC / BOTH / NA YOUNG-SUCCESSION-OLD SPRAY / SNAG / REMOVED MODIFIED / DIPPED OUT / NA LEVEED / ONE SIDED RELOCATED / CUTOFFS MOVING-BEDLOAD-STABLE ARMOURED / SLUMPS ISLANDS / SCOURED IMPOUNDED / DESICCATED	
Comment RE. Reach consistency Is reach typical of steam?, Recreation Obsases of African Contact of Street, Street, Street, Ingares by A Treet, Street,	AESTHETICS ANCE ALGAE SIVE MACROPHYTES SISTURBIDITY DLORATION ALISCUM HEEN HILLITER ANCE ODOR GE DEPOSITS JSSOS/OUTFALLS AREA DEPTH >100ft²□>3ft	
AJ SAMPLED REACH Check ALL that apply METHOD STAGE □ BOAT □ BOAT □ WADE □ LLINE □ OTHER □ ISTANCE □ INSW		Stream Drawing:

Pith weser Railranz Bridge root simpled. Bouldes embed; west in the, possibly howen. Dangerans. Fiches a tem building. No craffish.

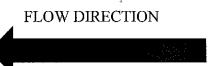
Date: 01 / 001 / 2019 Project Name: 149 701
Stream name: Tug Fork River Collection #: 17001-10 Trib. of: Big SandyRiver Basin: Geographic marker: Clouds H. "Charlie" Spencer Memorial Bridge Town: Herry hull Geographic marker: Clouds H. "Clarke" Spencer Memorial Bridge 0.33 miles (N & E W) of Hemphill Elevation: 1289 Stream Order: 3/4 Road bridge: Hemphill Cryparkld. Specific Location: Tug Fork River at City Park Road Crossing, 0.33 mi Sw of Hemphill, WV Northing: 37.44135 Easting: -81.59977 (NAD83, Zone 17)
Stream Width: 15 m Stream Depth: 0.2-4.0m Total # Seine Hauls: 20 Investigators/Firm: WLU/ Mountain State
_
Collectors: Longhman et. al
Temp(C) SpCon(mS/cm) TDS(g/L) Sal(ppt) pH Turb(NTU) %DO
16.4 0.606 - 0.4 8.34

3.7 3.7	Species	4.	Ιď	II3	φ.	BÇ	Juv.	Total
1.)	C. patveldi		. /	2	8		/	12
2.)	F. cristavarius		1	-	2	_		3
3.)			'					
4.)								
5.)	,							

Species				Number	of Speci	es Per S	eine Hau	d		÷
	1	2	3	4	5	6	7	8	9	10
O. cristivarius		/	/							
C. theepiensis										
C. hatfieldi	/	/	/	/	2	1	1	/	1	/
C. callainus										
C. veteranus										<u> </u>

Species	Sex	TCL	Species	Sex	TCL	Species	Sex	TCL

				:				
					,			,, ,
					:			



OhioEFA

Qualitative Habitat Evaluation Index and Use Assessment Field Sheet

Stream & Location:	170110-10	Jug River		RM:	Date:0	10ct 12017
			s Full Name & Affiliation: Lat./ Long.:27-AA			Office verified
River Code:		RET#:	(NAD 83 - decimal °)	<u>ろ/8</u> L.	<u> </u>	iocation □
DECT TVDEC	te % or note every tyl	HER TYPES HARDPAN [4] DETRITUS [3] MUCK [2] SILT [2] ARTIFICIAL [0] (Score natural substrate [2] sludge from point	ORIGIN LIMESTONE [1] TILLS [1] WETLANDS [0] HARDPAN [0] SANDSTONE [0] ales: ignore RIP/RAP [0]	SILT	average) QUALI QUALI HEAVY [-2 MODERAT NORMAL FREE [1] MEXTENSIV MODERAT NORMAL NONE [1]	2] FE [-1] Substrate [0]
- quality: 3. Highest quality in	quality; z-Moderate n moderate or greater well developed rootw [1] GETATION [1]	amounts, but not of a amounts (e.g., very la ad in deep / fast wate	y small amounts or if more commighest quality or in small amounts arge boulders in deep or fast water, or deep, well-defined, functional OXBOWS, BACKWAT AQUATIC MACROPHY LOGS OR WOODY DE	r, large il pools. [ERS [1] [/TES [1]	Check ONE (O) EXTENSIVE: MODERATE SPARSE 5-< NEARLY ABS	r 2 & average) >75% [11] 25-75% [7] 25% [3]
■ HIGH [4] ■ E □ MODERATE [3] ■ G □ LOW [2] □ F	ELOPMENT XCELLENT[7]	E in each category (C CHANNELIZATI NONE [6] RECOVERED [4] RECOVERING [3] RECENT OR NO RE	ON STABILITY HIGH [3] MODERATE [2		,	Channel Maximum 20
4] BANK EROSION A River right looking downstrea EROSION NONE / LITTLE [3] MODERATE [2] HEAVY / SEVERE [1] Comments	RIPARIAN	N WIDTH [4] □ □ □ □ □ 10-50m [3] ■ □ □ □ 10m [2] □ ■ ROW < 5in [1] □ □	each category for EACH BANK (I FLOOD PLAIN QUAL FOREST, SWAMP [3] SHRUB OR OLD FIELD [2]	.ITY 	CONSERVATIO URBAN OR IND MINING / CONS e predominant la 00m riparian.	DUSTRIAL [0] TRUCTION [0]
5] POOL / GLIDE AN MAXIMUM DEPTH Check ONE (ONLY!) > 1m [6] 0.7<1m [4] 0.4<0.7m [2] 0.2<0.4m [1] <0.2m [0] Comments	CHANNE	EL WIDTH Dr 2 & average) RIFFLE WIDTH [2] RIFFLE WIDTH [1] RIFFLE WIDTH [0]	CURRENT VELOCIT Check ALL that apply TORRENTIAL [-1] SLOW [1 VERY FAST [1] INTERSI FAST [1] INTERMI MODERATE [1] EDDIES Indicate for reach - pools and] TIAL [-1] TTENT [-2] 1]	(circle one and co	Contact y Contact
of riffle-obligate RIFFLE DEPTH ■ BEST AREAS > 10cm [2 □ BEST AREAS 5-10cm [1 □ BEST AREAS < 5cm [metric=0] Comments	species: RUN DEP g MAXIMUM > 5 g MAXIMUM < 5	Check ONE TH RIFFLE i0cm [2] ■ STABLE i0cm [1] □ MOD. ST	e large enough to suppor (Or 2 & average). I / RUN SUBSTRATE RII (e.g., Cobble, Boulder) [2] ABLE (e.g., Large Gravel) [1] LE (e.g., Fine Gravel, Sand) [0]	FFLE / RU	Ation NO IN EMBEDDINONE [2] LOW [1] MODERATE [0] EXTENSIVE [-1]	Riffle /
6] GRADIENT (DRAINAGE AREA	\	OW - LOW [2-4] RATE [6-10] VERY HIGH [10-6]	%POOL:(/5 %RUN: (70) %GLID)%RIFFL		Gradient Maximum 10

directions, etc. 101965 1019	FJ MEASUREMENTS X width X depth max. depth X bankfull width bankfull X depth WID ratio bankfull max. depth filoodprone x² width entrench. ratio
Comment RE. Reach consistency Is reach typical of steam?, Recreation/Observed-Inferred, Other/Sampling observations, Concerns, Access directions, etc. all with base of dept feet. Class, E Compaces cellaine truly defined by the large strained to the large of Real Large, in tiffle, Compaces cellained constants Species. Severy builts entry entry. S'Ither the technology.	EJ ISSUES WWYTP / CSO / NPDES / INDUSTRY HARDENED / URBAN / DIRT&GRIME CONTAMINATED / LANDFILL BMPs.CONSTRUCTION-SEDIMENT LOGGING / IRRIGATION / COOLING BANK / EROSION / SURFACE FALSE BANK / MANURE / LAGOON WASH H20 / TILE / H20 TABLE ACID / MINE / QUARRY / FLOW NATURAL / WETLAND / STAGNANT PARK / GOLF / LAWN / HOME LOG
Class, c. Cer. S. in Fifther. S. 1764.	Cirdle some & COMMENT
They it for with Silvers of Standard Deerve with Silvers of Redders in and the subsection of the subse	DJ MAINTENANĆE PUBLIC / PRIVATE / BOTH / NA ACTIVE / HISTORIC / BOTH / NA YOUNG-SUCCESSION-OLD SPRAY / SNAG / REMOVED MODIFIED / DIPPED OUT / NA LEVEED / ONE SIDED RELOCATED / CUTOFFS MOVING-BEDLOAD-STABLE ARMOURED / SLUMPS ISLANDS / SCOURED IMPOUNDED / DESICCATED
Somment RE. Reach consistency/Is reach typic large well established by the age of the second large should be the second large should be the second large.	BJAESTHETICS NUISANCE ALGAE INVASIVE MACROPHYTES EXCESS TURBIDITY DISCOLORATION FOAM / SCUM OIL SHEEN TRASH / LITTER NUISANCE ODOR SLUDGE DEPOSITS CSOs/SSOs/OUTFALLS ATION AREA DEPTH
AJ SAMPLED REACH Check ALL that apply METHOD STAGE BOAT 1st -semple pass- 2nd WADE DIP DIP CLEINE DIP DISTANCE DISY	0.5 Km

Stream Drawing:

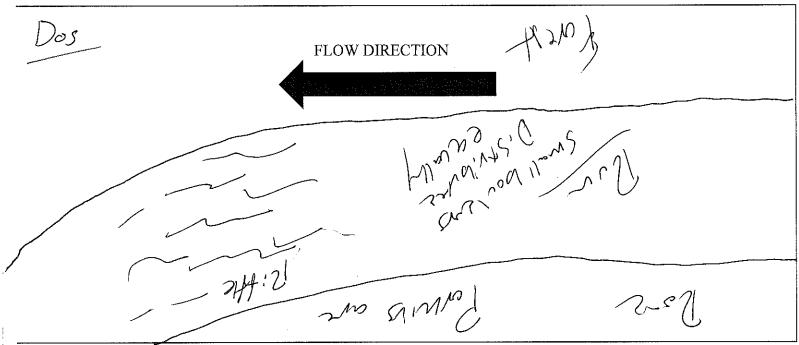
Date: Z / Oct / Zo17 Project Name: Do T - Gilbert
Stream name: Gilbert Croen Collection #: 171002-1
Trib. of: Guyandotte Co: @ Mingo
Town: Gilbyt Geographic marker: Trun full offers Jours to 1802
2.14 miles (NSEW) of Gillow Elevation: 1054 Stream Order: 2/3
Road/bridge: Hynnay 52 Specific Location: Gilbert Oreck 0.2 miles
west of Highway 52 and 2.14 miles North West of Gilbert, WV
Northing: 37.62635 Easting: -8/, 9022/ (NAD83, Zone 17)
Stream Width: 8-10 Stream Depth: 12-15 Total # Seine Hauls: 16
Investigators/Firm: WW MWHain Flate
Collectors: Laughman et all
Temp(C) SpCon(mS/cm) TDS(g/L) Sal(ppt) pH Turb(NTU) %DO
11.9 903 - 0.6 8.20

Species	Ιð	H3 :	Ŷ	BÇ	Juv.	Total
1.) Foxunics CristNess	2		~			Y
2.)						
3.)						
4.)						
5.)						

Species		• • • • • • • • • • • • • • • • • • • •	Agranda A	Number	of Speci	es Per Se	ine Hau	1		
opecies	1	2	3	4	5	6	7	8	9	10
O. cristivarius	1	ı	1	1	412					
C. theepiensis			· ,							
C. hatfieldi										
C. callainus										
C. veteranus										

Species	Sex	TCL	Species	Sex	TCL	Species	Sex	TCL
			·					
			\$ 84.					

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			-					



Please attach a topographic map identifying survey sites (include photos of sites), photos of specimens.

Also attach any additional comments.

Stream & Location:	171002	1 -	Gilbert	L Goon	RM:	Date	2100 2017
			Scorers	Full Name & Af	- 1 - 1	~800	Office verified —
River Code:		TORET #:_		Lat./ Long.: ع (NAD 83 - decimal °)	16/16/2018	4011	location 🗆
	ate % or note ever POOL RIFFLE	y type presen OTHER T' HARDPA DETRITL MUCK [2] SILT [2] ARTIFIC	t YPES POOL IN [4] JS [3] L]	TILLS WETLA HARDF / # SANDS es; ignore RIP/RA -sources) LACUS	1] SILT INDS [0] PAN [0] STONE [0] P [0] TURINE [0] E	QUAL □ HEAVY [MODERA ME NORMAI □ FREE [1	-2] ATE [-1] Substrate [-10] [VE [-2] ATE [-1] Maximum 20
2] INSTREAM COVE quality; 3-Highest quality diameter log that is stable I UNDERCUT BANK I OVERHANGING VI SHALLOWS (IN SL COMMENTS [1] Comments	quality; 2-Mode in moderate or gre , well developed r S [1] EGETATION [1]	erate amounts eater amounts ootwad in dee POOL ROOT	, but not of nig (e.g. very lard	ge boulders in deep of or deep, well-defined OXBOWS, E	aii amounts of nignes or fast water, large		Or 2 & average) E > 75% [11] E 25-75% [7] < 25% [3]
☐ HIGH [4] ☐ II	HOLOGY Check /ELOPMENT EXCELLENT [7] GOOD [5] FAIR [3] POOR [1]	CHANI NONE [6 RECOVE RECOVE	NELIZATIC]	ON STAE ☐ HIGH ☐ MOD ☐ LOW	ERATE [2]		Channel Maximum 20
4] BANK EROSION River right looking downstre EROSION NONE / LITTLE [3] M M MODERATE [2] HEAVY / SEVERE [4]	AM RIPAR RIPAR WIDE > MODER NARRO	IAN WIDTH 50m [4] ATE 10-50m [W 5-10m [2] ARROW < 5m	- R R R R R R R R R	ach category for <i>EAC</i> FLOOD PLAI DREST, SWAMP [3] HRUB OR OLD FIEL ESIDENTIAL, PARK, ENCED PASTURE [1 PEN PASTURE, ROI	N QUALITY D [2] NEW FIELD [1] Indic	nk & average) CONSERVATION URBAN OR IN MINING / CON ate predominant	DUSTRIAL [0] STRUCTION [0]
5] POOL / GLIDE AN MAXIMUM DEPTH Check ONE (ONLY!) □>1m [6] □ 0.7<1m [4] ■ 0.4<0.7m [2] □ 0.2<0.4m [1] □< 0.2m [0] Comments	CHAN	INEL WIDT E (Or 2 & ave I > RIFFLE WI I = RIFFLE WI	`H rage) DTH [2] ☐ : DTH [1] ☐ : DTH [0] [2] :		at apply I SLOW [1] I INTERSTITIAL [-1] I INTERMITTENT [-2 I EDDIES [1]	Primary Seconda (circle one and o	n Potential y Contact ry Contact comment on back) Pool/ Current Maximum 12
Indicate for fund of riffle-obligate RIFFLE DEPTH BEST AREAS > 10cm [BEST AREAS 5-10cm [BEST AREAS < 5cm [metric=	species: RUN D 2] ∰ MAXIMUN 1] ☐ MAXIMUN	EPTH > 50cm [2] < 50cm [1] 	Check ONE (RIFFLE / STABLE (e MOD, STABL UNSTABLE	Or 2 & average). RUN SUBSTRA .g., Cobble, Boulde, BLE (e.g., Large Gra E (e.g., Fine Gravel, S	TE RIFFLE / R r) [2] vel) [1] sand) [0]	UN EMBEDD NONE [2] LOW [1] MODERATE [0] EXTENSIVE [-1	Riffle / 5
6] GRADIENT (DRAINAGE ARE	д 🍱 МО	RY LOW - LOV DERATE [6-10 H - VERY HIG	0]	%POOL %RU N :			Gradient Maximum 10

ass directions, etc.	FJ MEASUREMENTS X width X depth max, depth Pankfull width bankfull X depth W/D ratio bankfull max, depth floodprone x² width entremch, ratio Legacy Tree:
Comment RE. Reach consistency Is reach typical of steam? Recreation/Observed - Inferred, Other/Sampling observations, Concerns, Access directions, etc. USFrequency of mire at first major fife carplex. Scrift preparation of the first major for the fort of the first major fort of the first major fort fort of the first major fort fort fort of the first fort fort fort fort fort fort fort for	EJ ISSUES WWTP / CSO / NPDES / INDUSTRY HARDENED / URBAN / DIRT&GRIME CONTAMINATED / LANDFILL BMPS-CONSTRUCTION-SEDIMENT LOGGING / IRRIGATION / COOLING BANK / EROSION / SURFACE FALSE BANK / MANURE / LAGOON WASH H ₂ D / TILE / H ₂ D TABLE ACID / MINE / QUARRY / FLOW NATURAL / WETLAND / STAGNANT PARK / GOLF / LAWN / HOME ATMOSPHERE / DATA PAUCITY
majer Con Observed - Interred, Other S majer Con Jan Con Jan Con Jan Con	Cirde some & COMMENT
reach typical of steam? Recreating the start of the start	DJ MAINTENANCE PUBLIC / PRIVATE / BOTH / NA ACTIVE / HISTORIC / BOTH / NA YOUNG-SUCCESSION-OLD SPRAY / SNAG / REMOVED MODIFIED / DIPPED OUT / NA LEVEED / ONE SIDED RELOCATED / CUTOFFS MOVING-BEDLOAD-STABLE ARMOURED / SLUMPS ISLANDS / SCOURED IMPOUNDED / DESICCATED FLOOD CONTROL / DRAINAGE
Comment RE: Reach consistency Is reach type USFreum Of Wire Lot Stabe 2 Auto Se 2 And Commen Commen Acion P.	ARITY BJAESTHETICS DISOLOGE DEBOTH BINNASIVE MACROPHYTES COUNTY COUNTY HI DEPTH COUNTY COUNTY COUNTY HI DEPTH COUNTY COUN
AJ SAMPLED REACH Check ALL that apply Check ALL that apply METHOD STAGE BOAT 1st-sample pass-2nd Wab HiGH UP UP UP CHINE UP UP UP UP UP UP UP U	0.5 Km

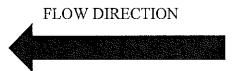
Stream Drawing:

Date: 2 / Oct / 2017 Project Name: Dot - Gilms
Stream name: 67164 Creek Collection #: 171002-2
Trib. of: Guyandotte River Basin: Gyyandotte Co: Mingo
Town: Geographic marker: Promise Christian Fellowship Church
Elevation: 957 Stream Order: 2/3
Road/bridge: Highway 52 Specific Location: Gilbert Creek at Provise Christian Fellowshif Christ, 1.55 mi NW of Gilbert
Promise Christian Fellowship Church, 1.55 mi NW of Gilbert
Northing: 37. 62336 Easting: -8/. 89825 (NAD83, Zone 17)
Stream Width: 3-5 Stream Depth: 12-15 Total # Seine Hauls: 16
Investigators/Firm: WW/Mountain Pale
Collectors: Lavannan et all
Temp(C) SpCon(mS/cm) TDS(g/L) Sal(ppt) pH Turb(NTU) %DO
12.0 976 - 8.34

Species	\mathbf{I}	. II♂	×. 4	B♀	Juv.	Total
1.) Paxonius enstavajus	2		3-6			5
2.)	i					
3.)						
4.)						
5.)						

Species		表127 · 写象	1	lumber	of Speci	es Per Se	ine Hau	I	tega († 1843) 1	Bagger (17)
	1	2	3	4	5	6	7	8	9	10
O. cristivarius	1	l			1	Pno	+10			
C. theepiensis									·	
C. hatfieldi										
C. callainus										
C. veteranus										

Species	Sex	TCL	Species	Sex	TCL	Species	Sex	TCL
					,			,
			<u> </u>			er Ça		
						<u></u>		
								:
						\(\frac{1}{4}\)		
		<u></u>	*					





QHEI Score:	(64)
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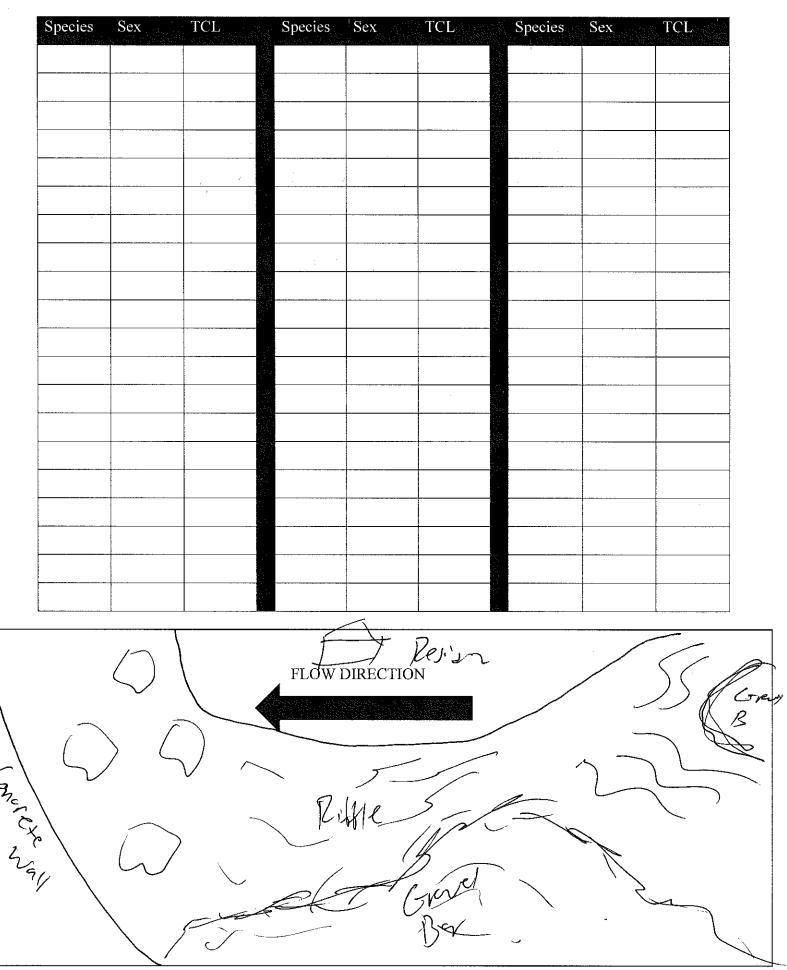
Stream & Location: 171002-2 - Gilber Creek RM: Date:	/
Scorers Full Name & Affiliation:	
	rerified ocation
1] SUBSTRATE Check ONLY Two substrate TYPE BOXES; estimate % or note every type present BEST TYPES POOL RIFFLE HARDPAN [4]	Substrate 15 Maximum 20
2] INSTREAM COVER Indicate presence 0 to 3: 0-Absent; 1-Very small amounts or if more common of marginal quality; 2-Moderate amounts, but not of highest quality or in small amounts of highest quality; 3-Highest quality in moderate or greater amounts (e.g., very large boulders in deep or fast water, large diameter log that is stable, well developed rootwad in deep / fast water, or deep, well-defined, functional pools. UNDERCUT BANKS [1]] 7]
3] CHANNEL MORPHOLOGY Check ONE in each category (Or 2 & average) SINUOSITY DEVELOPMENT CHANNELIZATION STABILITY HIGH [4] EXCELLENT [7] NONE [6] HIGH [3] MODERATE [3] GOOD [5] RECOVERED [4] MODERATE [2] LOW [2] FAIR [3] RECOVERING [3] LOW [1] Channel Maximum Comments	
4] BANK EROSION AND RIPARIAN ZONE Check ONE in each category for EACH BANK (Or 2 per bank & average) River right looking downstream RIPARIAN WIDTH FLOOD PLAIN QUALITY REROSION	N [0] N [0]
Solution Pool Fast [1] Pool	t ct
Indicate for functional riffles; Best areas must be large enough to support a population of riffle-obligate species: RIFFLE DEPTH RUN DEPTH RIFFLE / RUN SUBSTRATE RIFFLE / RUN EMBEDDEDNESS BEST AREAS > 10cm [2] MAXIMUM > 50cm [2] STABLE (e.g., Cobble, Boulder) [2] NONE [2] BEST AREAS 5-10cm [1] MOD, STABLE (e.g., Large Gravel) [1] LOW [1] BEST AREAS < 5cm Number of Maximum (metric=0) Riffle / Run (metric=0) Run (metric	
DRAINAGE AREA (mi²) HIGH - VERY HIGH [10-6] WPOOL: (15) %GLIDE: Gradient Maximum 10	

ss directions, etc.	·			FJ MEASUREMENTS X width X depth max. depth X bankfull width bankfull X depth WID: ratio bankfull max. depth floodprone x² width entrench. ratio Legacy Tree:	
typical of steam?, <i>Recreation</i> / Observed - Inferred, <i>Other</i> / Sampling observations, Concerns, Access directions, etc. (1716-1718-1718-1718-1718-1718-1718-1718-				WWTP / CSO / NPDES / INDUSTRY HARDENED / URBAN / DIRT&GRIME CONTAMINATED / LANDFILL BMPs-CONSTRUCTION-SEDIMENT LOGGING / IRRIGATION / COOLING BANK / EROSION / SURFACE FALSE BANK / MANURE / LAGOON WASH H ₂ 0 / TILE / H ₂ 0 TABLE ACID / MINE / QUARRY / FLOW NATURAL / WETLAND / STAGNANT PARK / GOLF / LAWN / HOME ATMOSPHERE / DATA PAUCITY	
f steam?, Recreation/ Observed - Inferred, Other/ Sampling obset H. & L. Con. 2, con. 1. (2.17-1-14/9 co.				Circle some & COMMENT	
//Is reach typical of steam?, <i>Recreation</i> } なんし、 んんしん。	,			DJ MAINTENANCE PUBLIC / PRIVATE / BOTH / NA ACTIVE / HISTORIC / BOTH / NA YOUNG-SUCCESSION-OLD SPRAY / SNAG / REMOVED MODIFIED / DIPPED OUT / NA LEVEED / ONE SIDED RELOCATED / CUTOFFS MOVING-BEDLOAD-STABLE ARMOURED / SLUMPS ISLANDS / SCOURED IMPOUNDED / DESICCATED FLOOD CONTROL / DRAINAGE	
Comment RE: Reach consistency/ Is reach	10			ARITY BJAESTHETICS Ple pass-2nd NUISANCE ALGAE m	
AJ SAMPLED REACH Check All that apply	D STAGE	BOAT WADE UNADE UNADE NORMAL NORMAL	DISTANCE DRY	0.5 Km	Stream Drawing:

Date: Z / OCt / Zo 17 Project Name: Do T- Gilbert
Stream name: Gilbert Creek Collection #: 17/002-3
Trib. of: Guyandolle River Basin: Guyandolle Co: Mino
Town: Gilbert on US-52
Town: Gilbert Geographic marker: Sign for the town of Gilbert on US-52 12 miles (DSEW) of Gilbert Elevation: 914 Stream Order: 2/3
Road/bridge: <u>US 57</u> Specific Location: <u>Unlust Waren at</u>
Wilbert Sign on USSZ., 1.2 mi NW of Gilbert
Northing: 37.62016 Easting: -91.88715 (NAD83, Zone 17)
Stream Width: Stream Depth: Total # Seine Hauls: 16
Investigators/Firm: WWW MWW Age
Collectors: Loughwan et 91
Temp(C) SpCon(mS/cm) TDS(g/L) Sal(ppt) pH Turb(NTU) %DO
11.8 968 - 0.7 8.7

Species	Ιď	IJ♂	Ŷ.	B♀	Juv.	Total
1.) Poronius Crskiverius			1		***	1
2.)						
3.)				-		
4.)						
5.)						

Species	Number of Species Per Seine Haul									
Species	1	2	3	4	5	6	7	8	9	10
O. cristivarius		F15								
C. theepiensis										
C. hatfieldi				:						
C. callainus										
C. veteranus										



Please attach a topographic map identifying survey sites (include photos of sites), photos of specimens.

Also attach any additional comments.

ChieEPA

Qualitative Habitat Evaluation Index and Use Assessment Field Sheet

Stream & Location:	Gilbert Cleck	(-#3	<i>RM:</i>	Date: 2 Oct 2017
17 10 02-3		Scorers Full Name & Affil	liation:	
River Code:	STORET#:	Lat./ Long. 131	-6201 181 BE	Office verified location
BEST TYPES BEST TYPES BEST TYPES BEST TYPES BEDWARD [6] GRAVEL [7] SAND [6] BEDROCK [5] NUMBER OF BEST Comments		ORIGINAL COAL FIFE	ONE [1] DS [0] N [0] ONE [0] JRINE [0] NES [-2]	Age) QUALITY HEAVY [-2] 7 MODERATE [-1] NORMAL [0] FREE [1] EXTENSIVE [-2] MODERATE [-1] NORMAL [0] NONE [1]
guality: 3-Highest quality	in moderate or greater amounts (e. s, well developed rootwad in deep / S [1]	ut not of highest quality or in small g., very large boulders in deep or t fast water, or deep, well-defined, the community of the community o	amounts of highest fast water, large functional pools. CKWATERS [1] MOCROPHYTES [1] SP/	AMOUNT k ONE (Or 2 & average) TENSIVE > 75% [11] DERATE 25-75% [7] ARSE 5-<25% [3] ARLY ABSENT < 5% [1] Cover Maximum 20
SINUOSITY DEN	EXCELLENT [7] NONE [6] GOOD [5] RECOVERI FAIR [3] RECOVERI	ELIZATION STABII	3] RATE [2]	Channel II.5
4] BANK EROSION River right looking downstre EROSION NONE / LITTLE [3] M MODERATE [2] HEAVY / SEVERE [4] Comments		FLOOD PLAIN R FOREST, SWAMP [3] SHRUB OR OLD FIELD RESIDENTIAL, PARK, NE	QUALITY CONS [2] URBA EW FIELD [1] UNININ	ERVATION TILLAGE [1] IN OR INDUSTRIAL [0] G / CONSTRUCTION [0] cominant land use(s)
5] POOL / GLIDE AN MAXIMUM DEPTH Check ONE (ONLY!) > 1m [6] 0.7-<1m [4] 0.4-<0.7m [2] 0.2-<0.4m [1] < 0.2m [0] Comments	MD RIFFLE / RUN QUALITY I CHANNEL WIDTH Check ONE (Or 2 & average POOL WIDTH > RIFFLE WIDT POOL WIDTH = RIFFLE WIDT POOL WIDTH < RIFFLE WIDT	CURRENT VEL (re) Check ALL that H [2] TORRENTIAL [-1] M S H [1] VERY FAST [1] UII	apply SLOW [1] NTERSTITIAL [-1] NTERMITTENT [-2] DDIES [1]	Creation Potential Primary Contact Condary Contact le one and comment on back) Pool / Current Maximum 12
Indicate for fund of riffle-obligate RIFFLE DEPTH BESTAREAS > 10cm [BESTAREAS 5-10cm [BESTAREAS < 5cm [metric=text]	RUN DEPTH [2]	nust be large enough to s eck ONE (<i>Or 2 & average</i>). RIFFLE / RUN SUBSTRATI STABLE (e.g., Cobble, Boulder) I MOD. STABLE (e.g., Large Grave JNSTABLE (e.g., Fine Gravel, Sar	E RIFFLE / RUN EN [2]	□NO RIFFLE [metric=0] MBEDDEDNESS [2]
6] GRADIENT (DRAINAGE AREA	ft/mi)	751 002.	() %GLIDE:	Gradient 7

2 2	ENTS m n
ons, etc.	FJ MEASUREMENTS x̄ width x̄ depth max. depth bankfull width bankfull x̄ depth WiD ratio bankfull max. depth floodprone x² width entrench. ratio Legacy Tree:
SANT Sess direction of the sess direction of	FJ MEASURE X width X depth max. depth X bankfull width bankfull X dept WID ratio bankfull max. c floodprone x², entrench, ratio Legacy Tree:
Comment RE: Reach consistency Is reach typical of steam? Recreation/Observed - Inferred, Other/Sampling observations, Concerns, Access directions, etc. New Interest, Many experience of Jange Colobbes of Manch Mon-existing. Neverty, MII compacts of Jange Colobbes of Manka Solor Forth Day also also present. Park Day also also present of the ext site.	WWTP / CSO / NPDES / INDUSTRY HARDENED / URBAN / DIRT&GRIME CONTAMINATED / LANDFILL BMPs-CONSTRUCTION-SEDIMENT LOGGING / IRRIGATION / COOLING BANK / EROSION / SURFACE FALSE BANK / MANURE / LAGOON WASH H ₂ 0 / TILE / H ₂ 0 TABLE ACID / MINE / QUARRY / FLOW NATURAL / WETLAND / STAGNANT PARK / GOLF / LAWN / HOME ATMOSPHERE / DATA PAUCITY
ch Mo	EJ ISSUES MTP / CSO / NPDES / INDUSTF RDENED / URBAN / DIRT&GRIN CONTAMINATED / LANDFILL IPS-CONSTRUCTION-SEDIMEI GGING / IRRIGATION / COOLIN BANK / EROSION / SURFACE LSE BANK / MANURE / LAGOC WASH H ₂ 0 / TILE / H ₂ 0 TABLE ACID / MINE / QUARRY / FLOW ATURAL / WETLAND / STAGNAI PARK / GOLF / LAWN / HOME ATMOSPHERE / DATA PAUCITY
Expose Mc	WWTP / CSO / NPDES / INDUSTRY HARDENED / URBAN / DIRT&GRIME CONTAMINATED / LANDFILL BMPs-CONSTRUCTION-SEDIMENT LOGGING / IRRIGATION / COOLING BANK / EROSION / SURFACE FALSE BANK / MANURE / LAGOON WASH H ₂ 0 / TILE / H ₂ 0 TABLE ACID / MINE / QUARRY / FLOW NATURAL / WETLAND / STAGNANT PARK / GOLF / LAWN / HOME ATMOSPHERE / DATA PAUCITY
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red - Inferred - Inferred - Post Land	Circle some & COMMENT
tion/ Observ	Ordes
The Secretary Recreaments of the Secretary Sec	DJ MAINTENANCE PUBLIC / PRIVATE / BOTH / NA ACTIVE / HISTORIC / BOTH / NA YOUNG-SUCCESSION-OLD SPRAY / SNAG / REMOVED MODIFIED / DIPPED OUT / NA LEVEED / ONE SIDED RELOCATED / CUTOFFS MOVING-BEDLOAD-STABLE ARMOURED / SLUMPS ISLANDS / SCOURED IMPOUNDED / DESICCATED FLOOD CONTROL / DRAINAGE
pical of stea	1 4 E 0 2 0 - 2 2 5 5 6 6 7 1
Compacing	
consistency	t
opment RE: Reach consistency Is reach by levy 1, 7the compact Mesery 1, 11 compact also present to the sample of t	BJAESTHETICS □ NUISANCE ALGAE □ INVASIVE MACROPHYTES □ EXCESS TURBIDITY □ DISCOLORATION □ FOAM / SCUM □ OIL SHEEN □ OIL SHEEN □ NUISANCE ODOR □ SLUDGE DEPOSITS □ SLUDGE DEPOSITS □ CSOS/SSOS/OUTFALLS ATION AREA DEPTH
Jueres San	A COC.
REACH that apply STAGE STAGE Ist -sample pass-2nd HIGH UP	CLARITY
AMPLED REACH Check ALL that apply HOD STAG AT 1st -sample po DE □ HIGH LINE □ NORM HER □ LOW	C C C C C C C C C C C C C C C C C C C
AJ SAMPLED REACH Check ALL that apply METHOD STAG DOAT 1st sample pa WADE DIFINE CHINE DORMA DISTANCE	0.5 Km 1st 0.15 Km 0.15 Km 0.15 Km 0.15 Km 0.12 Km 0.12 Km 0.12 Km 0.12 Km 0.12 Km 0.14 Km 0.15 Km 0.14 Km 0.14 Km 0.14 Km 0.15 Km 0.14 Km 0.15 Km 0.1

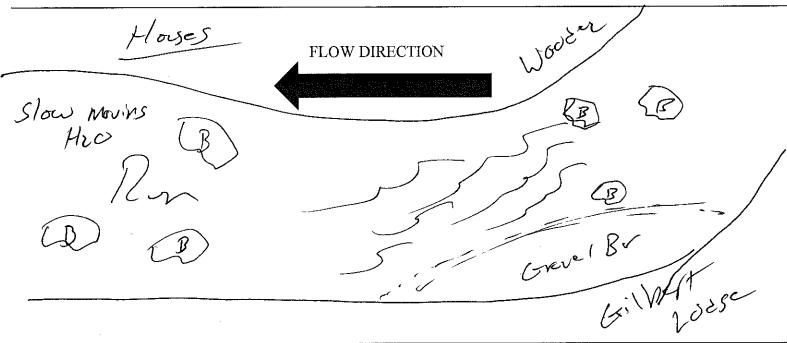
Stream Drawing:

Date: 7 / Oct / 2017 Project Name: Gilbyt Chern - Dot
Stream name: Gilbert Creen Collection #: 171002-4
Trib. of: Guymoble River Basin: Guyan dote River Co: Mingo
Town: Geographic marker: Tillet Loge
O. Timiles (D S E W) of Gilbert Elevation: 480 Stream Order; 2/3
Road bridge: Harwy 52 Elevation: 980 Stream Order: 2/3 Specific Location: Gibert Creek 0.5 miles
from the traintracks and 0.87 miles NW of Gilbert, WV
Northing: 37, 61429 Easting: -81.8828 (NAD83, Zone 17)
Stream Width: 4 · Ww Stream Depth: 12 - · 4 Total # Seine Hauls: 16
Investigators/Firm: WLW/ Mountain Rate
Collectors: Laughman et all
Temp(C) SpCon(mS/cm) TDS(g/L) Sal(ppt) pH Turb(NTU) %DO
12.1 967 - 16 8.36

Species	I 3'	IIđ	φ.	B♀	Juv.	Total
1.) Forcenius cysfivolius	 .		7			2
2.)					:	
3.)						
4.)					:	
5.)					i	

Species	Number of Species Per Seine Haul										
- Species	1	2	3	4	5	6	7	8	9	10	
O. cristivarius	1 .	Ì	+14								
C. theepiensis											
C. hatfieldi											
C. callainus											
C. veteranus											

Species	Sex	TCL	Species	Sex	TCL	Species	Sex	TCL
						£		
						: :: :: :: :: :: :: :: :: ::		
						:		
		j.				<u></u> 34.		
-								
		-						
			:					
			·					



Please attach a topographic map identifying survey sites (include photos of sites), photos of specimens.

Also attach any additional comments.

ChioEFA

Qualitative Habitat Evaluation Index and Use Assessment Field Sheet

QHEI Score: 64.5

Stream & Location: いんりつ	L-4-Gilbert	- Coel	RM:	Date:2_	Off zer
River Code:	Scorer STORET #:	s Full Name & Affiliation: Lat./Long.:スコーム』 ⊼	2 /81 .8	5 8 29	Office verified
1] SUBSTRATE Check ONLYTwo sestimate % or note BEST TYPES POOL RIFFLE BLDR /SLABS [10] BOULDER [9] COBBLE [8] GRAVEL [7] SAND [6] BEDROCK [5] NUMBER OF BEST TYPES:	ubstrate TYPE BOXES; every type present	ORIGIN UMESTONE [1] TILLS [1] WETLANDS [0] HARDPAN [0] SANDSTONE [0] RIP/RAP [0]	SILT		[-1] Substrate
2] INSTREAM COVER Indicate proquality; 3-Highest quality in moderate or diameter log that is stable, well develop UNDERCUT BANKS [1] OVERHANGING VEGETATION [1] SHALLOWS (IN SLOW WATER) ROOTMATS [1] Comments	r greater amounts, but not of nor greater amounts (e.g., very laged rootwad in deep / fast wate POOLS > 70cm [2 D ROOTWADS [1]	lighest quality or in small amounts irge boulders in deep or fast water	of highest C large C pools.		\$ average) % [11] 75% [7] 6 [3]
3] CHANNEL MORPHOLOGY CI SINUOSITY DEVELOPMEN HIGH [4]	IT CHANNELIZATI	ON STABILITY HIGH [3] MODERATE [2] LOW [1]			annel
EROSION WIDI	ARIAN WIDTH E > 50m [4]	each category for EACH BANK (O. FLOOD PLAIN QUALI' FOREST, SWAMP [3] SHRUB OR OLD FIELD [2] RESIDENTIAL, PARK, NEW FIELD ENCED PASTURE [1] DPEN PASTURE, ROWCROP [0]	TY	DNSERVATION T RBAN OR INDUS NING / CONSTRI predominant land on riparian. Rip	TRIAL [0] JCTION [0]
Check ONE (O <i>NLY!</i>) Check □ > 1m [6] □ POOL WI □ 0.7-<1m [4] ■ POOL WI	ANNEL WIDTH ONE (Or 2 & average) DTH > RIFFLE WIDTH [2] DTH = RIFFLE WIDTH [1] DTH < RIFFLE WIDTH [0]	CURRENT VELOCITY Check ALL that apply TORRENTIAL [-1] SSLOW [1] VERY FAST [1] INTERSTIF FAST [1] INTERMIT MODERATE [1] EDDIES [1] Indicate for reach - pools and rin	FIAL [-1] TENT [-2]]	Cı	ntact Contact
☐ BEST AREAS > 10cm [2] ☐ MAXIN ☐ BEST AREAS 5-10cm [1] ☐ MAXIN ☐ BEST AREAS < 5cm	Check ONE I DEPTH RIFFLE IUM > 50cm [2] STABLE (IUM < 50cm [1] MOD. STA	(Or 2 & average). / RUN SUBSTRATE RIFI e.g., Cobble, Boulder) [2]	FLE / RUN	<u>⊔NORIFI</u> EMBEDDEDI NE [2] W [1]	FLE [metric=0] NESS
DRAINAGE AREA	VERY LOW - LOW [2-4] MODERATE [6-10] HIGH - VERY HIGH [10-6]	%POOL: () %RUN: (% 2)	%GLIDE:(%RIFFLE:(>	adient

directions, etc. dry children dry children dry long	FJ MEASUREMENTS X width X depth max. depth X bankfull width bankfull X depth bankfull max. depth floodprone x² width entrench. ratio Legacy Tree:
Comment RE: Reach consistency/ Is reach typical of steam?, Recreation/ Observed - Inferred, Other/Sampling observations, Concerns, Access directions, etc. Sent days been new - Recreation/ Observed - Inferred of Servery of Carlos of Car	WWTP / CSO / NPDES / INDUSTRY HARDENED / URBAN / DIRT&GRIME CONTAMINATED / LANDFILL BMPS-CONSTRUCTION-SEDIMENT LOGGING / IRRIGATION / COOLING BANK / EROSION / SURFACE FALSE BANK / MANURE / LAGOON WASH H ₂ 0 / TILE / H ₂ 0 TABLE ACID / MINE / QUARRY / FLOW NATURAL / WETLAND / STAGNANT PARK / GOLF / LAWN / HOME LAMOSPHERE / DATA PAUCITY
on/Observed - Inferred, Other/SE For in 1/1/5. P. 1/2 Fren, I forfact Still high. Ce Soom of	Cirde some & COMMENT
stency Is reach typical of steam?, Recreation Observed - Inferred, seek press - Record - Compared of Lucy - Positor that they prove the Constant of Lucy - Positor that they have the Constant of the Constant	DJ MAINTENANCE PUBLIC / PRIVATE / BOTH / NA ACTIVE / HISTORIC / BOTH / NA YOUNG-SUCCESSION-OLD SPRAY / SNAG / REMOVED MODIFIED / DIPPED OUT / NA LEVEED / ONE SIDED RELOCATED / CUTOFFS MOVING-BEDLOAD-STABLE ARMOURED / SLUMPS ISLANDS / SCOURED IMPOUNDED / DESICCATED FLOOD CONTROL / DRAINAGE
South RE: Reach consistency Is reached the Control of the Control of Control	ARITY BJAESTHETICS Step pass-2nd NUISANCE ALGAE INVASIVE MACROPHYTES Step EXCESS TURBIDITY CM EXCESS TU
AJ SAMPLED REACH Check ALL that apply METHOD STAGE WADE ULINE ULINE CHINE CHIN	0.5 Km CLARITY 0.2 Km 1st -sample pass-2nd 0.15 Km 0.15 Km 0.12 Cm 0.12 0.1

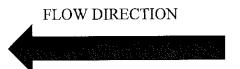
Stream Drawing:

Date: 2 10ct 17017 Project Name: DOT-Gilbert C.
Stream name: Gilbert Creek Collection #: 17/002-5
Trib. of: 6 yandofe River Basin: 6 yandofte Co: MINOO
Town: Cilbert Geographic marker: Devil Anse Trail house
Road/bridge: US 52 Specific Location: Gilbert Creek et
Davil Anse Trailhouse office in Gilbert
Northing: <u>37.6/064</u> Easting: <u>-8/.87806</u> (NAD83, Zone 17)
Stream Width: 12 m Stream Depth: 12 Total # Seine Hauls: 16
Investigators/Firm: WLU/Morriain Stee
Collectors: Loughmen et al.
Temp(C) SpCon(mS/cm) TDS(g/L) Sal(ppt) pH Turb(NTU) %DO
12.4 962 — 16 8.38 — —

Species	I♂	II.	₽	B₽	Juv.	Total
2.) Cambang theepers-s	1		1			2
2.) Cambang theeperss		-	1	-		1
3.)						
4.)						
5.)						

Species		Number of Species Per Seine Haul									
`	1	2	3	4	5	6	7	8	9	10	
O. cristivarius	1	1									
C. theepiensis	1 doc	<i>415</i>									
C. hatfieldi				4							
C. callainus											
C. veteranus											

Species	Sex	TCL	Species	Sex	TCL	Species	Sex	TCL
					15. 10. 14.			
					14 (14 (14 (14 (14 (14 (14 (14 (14 (14 (
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ChioEPA

Qualitative Habitat Evaluation Index and Use Assessment Field Sheet

QHEI Score: 63.5

Stream & Location:	Gilbert Croen	1-171002-5	RM:	Date: 2 소년 구석 7
		_Scorers Full Name	e & Affiliation:	
River Code:	STORET #:_	Lat./ Lon	9:37.6106/81	. 8780 Office verified location □
1] SUBSTRATE Cher estin BEST TYPES		PES POOL RIFFLE LES [3] LES [3	Check ONE (Or 2: ORIGIN IMESTONE [1] FILLS [1] WETLANDS [0] HARDPAN [0] SANDSTONE [0] FIP/RAP [0] CACUSTURINE [0]	QUALITY HEAVY [-2] MODERATE [-1] NORMAL [0] 0,5 FREE [1] EXTENSIVE [-2] MODERATE [-1] NORMAL [0] NONE [1]
Comments	□ 3 or less [0]		SUAL FINES [-2]	
quality: 3-Highest quality	EGETATION [1]/_ ROOTV	but not of highest quality or e.g., very large boulders in / fast water, or deep, well- > 70cm [2]	r in small amounts of highest deep or fast water, large defined, functional pools. DWS, BACKWATERS [1]	AMOUNT Check ONE (Or 2 & average) EXTENSIVE > 75% [11] MODERATE 25-75% [7] SPARSE 5-<25% [3] NEARLY ABSENT < 5% [1] Cover Maximum 20
	HOLOGY Check ONE in each o			
☐ HIGH [4] ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐	EXCELLENT [7] NONE [6] GOOD [5]	RED [4]	STABILITY HIGH [3] MODERATE [2] LOW [1]	Channel Maximum 20
River right looking downstrum REROSION NONE / LITTLE [3] MODERATE [2] > 2	R	FLOOD R FOREST, SWAN SHUB OR OLD RESIDENTIAL F	PLAIN QUALITY IP [3] D FIELD [2] PARK, NEW FIELD [1] JRE [1] Indica	conservation tillage [1] URBAN OR INDUSTRIAL [0] MINING / CONSTRUCTION [0] te predominant land use(s) 00m riparian. Riparian Maximum
				10 10
5] POOL / GLIDE AN MAXIMUM DEPTH Check ONE (ONLY!) > 1m [6] 0.7-<1m [4] 0.4-<0.7m [2] 0.2-<0.4m [1] < 0.2m [0] Comments	ND RIFFLE / RUN QUALIT I CHANNEL WIDTH Check ONE (Or 2 & avera □ POOL WIDTH > RIFFLE WID ■ POOL WIDTH < RIFFLE WID □ POOL WIDTH < RIFFLE WID	CURREI ge) Check TH [2] TORRENTIAL TH [1] VERY FAST [1] TH [0] FAST [1] MODERATE [1		Recreation Potential Primary Contact Secondary Contact (circle one and comment on back) Pool/ Current Maximum 12
Indicate for fund of riffle-obligate RIFFLE DEPTH BESTAREAS > 10cm [BESTAREAS 5-10cm [BESTAREAS < 5cm [metric=	RUN DEPTH 2] ■ MAXIMUM > 50cm [2] □ 1] □ MAXIMUM < 50cm [1] ■	heck ONE (Or 2 & average RIFFLE / RUN SUBS STABLE (e.g., Cobble, Be	o). STRATE RIFFLE / RU oulder) [2] □ I je Gravel) [1] □ I avel, Sand) [0] ■ I	
6] GRADIENT (DRAINAGE AREA (ft/mi)	,,,	POOL: ZO %GLID RUN: YO %RIFFL	

coess directions, etc. C/LC/C Caubas lu-e cob/horkes	FJ MEASUREMENTS X width X depth max. depth S bankfull width bankfull X depth WID ratio bankfull max. depth floodprone X width entrench, ratio Legacy Tree:	
ampling observations, Concerns, And Lother Concerns	EJ ISSUES WWTP / CSO / NPDES / INDUSTRY HARDENED / URBAN / DIRT&GRIME CONTAMINATED / LANDFILL BMPS-CONSTRUCTION-SEDIMENT LOGGING / IRRIGATION / COOLING BANK / EROSION / SURFACE FALSE BANK / MANURE / LAGOON WASH H ₂ 0 / TILE / H ₂ 0 TABLE ACID / MINE / QUARRY / FLOW NATURAL / WETLAND / STAGNANT PARK / GOLF / LAWN / HOME ATMOSPHERE / DATA PAUCITY	
Recreation/Observed - Inferred, Other/S or fire 57, Chemiz - EVIOS 5, RES - Se Murt - Sunfled	Circle some & COMMENT	
sistency is reach typical of steam?, Recreation/Observed - Inferred Learn 1 Strange from Learn 1 Strange Syltem Sources - Inferred Lower 1 Strange Syltem 1 Str	DJ MAINTENÁNCE PUBLIC / PRIVATE / BOTH / NA ACTIVE / HISTORIC / BOTH / NA YOUNG-SUCCESSION-OLD SPRAY / SNAG / REMOVED MODIFIED / DIPPED OUT / NA LEVEED / ONE SIDED RELOCATED / CUTOFFS MOVING-BEDLOAD-STABLE ARMOURED / SLUMPS ISLANDS / SCOURED IMPOUNDED / DESICCATED FLOOD CONTROL / DRAINAGE	
Comment RE: Reach consistency Is They show the text to text She diet to text Courtes and text Cour	BJAESTHET BJAESTHET INVASIVE MACRC EXCESS TURBID EXCESS TURBID DISCOLORATION FOAM / SCUM OIL SHEEN OIL SHEEN TRASH / LITTER INUISANCE ODOR SLUDGE DEPOSI SOS/SSOS/OUT	,
AJ SAMPLED REACH Check ALL that apply METHOD STAGE BOAT 1st -sample pass-2nd WADE HIGH L LINE UP CTHER LOW DISTANCE LOW	0.5 Km	

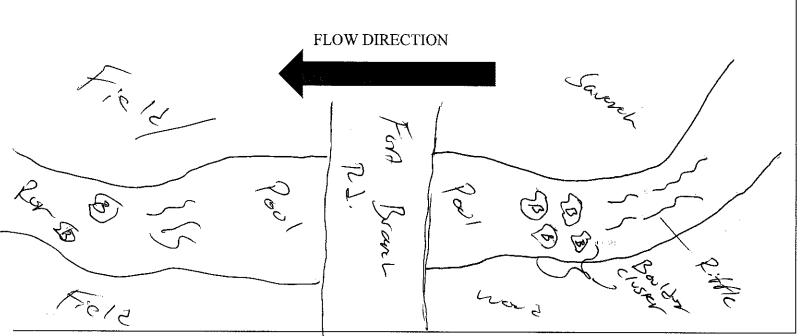
Indian Creek Data

Date: 30 / Seft. / 2017 Project Name: DoT-Indian Creek
Stream name: Indian CfccH- Has H20 Collection #: 170930-1
Trib. of: Gyand offe River Basin: Gyandoffe Co: Wyoming
Town: Fort Brench Geographic marker: Fort Bronch Pol Crossing
miles (N-S-E-W) of Fat Bi. Rs. Cas. Elevation: 1654 Stream Order: 2
Road/bridge: Fort Branch Rd. Specific Location: Indian Creen of
Fort Branch at Fort Branch Rd crossing, 3.67 mi N of Carswell, W
Northing: 37. 49042 Easting: - 81. 52083 (NAD83, Zone 17)
Stream Width: Z-5m Stream Depth: ,23 m Total # Seine Hauls: 16
Investigators/Firm: WLU/Mountain State
Collectors: Z. Layshmen, T. Khan, E. Delende, C. Vopel, A. Sylles
Temp(C) SpCon(mS/cm) TDS(g/L) Sal(ppt) pH Turb(NTU) %DO
10.6 548 - 0.4 8.43

Species	$\mathbf{I}_{\mathbb{Q}_p}$	ПÇ	<u> </u>	B♀	Juv.	Total
1.) Cambarus therpiensis	l	Z9	43		18	91
2.)						
3.)						
4.)						
5.) Campans Jubius bollows						

C	Number of Species Per Seine Haul									
Species	1	2	3	4	5	6	7	8	. 9	10
Object to the	» Y	6	6	14	D	8	7	. /	4	4
C. theepiensis	75	Ч	8	5	>	3				
C. hatfieldi	oul C. theep									
C. callainus										
C. veteranus			l							

Species	Sex	TCL	Species	Sex	TCL	Species	Sex	TCL
	1							
		4						
			· · · · · · · · · · · · · · · · · · ·		, .	:		
A15.11								
	-							
						-11-23-2-11000-1		



Please attach a topographic map identifying survey sites (include photos of sites), photos of specimens.

Also attach any additional comments.





	16	
ore:		The state of the s

Stream & Location:	170930	-1 = Indi	en Cite	en Hand	Pho RM:	Date	<u> 3019_12017</u>
		Sco	rers Full N	ame & Affilia	tion:		Office verified —
River Code:		TORET #:	Lat./. (NAD 83	Long.: 37 .4	<u> 19042 /8</u>	1.52083	location
1] SUBSTRATE Check	c <i>ONLY</i> Two substate % or note eve	trate TYPE BOXES;		C	Check ONE (O	r 2 & average)	•
DEAT TYPES	POOL RIFFLE	OTUED TYPES	OOL RIFFLE	ORIGII	N	QUAL	
☐ ☐ BLDR /SLABS [10]] HARDPAN [4] _		LIMESTON	E[1]	☐ HEAVY [-2] ATE [-1] Substrate
BOULDER [9]]		☐ TILLS [1] ☐ WETLANDS	S [0] SI	LT NORMAL	
GRAVEL [7]] [] SILT [2] _	二二二	HARDPAN	[0]	☐ FREE [1]	J
□□ SAND [6]		ARTIFICIAL [0]		SANDSTON [0] RIP/RAP	NE[U] ÆDD!	☐ EXTENS MODER NORMA NONE [1	ATE [-1], Maximum
□□ BEDROCK [5] NUMBER OF BEST	TVPES 4 or	(Score natural su more [2] sludge from	point-sources)		ŔNE [0] ౘ	NORMA	L [0] -0.5 20
Comments		less [0]		☐ SHALE [-1]	 C 1_21	⊔ NONE (1	
				Color of the color	te soon e terminoe ordinate		
2] INSTREAM COVE						arginal AMC	OUNT
quality; 3-Highest quality	in manarata ar arc	sator amounte (o.a. vo	ny latae houlde	ers in deen or fa:	st water, larde i	Check ONE (Or 2 & average) ≣ > 75% [11]
diameter log that is stable UNDERCUT BANK	e, well developed i S [1]	ootwad in deep / last v	m [2]	OXBOWS, BAC	KWATERS [1]		
OVERHANGING V	EGETATION [1]	O ROOTWADS [1] 🔑 🗀	AQUATIC MACI	eligi errilgi ett järtigi och flyre etter ett filt fra ett ett ett i ett ett ett ett ett ett e		
/ SHALLOWS (IN SL	.OW WATER) [1]	2 BOULDERS [1	1] <u> </u>	LOGS OR WOO	DY DEBKIS [II LINEANLIA	Cover
Comments							Maximum 5
,							20
3] CHANNEL MORPI		k ONE in each categor	y (Or 2 & aver ATION	age) STABILI	ITV		
— ************************************	VELOPMENT EXCELLENT [7]	CHANNELIZ	AHUN	☐ HIGH [3]			
	GOOD [5]	RECOVERED [4	1-72.5	MODER.	ATE [2]		
	FAIR [3]	RECOVERING [:		☐ LOW [1]			Channel (12
☐ NONE [1] ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐	POOR [1]	LI RECENT ON NO	<u></u>	<u>k. 146</u>			Maximum / 3. \$
					MANUS (O. O	- t (- 0 ava	
4] BANK EROSION River right looking downstru	AND RIPARIA	I <i>N ZONE</i> Check ON RIAN WIDTH	E in each cate;	gory for <i>EACH B</i> DOD PLAIN (<i>IANK</i> (Or 2 per DUALITY	pank & average)	
- EROSION	L K	50m [4]	P FOREST,			CONSERVATI	ON TILLAGE [1]
☐ ☐ NONE / LITTLE [3]	MODER	RATE 10-50m [3] 🏻 💆	SHRUB O	R OLD FIELD [2		I ☐ URBAN OR II	다 중 전 및 경우는 사용상 사용하다 등 전 경우 전 경우를 받는 는
M M MODERATE [2] ☐ HEAVY / SEVERE [☐☐NARRO)W 5-10m [2]		ΠΑ <mark>L, PARK, NE\</mark> PASTURE [1]		I □ MINING I CON dicate predominant	
	NONE	salan alikus kan katalinda da da da da ka 🚤		STURE, ROWCI		ast 100m riparian.	Riparian (
Comments							Maximum 10
5] POOL / GLIDE AI	ND DIEEL E / E	ZUN QUALITY				f 	
MAXIMUM DEPTH	H CHA	NNEL WIDTH	cu	RRENT VEL	OCITY	11	on Potential
Check ONE (ONLY!)	Check Of	NE (Or 2 & average)		Check ALL that a		0.000,000,000	y Contact
□ > 1m [6] □ 0,7-<1m [4]		H > RIFFLE WIDTH [2] H = RIFFLE WIDTH [1]		ITIAL [-1] M FSL AST 111 □ IN	_OW [1] Terstitial [comment on back)
□ 0.4≺0.7m [2]	POOLWIDT	H < RIFFLE WIDTH [0]	FAST [1	או 📙 🧎 ב	TERMITTENT		
1 0,2≪0.4m [1]			MODER Indicat	ATE [1] LI EL e for reach - poo	ODIES [1] ols and riffles.		Pool / Current
□ < 0.2m [0] Comments				·			Maximum 12
	ctional riffles	; Best areas mus	t be large e	nough to su	pport a po	pulation	DIEELE F. 441-03
of riffle-obligate	e species:	Check	ONE (Or 2 & a	iverage).			O RIFFLE [metric=0]
RIFFLE DEPTH	RUNI			SUBSTRATE		RUN EMBEDI ☐ NONE [2]	50.00
☐ BEST AREAS > 10cm ■ BEST AREAS 5-10cm		M > 50cm [2] 🛍 STAE M < 50cm [1] 🔲 MOD	. STABLE (e.g.	inie, Boulder) [2]., Large Gravel	4]) [1]	LOW [1]	.5
☐ REST AREAS < 5cm		UNS	TABLE (e.g., F	ine Gravel, San	d) [0]	MODERATE [Riffle / C
[metric=	-U1					☐ EXTENSIVE [-	Maximum 8
	61 n = 1-2	TOVE ONE SECURITY OF		0/5001	<u></u>	LIDE	Gradient
6] <i>GRADIENT</i> (DRAINAGE ARE	1 -7 1 -7	RY LOW - LOW [2-4] DDERATE [6-10]		%POOL:(LIDE:	Gradient 7
(mi²) 🔲 HI	GH - VERY HIGH [10-	6]	%RUN: (60)%RI	FFLE:(_35)	10
		0.00					06/16/06

*/Is reach typical of steam?, Recreation/Observed - Inference - Active - Ac	Comment RE. Reach consistency is reach typical of steam?, Recreation/Observed, Interest, Other/Sampling observations, Concerns, Access directions, etc. Little apply Comment RE. Reach consistency is reach typical of steam?, Recreation/Observed, Interest, Other Comment RE. Reach consistency is reached by the comment of the commen	cal of steam?, Recreation/ Observed - Inferred, Other/ Sampling observations, Concerns, Access directions, etc.	over by losthone s bed.	report, in stack Hos enc, ma	Stream for resion. Not Campans veteranus heavil	L Cordinate	OMMENT EJ ISSUES FJ MEASUREMENTS	WWYP / CSO / INDUSTRY HARDENED / URBAN / DIRT&GRIME CONTAMINATED / LANDFILL BMPs-CONSTRUCTION-SEDIMENT LOGGIGG / IRRIGATION / COOLING BANK / EROSION / SURFACE FALSE BANK / MANURE / LAGOON WASH H ₂ 0 / TILE / H ₂ 0 TABLE ACID / MINE / QUARRY / FLOW NATURAL / WETLAND / STAGNANT PARK / GOLF / LAWN / HOME ATMOSPHERE / DATA PAUCITY
		Is reach typical of steam?, Recreation/ Observed - Infer	all bouldy shostrates	sak , Se Jimepotaton De	- 1	٦	D] MAINTENANCE Circle some & COMMENT	PUBLIC / PRIVATE / BOTH / NA ACTIVE / HISTORIC / BOTH / NA YOUNG-SUCCESSION-OLD SPRAY / SNAG / REMOVED MODIFIED / DIPPED OUT / NA LEVEED / ONE SIDED RELOCATED / CUTOFFS MOVING-BEDLOAD-STABLE ARMOURED / SLUMPS ISLANDS / SCOURED IMPOUNDED / DESICCATED FLOOD CONTROL / DRAINAGE

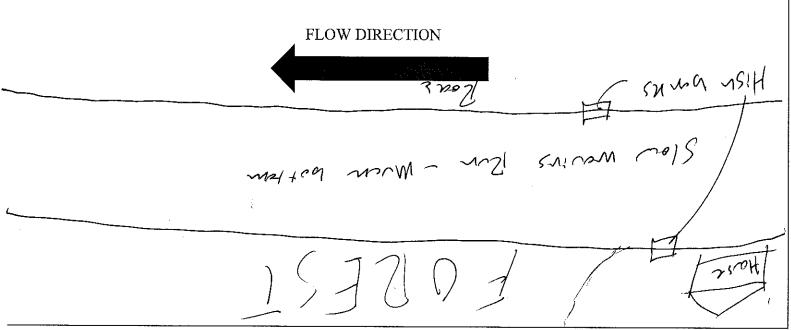
Stream Drawing:

Date: 30 / Seft / Zo17 Project Name: DOT - Freder Clark
Stream name: Indian Clean Collection #: 170930-2
Trib. of: Gyandotte River Basin: Gyandotte Co: Wyoming
Town: Kimball Geographic marker: Electrical Station
5.1 miles (N(S)EW) of Kimball Elevation: 1572 Stream Order: 2
Road bridge: For Brench Rd. Specific Location: Ind on Creek O.4
miles from fort Brorch R2 1R4 16 Ints. , 5.1 mi S of Kimball
Northing: 37, 497/7 Easting: -81, 53249 (NAD83, Zone 17)
Stream Width: 5-9m Stream Depth: 12-13 Total # Seine Hauls: 16
Investigators/Firm: WLU/Mountain State
Collectors: See provises
Temp(C) SpCon(mS/cm) TDS(g/L) Sal(ppt) pH Turb(NTU) %DO
126 573 - 0.4 8.32

Species	$\mathbf{I}_{\mathbb{Q}_{p}}^{2}$	н₫	\$	B♀	Juv.	Total
1.) Faxonius cristivarius	2	1	Ų		_	7
2.)						
3.)		• • • • • • • • • • • • • • • • • • • •				
4.)				×		
5.)						

				Number	of Spec	ies Per Se	ine Hau	il		
Species	1	2	3	4	5	6	7	8	9	10
O. cristivarius	1		1	3		+12				
C. theepiensis					:					
C. hatfieldi							,			
C. callainus										
C. veteranus										

Species Sex	TCL	Species	Sex	TCL	Species	Sex	TCL
·							



Please attach a topographic map identifying survey sites (include photos of sites), photos of specimens.

Also attach any additional comments.

ChicEFA

EPA 4520

Qualitative Habitat Evaluation Index and Use Assessment Field Sheet

QHEI Score: (4,5)

	and Use Assess	ment Field Sheet		
Stream & Location: Twoia	Week = 1700	130 - 2	RM: Da	ate:4914 1 2017
		s Full Name & Affiliation	1:	
River Code:	STORET#:		<u>717 181 .5324'</u>	9 Office verified □
1] SUBSTRATE Check ONLY Two St	ubstrate TYPE BOXES;	Check	ONE (Or 2 & average)	
BEST TYPES POOL RIFFLE	OTHER TYPES			IALITY -/.5
□ □ BLDR /SLABS [10]	☐ ☐ HARDPAN [4]	ULIMESTONE [1]	2000 Land Control Cont	NY [-2] 7
BOULDER [9]	☐ ☐ DETRITUS [3] ☐ ☐ MUCK [2]	_	SILT NOR	ERATE [-1] Substrate MAL [0]
☐ COBBLE [8]		☐ ☐ ☐ HARDPAN [0]	□ FRE	12.5
□□ SAND [6]	ARTIFICIAL [0] (Score natural substra	ME SANDSTONE [0] ates: ignore □ RIP/RAP [0]	J SEDDEON MEMOD	ENSIVE [-2] Maximum
NUMBER OF BEST TYPES: 4	or more [2] sludge from poir	nt-sources) LACUSTURINE	DEON DEXTI	MAL[0] Maximum 20
Comments	or less [0]	LI SHALE [-1] □ COAL FINES [-2	∐ NON ∷	E [1]
		V. 10. 20.00 V. 10.00		
2] INSTREAM COVER indicate pre	esence 0 to 3: 0 -Absent; 1 -Ver	y small amounts or if more comr ighest quality or in small amoun	mon of marginal A	MOUNT
quality, 2-iv	greater amounts (e.g. verv la	arge boulders in deep or fast wa	ter, large Check ON	E (Or 2 & average) SIVE >75% [11]
diameter log that is stable, well developed UNDERCUT BANKS [1]	ed rootwad in deep / fast wate		TERS[1] MODER	ATE 25-75% [7]
OVERHANGING VEGETATION [1		AQUATIC MACROPH		E 5-<25% [3] / Y ABSENT <5% [1]
SHALLOWS (IN SLOW WATER) ROOTMATS [1]	[1] O BOULDERS [1]	LOGS OR WOOD! D	EDVIS [1]	Cover
Comments	and the second			Maximum 10
				20
3] CHANNEL MORPHOLOGY CH	neck ONE in each category (C	on STADILITY		
SINUOSITY DEVELOPMEN	Co. Company of the Co	ON STABILITY ☐ HIGH [3]		
☐ HIGH [4] ☐ EXCELLENT [7] ☐ MODERATE [3] ☐ GOOD [5]	RECOVERED [4]	☐ MODERATE	[2]	
☐ LOW [2]	☐ RECOVERING [3] ■ RECENT OR NO RE	COVERVIAL		Channel
NONE [1] POOR [1] Comments	M KECENTOKNO KE	COVERTITI		Maximum 5
4] BANK EROSION AND RIPAR		each category for EACH BANK	(Or 2 per bank & average)
aaaa.	ARIAN WIDTH	FLOOD PLAIN QUA FOREST, SWAMP [3]	A 1 R	ATION TILLAGE [1]
	SERATE 10-50m [3]	SHRUB OR OLD FIELD [2]	□□ □ URBAN O	R INDUSTRIAL [0]
	ROW 5-10m [2]	RESIDENTIAL, PARK, NEW FIE FENCED PASTURE [1]		
☐ ☐ HEAVY / SEVERE [1] MY ME VER	menang menanggalanggalanggalanggalang 👝 👝 🗀 🖯	OPEN PASTURE, ROWCROP	Indicate predomir [0] past 100m riparia	
Comments	25 2 7 5 00 feet			Maximum 10
	· D.III. G.(II.) ITV			70
5] POOL / GLIDE AND RIFFLE MAXIMUM DEPTH CH	/ RUN QUALITY IANNEL WIDTH	CURRENT VELOCI	TY Recre	ation Potential
Check ONE (ONLY!) Check	ONE (Or 2 & average)	Check ALL that apply	Prin	nary Contact
] TORRENTIAL [-1] ■ SLOW] VERY FAST [1] □ INTERS	1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 -	ndary Contact
	IDTH < RIFFLE WIDTH [0]] FAST [1] DINTER	WITTENT [-2]	
☐ 0.2-<0.4m [1]		MODERATE [1] DEDDIES		Pool / Current
₩ < 0.2m [0] Comments		maiotic for fouch poors an		Maximum 12
Indicate for functional riffle	and Doot orong must be	large enough to suppo	ort a nonulation	12
of riffle-obligate species:	es; best areas must be Check ONE	(Or 2 & average).	=	NO RIFFLE [metric=0]
RIFFLE DEPTH RUI			IFFLE / RUN EMBI	EDDEDNESS
	/IUM > 50cm [2] ☐ STABLE /IUM < 50cm [1] ☐ MOD. ST	(e.g., Cobble, Boulder) [2] ABLE (e.g., Large Gravel) [1]	☐ NONE [2] XX LOW [1]	
BEST AREAS < 5cm		LE (e.g., Fine Gravel, Sand) [0]	MMODERAT	E [0] Riffle /
[metric=0] Comments	**************************************		∐ EXTENSIV	E [-1] Run
			<u></u>	0
	VERY LOW - LOW [2-4] -3 MODERATE [6-10] - 7	%POOL:(<u>20</u>	< -	Gradient 5
DRAINAGE AREA (mi²)	HIGH - VERY HIGH [10-6]	%RUN: (ੴ	%RIFFLE:(~_	Maximum 10

Acreation/Observed - Inferred, Other/Sampling observations, Concerns, Access directions, etc. H. Ma Real 1. + flex of States Messy. Messylas unite of Streem Las Same States morphales y. first Sire where stream gradest thouse indicative of C. Vetrem Gradest mairent (confish here.	WWYTP / CSO / NPDES / INDUSTRY HARDENED / URBAN / DIRT&GRIME CONTAMINATED / LANDFILL BMPs-CONSTRUCTION-SEDIMENT SAME LOGGING / IRRIGATION / COOLING BANK / EROSION / SURFACE FALSE BANK / MANURE / LAGOON WASH H ₂ 0 / TILE / H ₂ 0 TABLE ACID / MINE / QUARRY / FLOW NATURAL / WETLAND / STAGNANT PARK / GOLF / LAWN / HOME ATMOSPHERE / DATA PAUCITY WANTP / CSO / NPDES / INDUSTRY X width X depth max. depth max. depth bankfull max. depth floodprone x² width floodprone x² width entrench. ratio	
Comment RE: Reach consistency Is reach typical of steam?, Recreation/Observed - Inferred, Other/Sampling observations, Concerns, Access directions, etc. Syree m Joseph 2 months feet 1.7 feet of Streem has Sume loading strice of Streem has Sume form; Still head the manghales of 1/8st Sire where Streem on it has a managed in Streem of C. Vetramo directly family controlled.	ARITY BJ AESTHETICS DJ MAINTENANCE Circle some & COMMENT PUBLIC / PRIVATE / BOTH / NA ACTIVE / HISTORIC / BOTH / NA ACTI	
KALL that apply STAGE 1st -sample pass-2nd High UP NORMAL LOW LOW LOW	0.5 km	ı

Date: 30 / Seft. / 2017 Project Name: DOT - Indian Green
Stream name: Indian creek - For Bra/16 irs Collection #: 170930 - 3
Trib of /Juyandotte River Basin: Guyandotte Co: Wyoming
Town: <u>Himball</u> Geographic marker: Fost Block R2/Rt 16 Ints
Town: <u>Himball</u> Geographic marker: Fost Black R2/Rt 16 Zuts O miles (NSEW) of Bast Church Elevation: 1586 Stream Order: 2/3
Road/Bridge Fort Branch Kd. Specific Location: Indian Creen at
Fort Brench R2 crossing of mi from fort Branch Rd/R+ 16 Crossy
5.34mi NW of Kimbal, WV Northing: 37. 49966 Easting: -81.53688 (NAD83, Zone 17)
Stream Width: 5-8 Stream Depth: 12-16m Total # Seine Hauls: 20
Investigators/Firm: WLU/Mourtain State
Collectors: See previous - Loughmen et al.
Temp(C) SpCon(mS/cm) TDS(g/L) Sal(ppt) pH Turb(NTU) %DO
12.9 588 - 0.4 8.47

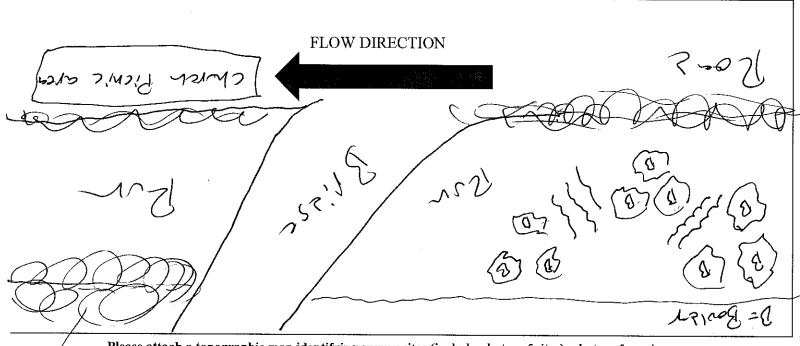
Species Collected

Species	Ιđ	II 💍	9	B♀	Juv.	Total
1.) Examis Chitakais	4	4	19	-	1	18
1.) Faxonius critavarius 2.) Cambans theepicas.	t	6	5		1	13
3.)						
4.)						:
5.)						

6			N	lumber	of Speci	es Per Se	eine Hau	ιl		
Species	1	2	3	4	5	6	7	8	9	10
O. cristivarius	I	1	2	١	1	4		44	1	ţ
C. theepiensis	90 1	# 1	1	l	3	ł	3	1	2	+ 11
C. hatfieldi			,							
C. callainus										
C. veteranus										

1410

Species	Sex	TCL	Species	Sex	TCL	Species	Sex	TCL
				,				
						,		
							\$ * /	
					·			



Please attach a topographic map identifying survey sites (include photos of sites), photos of specimens.

Also attach any additional comments.

Ne schoter



~,,_,	Score:	(avaa
YHEI	Score:	OWO



06/16/06

Stream & Location: 1709 30 -	3 - Indian Cl	rek	. RM:	Date:30	0/9/24/7
		Full Name & Affiliation:			Office verified
///// OCCC,	TORET #:	Lat./Long.: 31.4996	<u>o /81 .</u>	<u>53688</u>	location
1] SUBSTRATE Check ONLY Two substracts or note ever BEST TYPES POOL RIFFLE BLDR /SLABS [10] /	y type present OTHER TYPES POOL HARDPAN [4] DETRITUS [3] MUCK [2] SILT [2] ARTIFICIAL [0] (Score natural substrate more [2] sludge from point-	ORIGIN LIMESTONE [1] TILLS [1] WETLANDS [0] HARDPAN [0] SANDSTONE [0] RIP/RAP [0]	i.	average) QUALIT QUALIT HEAVY [-2] MODERATI NORMAL [I EXTENSIVI MODERATI NORMAL [I NONE [1]	E [-1] Substrate [-2] [/6.5]
2] INSTREAM COVER Indicate present quality; 2-Moder quality; 3-Highest quality in moderate or greed diameter log that is stable, well developed to UNDERCUT BANKS [1] 2 OVERHANGING VEGETATION [1] SHALLOWS (IN SLOW WATER) [1] ROOTMATS [1] Comments	ater amounts, but not of hig ater amounts (e.g., very larg potwad in deep / fast water,	riest quality of its small amounts le boulders in deep or fast wate	r, large pools. [RS [1] [Check ONE (Or: EXTENSIVE > MODERATE 2 SPARSE 5-<2: NEARLY ABSI	2 & average) 75% [11] 5-75% [7] 5% [3]
3] CHANNEL MORPHOLOGY Check					
SINUOSITY DEVELOPMENT HIGH [4] EXCELLENT [7] MODERATE [3] GOOD [5] LOW [2] FAIR [3] NONE [1] POOR [1] Comments	CHANNELIZATIO NONE [6] RECOVERED [4] RECOVERING [3] RECENT OR NO RECOVERING [4]	☐ HIGH [3] MODERATE [2] ☐ LOW [1]	15 St		Channel Paximum 20
4] BANK EROSION AND RIPARIA				& average)	
EROSION WIDE>	ATE 10-50m [3] → □ □ SH W 5-10m [2] → □ ■ RE ARROW < 5m [1] □ □ FE	FLOOD PLAIN QUAL PREST, SWAMP [3] PRUB OR OLD FIELD [2] PSIDENTIAL, PARK, NEW FIELD PROCED PASTURE [1] PEN PASTURE, ROWCROP [0]		CONSERVATION JRBAN OR INDU MINING / CONST predominant lan om riparian.	JSTRIAL [0] RUCTION [0]
Comments				M	aximum 10
Check ONE (ONLY!) Check ON □ > 1m [6] □ POOL WIDTH ■ 0.7<1m [4] ■ POOL WIDTH	INEL WIDTH E (Or 2 & average) 1> RIFFLE WIDTH [2]	CURRENT VELOCIT) Check ALL that apply FORRENTIAL [-1] SLOW [1] VERY FAST [1] INTERST FAST [1] SDDIES [MODERATE [1] EDDIES [Indicate for reach - pools and in	ITIAL [-1] ITENT [-2] 1]	Recreation Primary C Secondary (circle one and con	Contact Contact
	Check ONE (EPTH RIFFLE / > 50cm [2] STABLE (e < 50cm [1] MOD. STAB	Or 2 & average). RUN SUBSTRATE RIF	FLE / RU	tion ☐NO R N EMBEDDE ONE [2] OW [1] ODERATE [0] XTENSIVE [-1]	IFFLE [metric=0] DNESS Riffle /
DRAINAGE AREA MO	RY LOW - LOW [2-4] DERATE [6-10] IH - VERY HIGH [10-6]	%POOL: %RUN: (80) %GLIDI)%RIFFLI	× ,	Gradient 7

ess directions, etc.	The last	Ros. No	24 Sunstren		F] MEASUREMENTS	⊼width	xّdepth	max danth		A Daring Widel	pankruli x deptii	W/D ratio	bankfull max, depth	floodprone x5 width	entrench. ratio	Legacy Tree:	
Comment RE: Reach consistency/ Is reach typical of steam?, Recreation/Observed - Inferred, Other/Sampling observations, Concerns, Access directions, etc	selment acoured on some - possibly due do	I along of in am.	present in frach. Sunflex 200 m ingo Sunsten		EJ ISSUES	WWTP / CSO / NPDES / INDUSTRY	HARDENED/URBAN/DIRT&GRIME	CONTAMINATED / LANDFILL	BMPs-CONSTRUCTION-SEDIMENT	LOGGING / IRRIGATION / COOLING	BANK / EROSION / SURFACE	FALSE BANK / MANURE / LAGOON	WASH H ₂ 0 / TILE / H ₂ 0 TABLE	ACID / MINE / QUARRY / FLOW	NATURAL / WETLAND / STAGNANT	PARK / GOLF / LAWN / HOME	ATMOSPHERE / DATA PAUCITY
// Observed - Inferred, <i>Other</i> / ・アユー <i>ひっ</i> ナケwe.ユ	ned on Sens	closts pera	in kach. Si		Circle some & COMMENT		te.										
s reach typical of steam?, <i>Recreatio</i> ろんが、 アメージ	ic seliment acc	toe consitous Separal bould clustes present	thes present		DJ MAINTENANCE	PUBLIC / PRIVATE / BOTH / NA	ACTIVE / HISTORIC / BOTH / NA	YOUNG-SUCCESSION-OLD	SPRAY / SNAG / REMOVED	MODIFIED / DIPPED OUT / NA	LEVEED / ONE SIDED	RELOCATED / CUTOFFS	MOVING-BEDLOAD-STABLE	ARMOURED / SLUMPS	ISLANDS / SCOURED	IMPOUNDED / DESICCATED	FLOOD CONTROL / DRAINAGE
Comment RE: Reach consistency!	Nexa. Excessive	flor consitous.	Migh Velocity NAThes	of Widse.	BJ AESTHETICS	U NUISANCE ALGAE	UNVASIVE MACROPHYTES	☐ EXCESS TURBIDITY	☐ DISCOLORATION	☐ FOAM/SCUM	☐ OIL SHEEN	n 🗆 TRASH/LITTER	☐ NUISANCE ODOR	n ☐ SLUDGE DEPOSITS	☐ CSOs/SSOs/OUTFALLS	CI RECREATION AREA DEPTH	POOL: □>100ft²□>3ft
AJ SAMPLED REACH Check ALL that apply	METHOD STAGE THO STAGE THE BOAT STAG			ш.,	CLARITY	~ L		L]		meters	CANOPY 1st cm	SS COPEN				SED

Stream Drawing:

Date: 30 / Seft / 2017 Project Name: 207 - Indian Greek
Stream name: <u>Indian Cleen - CR 16-14</u> Collection #: 170930 -4
Trib. of: Gyando He River Basin: Geyando He Co: Wyoming
Town: Hemphill Geographic marker: CR 16-14 crossing
5.5 miles (NSEW) of Hemphill Elevation: 1581 Stream Order: 3
Road bridge CR 16-14 Specific Location: Frein Creek at
CR 16-14 crossing, 5.5 m; S of Hemphill, WV
Northing: 37. 50577 Easting: -81.54182 (NAD83, Zone 17)
Stream Width: 8-10 Stream Depth: .275. Total # Seine Hauls: ZO
Investigators/Firm: WLU / Mantain State
Collectors: Lughman et al.
Temp(C) SpCon(mS/cm) TDS(g/L) Sal(ppt) pH Turb(NTU) %DO

Temp(C)	SpCon(mS/cm)	TDS(g/L)	Sal(ppt)	pН	Turb(NTU)	%DO
13.5 %.	.529	_	3	8.51		

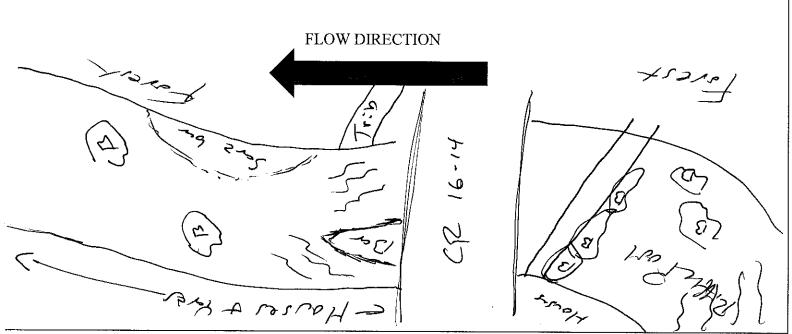
Species Collected

Species	I&	Πζ	9	\mathbf{B}	Juv.	Total
1.) Faxonius cristowanius	5	6	8	. –	0	19
2.) Cambars thee piensis	0,	9	5	_	0	14
3.)		·				
4.)						
5.)						

Species		Number of Species Per Seine Haul										
Species	1	2	3	4	5	6	7	8	9	10		
O. c at Smartin	71	Z	1	[[1	1	1		1			
C. theepiensis		7	1									
C. hatfieldi			,									
C. callainus	l	(1	3	4	1	1	1	3	1		
C. veteranus	12											

F. Crativara

Species	Sex	TCL	Species	Sex	TCL	Species	Sex	TCL
								
			-					
			· · · · · · · · · · · · · · · · · · ·					
			, , , , , , , , , , , , , , , , , , , ,					



Please attach a topographic map identifying survey sites (include photos of sites), photos of specimens.

Also attach any additional comments.

QHEI Score:



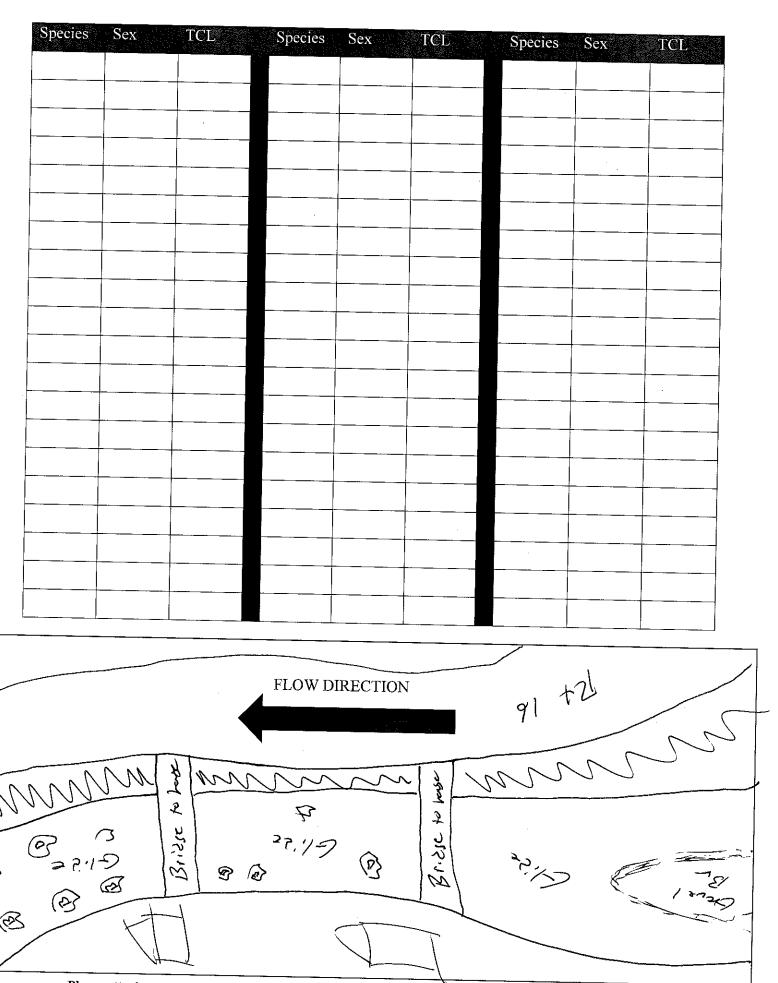
<u> Armay</u>	and Use Assessmen	4 170930-4 RM:	Date: >0 S (2 0 7
Stream & Location: 7	Endian Croen - CR 16-1	"Name & Affiliation"	
	Scorers Full	Name & Affiliation: at./Long.:37 .50577 8 .	54182 Office verified location □
River Code:		D 83 - dectimal °) Check ONE (Or 2 &	
BEST TYPES PC BLDR /SLABS [10] BOULDER [9] COBBLE [8] GRAVEL [7] SAND [6]	DNLYTwo substrate TYPE BOXES; by or note every type present OTHER TYPES POOL RIFFLE OTHER TYPES OTHER	ORIGIN LIMESTONE [1] TILLS [1] WETLANDS [0] HARDPAN [0] SANDSTONE [0] RIP/RAP [0] LACUSTURINE [0] SHALE [-1]	QUALITY HEAVY [-2] MODERATE [-1] Substrate NORMAL [0] FREE [1]
Comments	☐ <u>③ O⊔sese (o</u> 1®	COAL FINES [-2]	
2] INSTREAM COVER quality; 3-Highest quality in diameter log that is stable, OUNDERCUT BANKS OVERHANGING VE SHALLOWS (IN SLE) ROOTMATS [1] Comments	GETATION [1] C ROUTWARDS TO COMMAND	all amounts or if more common of marg st quality or in small amounts of highes coulders in deep or fast water, large deep, well-defined, functional pools. OXBOWS, BACKWATERS [1] AQUATIC MACROPHYTES [1] LOGS OR WOODY DEBRIS [1]	inal AMOUNT Check ONE (Or 2 & average) EXTENSIVE > 75% [11] MODERATE 25-75% [7] SPARSE 5-<25% [3] NEARLY ABSENT < 5% [1] Cover Maximum 20
SINUOSITY DEV HIGH [4] MODERATE [3] LOW [2] NONE [1] Comments	## CHANNELIZATION ### CHA	HIGH [3] MODERATE [2] LOW [1] VERY [1]	Channel 9 Maximum 20
	AND RIPARIAN ZONE Check ONE in each	ch category for EACH BANK (Or 2 per b	oank & average)
River right looking downstra EROSION B NONE / LITTLE [3] M MODERATE [2] HEAVY / SEVERE	NARROW 5 m [4] FOR	REST, SWAMP [3] RUB OR OLD FIELD [2] SIDENTIAL, PARK, NEW FIELD [1]	CONSERVATION TILLAGE [1] URBAN OR INDUSTRIAL [0] MINING / CONSTRUCTION [0] dicate predominant land use(s) st 100m riparian. Riparian Maximum 10
Comments			
MAXIMUM DEP1 Check ONE (ONLY!) □ > 1m [6] □ 0.7<1m [4] □ 0.4<0.7m [2] ■ 0.2<0.4m [1] □ < 0.2m [0]	Check ONE (U) 2 & average) POOL WIDTH > RIFFLE WIDTH [2] POOL WIDTH = RIFFLE WIDTH [1] POOL WIDTH < RIFFLE WIDTH [0]	CURRENT VELOCITY Check ALL that apply [ORRENTIAL [-1] M SLOW [1] VERY FAST [1] INTERSTITIAL [Pool / Current Maximum 12
Indicate for full of riffle-obliga RIFFLE DEPTH □ BEST AREAS > 10cr □ BEST AREAS < 5cn [metricular comments]	RUN DEPTH RIFFLE / m [2] MAXIMUM > 50cm [2] STABLE (e m [1] MAXIMUM < 50cm [1] MOD. STABLE n	RUN SUBSTRATE RIFFLE e.g., Cobble, Boulder) [2] BLE (e.g., Large Gravel) [1] E (e.g., Fine Gravel, Sand) [0]	□ NONE [2] □ LOW [1] ■ MODERATE [0] □ EXTENSIVE [-1] Maximum 8
6] GRADIENT (DRAINAGE AF	ft/mi) ☐ VERY LOW - LOW [2-4] REA MODERATE [6-10] mi²) ☐ HIGH - VERY HIGH [10-6]	/01 00	GLIDE: 5 Gradient 7 IFFLE: 20 Maximum 10 06/16/06

Exercise directions, etc. Low Hoodprone x ² width floodprone x ²
Comment RE: Reach consistency Is reach typical of steam? Recreation/ Observed - Inferred, Other/ Sampling observations, C Street Control of Street Control o
Somment RE. Reach consistency Is reach typical of steam?, Recreation Observed - Inferred, Oct. Control of Secret Control o
AJ SAMPLED REACH Check ALL that apply METHOD STAGE □ BOAT

Date: 30 / Seft / Zo17 Project Name: DOT - Indian CYCCK
Stream name: Indian Creek-R+16 Collection #: 170930-5
Bosin Govardate Co: Wyoming
Jan 11/1 Coographic marker: Pull oft adJocert to Pt 18
Elevation: 1531 Stream Order.
Roady bridge: Rt 16 Specific Location: French Greek George
12 Px 1/2 4.9 mi Sw cet Hemphill
Northing: 37.50 8 Easting: -81.39971 (NAD83, Zone 17)
Stream Width: 9-11 Stream Depth: 12-14 Total # Seine Hauls: 20
Investigators/Firm: WLU / Martin State
Collectors: Loughmer et al.
Temp(C) SpCon(mS/cm) TDS(g/L) Sal(ppt) pH Turb(NTU) %DO
13.8 .6184 8.55

	Species	Ιð	Πζ	. 0	B \$	Juv.	Total
1) 1	Table 18 Comments	_	4	9		/	14
2.) C	s crittivation	-	3	4	-	_	7
3.)	us queepreps-						
4.)							
5.)							

			N	umber	of Speci	es Per Se	ine Hau	ıl		
Species	1	2	3	4	5	6	7	8	9	10
O. cristivarius	2	11	1	١	3	1	4	+13		
C. theepiensis	L	1	1	l	1	\	\	413		
C. hatfieldi								-		
C. callainus			<u> </u>							
C. veteranus		<u> </u>						<u> </u>		



Please attach a topographic map identifying survey sites (include photos of sites), photos of specimens.

QHEI Score:

Stream & Location:	170930-5	Indian C	ren	<i>RM:</i>	Date:32}	P1 Z017
		Scorers	Full Name & Affiliation		Offic	e verified —
River Code:	<i>sto</i> r		Lat./Long.:33.50	<u> </u>	<u>54971</u>	location
1] SUBSTRATE Cheestin BEST TYPES BEST TYPES BLDR /SLABS [10] COBBLE [9] COBBLE [8] GRAVEL [7] SAND [6] BEDROCK [5] NUMBER OF BEST Comments	POOL RIFFLE OTH	ARDPAN [4] DETRITUS [3] MUCK [2] SILT [2] ARTIFICIAL [0] (Score natural substration point	ORIGIN ORIGIN LIMESTONE [TILLS [1] WETLANDS [0] HARDPAN [0] SANDSTONE es: ignore RIP/RAP [0]	SILT [0] GODEON	QUALITY HEAVY [-2] MODERATE [-1] NORMAL [0] FREE [1]	Substrate 14 Maximum 20
quality; 3-Highest quality diameter log that is stab	y in moderate or greater a le, well developed rootwa KS [1]	mounts (e.g., verv lar	small amounts or if more coghest quality or in small amounts or if more coghest quality or in small amounts or deep or fast or deep, well-defined, funct OXBOWS, BACKY AQUATIC MACRO LOGS OR WOOD	water, large ional pools. [VATERS [1] PHYTES [1] [Check ONE (Or 2 & a) EXTENSIVE >75% MODERATE 25-75% SPARSE 5-<25% NEARLY ABSENT < COV. Maximu	[11] % [7] 3] <5% [1]
3] CHANNEL MORF SINUOSITY DE HIGH [4] DE MODERATE [3] DE LOW [2] NONE [1] Comments	EVELOPMENT EXCELLENT [7]	in each category (<i>Or</i> CHANNELIZATION ONE [6] RECOVERED [4] RECOVERING [3] RECENT OR NO REC	ON STABILIT High [3] MODERAT LOW [1]		Chan i Maximi	B
4] BANK EROSION River right looking downst EROSION NONE / LITTLE [3] MODERATE [2] MODERATE [2] MODERATE [2] Comments	RIPARIAN	WIDTH 41]	each category for EACH BAN FLOOD PLAIN QU OREST, SWAMP [3] ———————————————————————————————————	JALITY 72	CONSERVATION TILL URBAN OR INDUSTR MINING / CONSTRUC e predominant land use Om riparian. Ripar. Maximu	IAL [0] TION [0] e(s) ian
5] POOL / GLIDE A MAXIMUM DEPT Check ONE (ONLY!) > fm [6] 0.7<1m [4] 0.4<0.7m [2] 0.2<0.4m [1] < 0.2m [0] Comments	H CHANNEI	_WIDTH 2 & average) FFLE WIDTH [2] FFLE WIDTH [1] FFLE WIDTH [0] FFLE WIDTH [0]	CURRENT VELOC Check ALL that app TORRENTIAL [-1] SLOT VERY FAST [1] INTE FAST [1] INTE MODERATE [1] EDDI Indicate for reach - pools	ly W [1] RSTITIAL [-1] RMITTENT [-2] IES [1]	Recreation Pote Primary Cont Secondary Con (circle one and comment of	tact ntact on back)
Indicate for fur of riffle-obligat RIFFLE DEPTH BEST AREAS > 10cm BEST AREAS < 5cm [metric Comments]	te species: RUN DEPT [2]	Check ONE H RIFFLE cm [2] STABLE (cm [1] MOD. STA	large enough to sup (Or 2 & average). / RUN SUBSTRATE e.g., Cobble, Boulder) [2] BLE (e.g., Large Gravel) [E (e.g., Fine Gravel, Sand)	RIFFLE / RU	N EMBEDDEDNE IONE [2] OW [1] MODERATE [0] EXTENSIVE [-1] Maxim	ESS file / 5 frum 8
DRAINAGE ARI	EA MODER		%POOL:(~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	Movin	

last directions, etc. Last des Chales. The stades of the character of the character.	FI MEASUREMENTS X width X depth max. depth X banktull width bankfull X depth WID ratio bankfull max. depth floodprone x² width entrench, ratio Legacy Tree:
Cogninent RE. Reach consistency Is reach typical of steam? Recreation Observed - Inferred, Other Sampling observations, Access directions, etc. Fract. Constituted to the State of the Sta	EJISSUES WWTP / CSO / NPDES / INDUSTRY HARDENED / URBÄN / DIRT&GRIME CONTAMINATED / LANDFILL BMPS-CONSTRUCTION-SEDIMENT LOGGING / IRRIGATION / COOLING BANK / EROSION / SURFACE FALSE BANK / MANURE / LAGOON WASH H ₂ 0 / TILE / H ₂ 0 TABLE ACID / MINE / QUARRY / FLOW NATURAL / WETLAND / STAGNANT PARK / GOLF / LAWN / HOME ATMOSPHERE / DATA PAUCITY
in Observed - Inferred, Other/s in St. 2 in in Clube Sedima inclube Sedima	Circle some & COMMENT
reach typical of steam?, Recreating the Language beginning the Language of the	DJ MAINTENANCE PUBLIC / PRIVATE / BOTH / NA ACTIVE / HISTORIC / BOTH / NA YOUNG-SUCCESSION-OLD SPRAY / SNAG / REMOVED MODIFIED / DIPPED OUT / NA LEVEED / ONE SIDED RELOCATED / CUTOFFS MOVING-BEDLOAD-STABLE ARMOURED / SLUMPS ISLANDS / SCOURED IMPOUNDED / DESICCATED FLOOD CONTROL / DRAINAGE
Supment RE. Reach consistency/Is reach typic feet consistency/Is reach typic stream Sone with the during higher flows. Channelization Some Sone Channelization	BJAESTHETICS □ NUISANCE ALGAE □ INVASIVE MACROPHYTES □ EXCESS TURBIDITY □ DISCOLORATION □ FOAM / SCUM □ OIL SHEEN □ NUISANCE ODOR □ SLUDGE DEPOSITS □ SLUDGE DEPOSITS □ CSOS/SSOS/OUTFALLS #71ON ATION AREA DEPTH
KALL that apply STAGE 1st -sample pass-2nd by lingH	0.5 Km

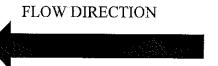
Stream Drawing:

Date: 30 / Seft / 2017 Project Name: DOT - Indian Creek
Stream name: Iveian Creek - Seneca minache Collection #: 170930 - 6
Trib. of: Gyandotte River Basin: Guyandotte Co: 170930-6
Town: Wolf Ren Geographic marker: Senaca Coal Sign along 12+16
3.08 miles (N & Wolf len Elevation: 1456 Stream Order: 3
Roady bridge: SR 16 Specific Location: Indian Creek ad Jacer
to SR 16 at Senea Mining Pinacle LLC Sign, 3.08 mi
Wolf Pen, WV Northing: 37.5038/ Easting: -91.55634 (NAD83, Zone 17)
Stream Width: 10-13m Stream Depth: 12-16 Total # Seine Hauls: 20
Investigators/Firm: WLO / Mantain State
Collectors: Loughman et al
Temp(C) SpCon(mS/cm) TDS(g/L) Sal(ppt) pH Turb(NTU) %DO
151 517 - 0.3 8.56

Species	$\mathbf{I}\mathcal{J}$	$\mathbf{H}_{\mathbb{Q}}$	\$	B ♀	Juv.	Total
1.) Faxonics (13tavacius	12	10	16		ł	39
2.) Cambons theepiers.s	_	Z	3	_	-	5
3.)	·					
4.)						
5.)			:			

Caraina				Number	of Speci	ies Per Se	ine Hau	1		
Species	1	2	3	4	5	6	7	8	9	10
O. cristivarius	4	7	1	١	8	į	١	1	7	2
C. theepiensis	\	3	3	b	١	2 :	+ 4			
C. hatfieldi	V 1 1/24	12	١	11	16					
C. callainus										
C. veteranus										

Species	Sex	TCL	Species	Sex	TCL	Species	Sex	TCL
			·					
								1
	· · · · · · · · · · · · · · · · · · ·					-		:
			•					





8000	79
	40

Stream & Location:	Indian	Creek -	17093	0-6		RM:	Date:	30 sef# <u>2</u> 217
			_Scorers	Full Nar.	ne & Affiliation	<u>:</u>		
River Code:		STORET #:		Lat./ Lo NAD 83 - dec	ong.: 37 . 50_3	<u>8/1/81</u> .	<u>55634</u>	Office verified location ☐
DECT TYPES	POOL RIFFLE	OTHER TY Graph Hardpan Graph Hardp	PES POOL [4] [5 [3] AL [0] tural substrate	es; ignore [-sources) [Check ORIGIN LIMESTONE [1] TILLS [1] WETLANDS [0] HARDPAN [0] SANDSTONE [0] RIP/RAP [0] LACUSTURINE SHALE [-1] COAL FINES [-2	E IO	QUAL	2] -0.5 ITE [-1] Substrate [0] 20 VE [-2] Maximum [0] -0.5
quality; 3-Highest quality is diameter log that is stable UNDERCUT BANKS OVERHANGING VECTOR	quality, 2-Mo n moderate or g , well developed S [1] EGETATION [1]	reater amounts (rootwad in deep /_ POOLS	e.g., very larg / fast water, > 70cm [2] VADS [1]	ge boulders or deep, w O OX	in deep or fast wat	ter, large lal pools. TERS [1] IYTES [1]	Check ONE (C EXTENSIVE MODERATE SPARSE 5-4)r 2 & average) >75% [11] 79 : 25-75% [7]
☐ HIGH [4] ■ E MODERATE [3] ■ C LOW [2] ☐ F	HOLOGY Che VELOPMENT EXCELLENT [7] GOOD [5]	CHANN NONE [6] RECOVE	RED [4]—3) 1.5	STABILITY HIGH [3] - MODERATE LOW [1]			Channel Maximum 20
4] BANK EROSION River right looking downstre EROSION NONE / LITTLE [3]. MODERATE [2] HEAVY / SEVERE [2]	AM RIPA RIPA WIDE MODE	RIAN WIDTH > 50m [4] RATE 10-50m [3 OW 5-10m [2]— NARROW < 5m	R F6 	FLOC OREST, SV HRUB OR ESIDENTIA ENCED PA	OD PLAIN QUA VAMP [3] OLD FIELD [2] IL, PARK, NEW FIE	LITY 12	CONSERVATION	ON TILLAGE [1] DUSTRIAL [0] STRUCTION [0] land use(s) Riparian Maximum 10
5] POOL / GLIDE AN MAXIMUM DEPTH Check ONE (ONLY!) > 1m [6]	CHA Check (POOLWID	RUN QUALIT NNEL WIDT ONE (Or 2 & aver TH > RIFFLE WII TH = RIFFLE WII TH < RIFFLE WII	H age) DTH[2] □ DTH[1] □ DTH[0] ■	Che TORRENTI VERY FAS FAST [1] - MODERAT		[1] STITIAL [-1] MITTENT [-2] S [1]	Primary Seconda	n Potential y Contact ry Contact comment on back) Pool / Current Maximum 12
Indicate for fund of riffle-obligate RIFFLE DEPTH BESTAREAS > 10cm [BESTAREAS < -10cm [BESTAREAS < 5cm [metric=	Species: RUN 21	DEPTH JM > 50cm [2] [0 JM < 50cm [1] [Check ONE (RIFFLE / STABLE (MOD. STA UNSTABLE	(Or 2 & ave / RUN Sl e.g., Cobbl BLE (e.g.,	rage). JBSTRATE R e, Boulder) [2] Large Gravel) [1] e Gravel, Sand) [0]	IFFLE / RU	IN EMBEDE NONE [2] OW [1] MODERATE [0 EXTENSIVE [-1	Riffle /
6] GRADIENT (DRAINAGE ARE.	A 💆 N	ERY LOW - LOV IODERATE [6-10 IGH - VERY HIG)]		%POOL:(<u>/Ĉ</u> %RUN: <u> </u>) %GLID)%RIFFL	\rightarrow	Gradient Maximum 10 06/16/06

cess directions, etc.	2	FJ MEASUREMENTS X width X depth max. depth T bankfull width bankfull X depth WID ratio bankfull max. depth floodprone x² width entrench. ratio	The state of the s
Comment RE: Reach consistency/ Is reach typical of steam?, Recreation/ Observed - Inferred, Other/ Sampling observations, Concerns, Access directions, etc.		EJ ISSUES WWYTP / CSO / NPDES / INDUSTRY HARDENED / URBAN / DIRT & GRIME CONTAMINATED / LANDFILL BMPS-CONSTRUCTION-SEDIMENT LOGGING / IRRIGATION / COOLING BANK / EROSION / SURFACE FALSE BANK / MANURE / LAGOON WASH H ₂ 0 / TILE / H ₂ 0 TABLE ACID / MINE / QUARRY / FLOW NATURAL / WETLAND / STAGNANT PARK / GOLF / LAWN / HOME ATMOSPHERE / DATA PAUCITY	
/ Observed - Inferred, Other/		Circle some & COMMENT	
reach typical of steam?, Recreation		DJ MAINTENANCE PUBLIC / PRIVATE / BOTH / NA ACTIVE / HISTORIC / BOTH / NA YOUNG-SUCCESSION-OLD SPRAY / SNAG / REMOVED MODIFIED / DIPPED OUT / NA LEVEED / ONE SIDED RELOCATED / CUTOFFS MOVING-BEDLOAD-STABLE ARMOURED / SLUMPS ISLANDS / SCOURED IMPOUNDED / DESICCATED FLOOD CONTROL / DRAINAGE	
Comment RE: Reach consistency/ Is		BJAESTHETICS □ NUISANCE ALGAE □ INVASIVE MACROPHYTES □ EXCESS TURBIDITY □ DISCOLORATION □ FOAM / SCUM □ OIL SHEEN □ TRASH / LITTER □ NUISANCE ODOR □ SLUDGE DEPOSITS □ CSOS/SSOS/OUTFALLS 47/ON AREA DEPTH	
AJ SAMPLED REACH Check ALL that apply METHOD STAGE	BOAT	0.5 Km	Stream Drawing:

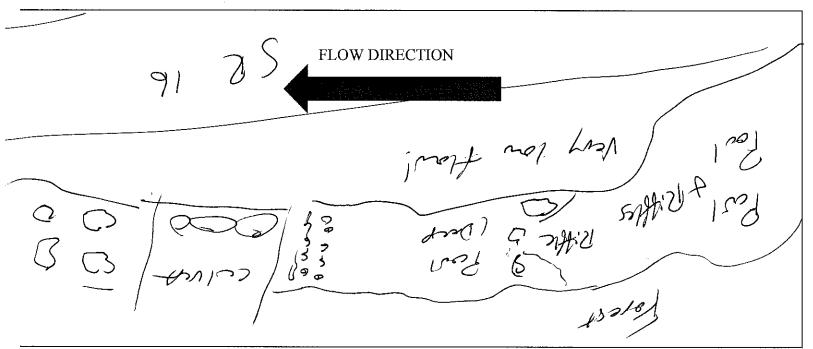
Comment RE: Reach consistency/ Is reach typical of steam?, Recreation/ Observed - Inferred, Other/ Sampling observations, Concerns, Access directions, etc.

Date: 30 / Seft / 2017 Project Name: Dott-Indian Crock
Stream name: Frence Creek - PSII off DS of Coase Collection #: 176930 - 7
Trib. of: Gyandotte River Basin: Gyandotte Co: Wyaning
Town: Hengh.71 Geographic marker: Pollitt Quad Crossing
4.7 miles (NSE W) of Hemphill Elevation: 1455 Stream Order: 3
Road bridge: 52. 16 Specific Location: India (1784 adJucent
to SR 16, 4.7 mi South of Henghill, WV
Northing: 37, 50557 Easting: -81,5685Z (NAD83, Zone 17)
Stream Width: 9-12 Stream Depth: 12-15 Total # Seine Hauls: 20
Investigators/Firm: WLU/Mantan State
Collectors: Leyshmen et al.
Temp(C) SpCon(mS/cm) TDS(g/L) Sal(ppt) pH Turb(NTU) %DO
149 2039 - 0.7 870

	Species	Ιð	ПЗ	\$	\mathbf{B}	Juv.	Total
1.) faxo	nius cristivanius	6	5	8		1.	2.2
2.) (am	nis cristivaries		2	_		_	05
3.)							
4.)							
5.)							

Consins	Number of Species Per Seine Haul									
Species	1	2	3	4	5	6	7	8	9	10
O. cristivarius	>5	2	l	2	2	l	2	2	2	(+10
C. theepiensis								,		
	51	1	ŀ	+17						
C. callainus										
C. veteranus										

Species	Sex	TCL	Species	Sex	TCL	Species	Sex	TCL
			3 ·	·				
					-			



ChicEPA

Qualitative Habitat Evaluation Index and Use Assessment Field Sheet

QHEI Score:

Stream & Location:	Indian	Creen-				RM:	Date:	34541 Z27
River Code: -		STORET #:	_Scorers	Full Name & Lat./ Long.	Affiliation:	- <i>3- [</i> 81 .	56852	Office verified location
11 SUBSTRATE Chec	POOL RIFFLE	Distrate TYPE BOX EVERY type present OTHER TY HARDPAN DETRITUS DETRITUS SILT [2] ARTIFICIA	PES POOL [4]	RIFFLE LIM TIL WE Z HA Z SA Signore RIP Sources) LAI		SILT		ITY 2] TE [-1] Substrate [0]
quality; 3-Highest quality diameter log that is stable UNDERCUT BANK OVERHANGING VERHANGING VERHANG	quality; 2-M in moderate or e, well develope (S [1] EGETATION [1	greater amounts, or greater amounts (ead rootwad in deep POOLS ROOTW	out not of high e.g., very largo / fast water, c > 70cm [2] /ADS [1]	test quality of in the boulders in de the boulders in de the boulders in de the boulders in the boulders of the boulders in th	ı smaii aniounis en or fast water	of nighest , large pools. [:RS [1] [TES [1] [Check ONE (C EXTENSIVE MODERATE SPARSE 5-	or 2 & average) >75% [11] 25-75% [7] 25% [3]
☐ HIGH [4] ☐ ☐ MODERATE [3] ☐ ☐ LOW [2] → 2.5 ☐	HOLOGY CH VELOPMEN EXCELLENT [7 GOOD [5], 4 FAIR [3] POOR [1]	T CHANN NONE [6] RECOVER	ELIZATIOI RED [4] つる、	N S' 	TABILITY HIGH [3] WODERATE [2] LOW [1]			Channel Maximum 20
4] BANK EROSION River right looking downstr EROSION NONE/LITTLE [3] MODERATE [2] HEAVY/SEVERE Comments	RIPA RIPA RIPA RIPA RIPA RIPA RIPA RIPA	ARIAN WIDTH E > 50m [4] ERATE 10-50m [3] ROW 5-10m [2] 7. Y NARROW < 5m [R D FO D SH G RE T D FE	FLOOD P REST, SWAMP RUB OR OLD F SIDENTIAL, PA NCED PASTUR	LAIN QUALI [3] —— 2.5 FIELD [2] RK, NEW FIELD	TY	CONSERVATION URBAN OR IN MINING / CON- e predominant / 00m riparian.	STRUCTION [0]
5] POOL / GLIDE A: MAXIMUM DEPTI Check ONE (ONLY!) > 1m [6] 0.7 < 1m [4] 0.4 < 0.7m [2] 0.2 < 0.4m [1] < 0.2m [0] Comments	Check Check POOL WII	PRUN QUALIT ANNEL WIDTH ONE (Or 2 & avera OTH > RIFFLE WID OTH = RIFFLE WID OTH < RIFFLE WID	-{ nge) тн[2] □ т тн[1] □ ∨ тн[0] □ Е	Check Al ORRENTIAL [-1 ERY FAST [1] AST [1] IODERATE [1]	T VELOCITY L that apply J SLOW [1] INTERSTI INTERMIT D EDDIES [1] ch - pools and n	TIAL [-1] TENT [-2] 1]	Primary Secondar	Pool / Current Maximum 12
Indicate for fun of riffle-obligate RIFFLE DEPTH BESTAREAS > 10cm BESTAREAS 5-10cm BESTAREAS 5-focm [metrics: Comments 6] GRADIENT	e species: RUN [2] □MAXIM [1] ■MAXIM	ON DEPTH UM > 50cm [2]	CHECK ONE (C RIFFLE / I STABLE (e. MOD. STAB UNSTABLE	or 2 & average). RUN SUBST g., Cobble, Bot	RATE RIF ilder) [2] Gravel) [1] rel, Sand) [0]	FLE / RU	IN EMBEDD IONE [2] IOW [1] MODERATE [0] EXTENSIVE [-1	Riffle /
DRAINAGEARE	A É	MODERATE [6-10] HIGH - VERY HIGH		%PC %RU)%RIFFL	\rightarrow	Maximum 1

C. 2 1. 2 1. 2 1. 2 2. 2 1. 2 2. 2 2. 2	
は See directions, etc.	
The way be frequently to reach typical of steam? Recreation/Observed - Inferred, Other/Sampling observations, Concerns, Access directions, etc. The way be frequently to a fection of the way to be the control of the control	
Wobserved - Inferred, Other/ Sam Log Circle some & COMMENT WWW HARE CIRCLE SOM AND WWW NAT WW AS RAL P RAL NAT NAT NAT NAT NAT NAT NAT N	
** Street, typical of steam?, Recreation and the street of	\$.
Comment RE: Reach consister	
AJ SAMPLED REACH Check ALL that apply NETHOD STAGE S	

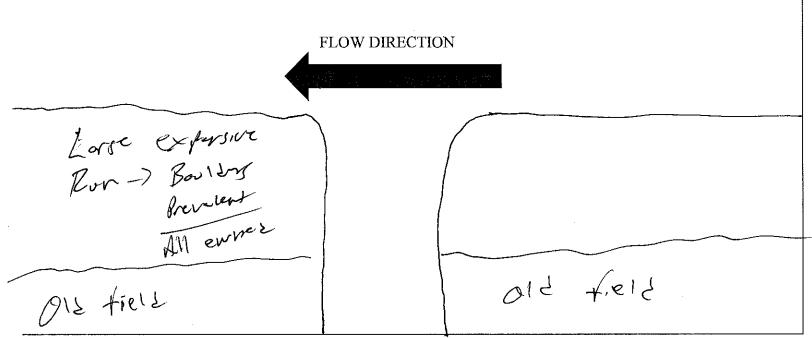
Stream Drawing:

Date: 30 /Seft/ 2017 Project Name: In 2 an Cleek - Dot								
Stream name: Frein Creen - Bailey B. Collection #: 170930-8								
Trib. of: Guyandotte River Basin: Guyandotte Co: Wyoming								
Town: Henghill Geographic marker: Mine Vent/ Abandoned Bridge								
Road/bridge: SR 16 Specific Location: Indian Creen								
adjacent to 82+16 at Confluence of Bailey Brench								
+ Ind. a Cr. Northing: 37.5/291 Easting: -81.57926 (NAD83, Zone 17)								
Stream Width: 10-12 Stream Depth: 12-4 Total # Seine Hauls: 20								
Investigators/Firm: WLU / Mountain Stt								
Collectors: Loughmen et al.								
Temp(C) SpCon(mS/cm) TDS(g/L) Sal(ppt) pH Turb(NTU) %DO								
140 1250 - 0.7 854 -								

Species	I♂	Пð	9	В♀	Juv.	Total
1.) Faxonius crustivarius	ı	0	3			4
2.) Lawbars theepress	3	1	2	-	-	6
3.)						
4.)						
5.)						

Species	Number of Species Per Seine Haul									
Species	1	2	3	4	5	6	7	8	. 9	10
O. cristivarius	1	l	2							
C. theepiensis	1	l	T.	1	(1 Pur				
C. hatfieldi							-			
C. callainus								s		
C. veteranus										

Species S	ex	TCL	Species	Sex	TCL	Species	Sex	TCL
								_
				. , .				
			<u>. </u>					



Please attach a topographic map identifying survey sites (include photos of sites), photos of specimens.

Also attach any additional comments.

Qualitative Habitat Evaluation Index and Use Assessment Field Sheet

QHEI Score:

	-	-	
	W	, %	
Comme		K	g,
_			_

Stream & Location: 170930 - 8 - Indian Wee	M/Bailey RM:	Date <u>30 SeP 2</u> 517
	nme & Affiliation:	101/ Office verified
(NAD 83 - d	ong.: 37 . 51281 181 .57	7926 Incation
1] SUBSTRATE Check ONLY Two substrate TYPE BOXES; estimate % or note every type present	Check ONE (Or 2 & ave	erage)
BEST TYPES POOL RIFFLE OTHER TYPES POOL RIFFLE	ORIGIN	QUALITY
□□ BCDR/SLABS[10] □□ □HARDPAN[4]		HEAVY [-2]
■ BOULDER [9] /_ □ DETRITUS [3] /_ □ MUCK [2] / /_	- Control of the Cont	MODERATE [-1] Substrate NORMAL [0]
□ □ GRAVEL [7]	☐ HARDPAN [0]	□ FREE [1]
SAND [6] / Grore natural substrates; ignore		MODERATE [-2]
NUMBER OF BEST TYPES: 4 or more [2] sludge from point-sources)	☐ LACUSTURINE [0] ☐ `SE	□ NORMAL [0] 75 20
Comments 3 or less [0]	LISTACE [FI]	□ NONE [1]
	COAL FINES [-2]	
2] INSTREAM COVER Indicate presence 0 to 3: 0-Absent; 1-Very small amount	ounts or if more common of marginal	AMOUNT
quality; 2-Moderate amounts, but not of highest quality quality; 3-Highest quality in moderate or greater amounts (e.g., very large boulder	ity or in small amounts of highest	eck ONE (Or 2 & average)
diameter log that is stable, well developed rootwad in deep / fast water, or deep, v	well-defined, functional pools. 🛮 🔲 🖹	EXTENSIVE >75% [11]
		MODERATE 25-75% [7] SPARSE 5-<25% [3]
		NEARLY ABSENT <5% [1]
O ROOTMATS [1]	N	Cover
Comments		Maximum / 3
OLOUANUEL HORBUOLOOVOL LOVE: 1 (0.00		20
3] CHANNEL MORPHOLOGY Check ONE in each category (Or 2 & average SINUOSITY DEVELOPMENT CHANNELIZATION	ge) STABILITY	
☐ HIGH [4] ☐ EXCELLENT [7] ☐ NONE [6]		
MODERATE [3] GOOD [5] BRECOVERED [4]	MODERATE [2]	
LOW [2] - 2.5 FAIR [3] RECOVERING [3]	☐ LOW [1]	Channel
□ NONE [1] □ POOR [1] □ RECENT OR NO RECOVERY [1] Comments		Maximum /3
		20
4] BANK EROSION AND RIPARIAN ZONE Check ONE in each category		average)
	DD PLAIN QUALITY L R	register transport regional, etc. or superport parties parties parties of
EROSION DI WIDE > 50m [4] DI FOREST, SI	WAMP[3] ☐ ☐ UPE	NSERVATION TILLAGE [1] BAN OR INDUSTRIAL [0]
M MODERATE [2] NARROW 5-10m [2] RESIDENTIA	AL, PARK, NEW FIELD [1] 🔲 🛅 MIN	ING / CONSTRUCTION [0]
☐ ☐ HEAVY / SEVERE [1] ☐ ☐ VERY NARROW < 5m [1] ☐ ☐ FENCED PA	ASTURE [1] $ u$ Indicate or	edominant land use(s)
☐ NONE [0] ☐ OPEN PAST	FURE, ROWCROP [0] Opast 100m	
Comments		Maximum 10
5] POOL / GLIDE AND RIFFLE / RUN QUALITY	[
	1220-111	Recreation Potential
		Primary Contact
		Secondary Contact
0.4-<0.7m [2] POOL-WIDTH < RIFFLE WIDTH [0] FAST [1]	☐ INTERMITTENT [-2] ☐	it die die die de die de
■ 0.2<0.4m [1] ■ MODERAT □ < 0.2m [0] Indicate i	[E [1]	Pool / Current
Comments	or rough poole and ninee.	Maximum ()
Indiana for formational different Pont areas months I have		12
Indicate for functional riffles; Best areas must be large en- of riffle-obligate species: Check ONE (Or 2 & ave		□ NO RIFFLE [metric=0]
RIFFLE DEPTH RUN DEPTH RIFFLE / RUN SU	JBSTRATE RIFFLE / RUN E	MBEDDEDNESS
BEST AREAS > 10cm [2] MAXIMUM > 50cm [2] STABLE (e.g., Cobbl	e, Boulder) [2] 🛶 1.5 🔻 NONI	다 (V. C) - (T. P. M.
■ BEST AREAS 5-10cm [1] MAXIMUM < 50cm [1] MOD. STABLE (e.g., BEST AREAS < 5cm UNSTABLE (e.g., Fine		[1] ERATE [0] Riffle /
[metric=0]	EXTE	ENSIVE [-1] Run 3.5
Comments		8
6] GRADIENT (ft/mi) VERY LOW LOW [2-4]	%POOL: // %GLIDE:(- Gradient
DRAINAGE AREA MODERATE [6-10]	>	Maximum +
(mi²)	%RUN: (90)%RIFFLE:(10

CH Substituting the consistency is reach typical of steam? Recreation/Observed - Inferred, Other/Sampling observations, Concerns, Access directions, etc. Substituting the consistency is reach typical of steam? Recreation/Observed - Inferred, Other/Sampling observations, Concerns, Access directions, etc. Substituting the consistency is reach typical of steam? Recreation/Observed - Inferred, Other Substituting the consistency is reached to the consistency in the consistency is reached to the consistency in the consistency is reached to the consistency in the consistency in the consistency is reached to the consistency in the consistency in the consistency is reached to the consistency in the consistency in the consistency is reached to the consistency in the consistency in the consistency is reached to the consistency in the consistency	
AJ SAMPLED REACH Check All that apply METHOD STAGE	

Cambarus callainus/Cambarus veteranus Survey Data Sheet

Date: 30 / Sep / Z017 Project Name: DOT- Indian Creek
Stream name: Trêin Creen Collection #: 136930-9
Trib. of: Gyandotte River Basin: Gyandotte River Co: Wyoming
Town: Handrill Geographic marker: Low HzO bridge/ Cabia
66 miles $8EW$) of $WeCV$ Elevation: 1347 Stream Order: 3
Road/bridge: 5/2 16 Specific Location: Indian Creen added
to SR 16 at 1st for Hoo bridge upstream of mine
exhast. Northing: 37, 50764 Easting: -81.57432 (NAD83, Zone 17)
Stream Width: 8-10m Stream Depth: 12-15 Total # Seine Hauls: 20
Investigators/Firm: WLU / Mountain & take
Collectors: Laughmen et al.
Temp(C) SpCon(mS/cm) TDS(g/L) Sal(ppt) pH Turb(NTU) %DO
14 308 - 0.2 7.22 -

Species Collected

Species	I♂	II ♂	\$	B♀	Juv.	Total
1.) Paxerius (N'Stickelis	t	4	4		-	9
1.) Faxonius Cristichois 2.) Lambars theopicus: 7	_	\	3		/	4
3.)						
4.) Wolfins!						
5.)						

Species				Number	of Speci	es Per Se	ine Haul			
Species	1	2	3	4	5	6	7	8	9	10
O. cristivarius	Ī	4	7	117			, , , , , , , , , , , , , , , , , , , ,			
C. theepiensis	7	\	\	+16						
C. hatfieldi										
C. callainus				<u> </u>						
C. veteranus										

Species	Sex	TCL	Species	Sex	ŤCL	Species	Sex	TCL
						<u> </u>		
						<u></u>		
								·
4	Rt 1	<u>'</u> -	FLOW I	DIRECTION	N Mariana			
	(sur g					7	/	
	?	or her	uric)			Por) 9	The state of the s
\		ot her					HAK	11/4

Please attach a topographic map identifying survey sites (include photos of sites), photos of specimens.

Also attach any additional comments.



Qualitative Habitat Evaluation Index and Use Assessment Field Sheet

QHEI Score: 52.5

Scores Full Name & Affiliation: Start Name & Affiliation: SubSTRATE Check ONLY two substitute YIVE SOLVES: SubStante Source were you present to substitute of conditions of cond	Stream & Location: 1709 30 - 9 - 2	ndian Ucen - 1420	RM:Date:30 Sep _Z=17
SUBSTRATE Circle, ONLY Two substants TYPE SO/ES 100 10	S		
BEST TYPES POOL RIFLE O'THER TYPES POOL RIFLE CHARDRAN (4) CHECK TYPES POOL RIFLE CHARDRAN (4) CHECK TYPES POOL RIFLE CHARDRAN (4) CHECK TYPES CHARDRAN (4) CHECK TYPES CHARDRAN (4) CHECK TYPES CHARDRAN (5) CHARDRAN (6) CHECK TYPES CHARDRAN (7) CH	have been been been been been been been be	(NAD 83 - decimal °) 🚅 🚅 🐣 💆 🔔 💄	(24/8] . 5 7 4 3L Office verified location □
BEST TYPES OOL RIFFLE OTHER TYPES POOL RIFFLE ORIGIN QUALITY BLORXIGAST (19)	1] SUBSTRATE Check ONLYTwo substrate TYPE BOXES	Check ON	IF (Or 2 & average)
BADDR/SLABS (10)	DEST TYPES OTHER TYPE	C ODICIN	, = ,
	☐ ☐ BLDR/SLABS [10] ☐ ☐ HARDPAN [4		
			SILI — SOME SOME SOME SOME SOME SOME SOME SOME
Cover hatural substrates (grots RECONTENSITY MODERATE [1-1] MODERA	1996 1996 1996 1996 1996 1996 1996 1996	2005 1000000000000000000000000000	□ FREE (1)
NUMBER OF BEST TYPES: 4 or more [2] librige from point-earcies) LACUISTURME [6] NORMAL [0] SANDSTONE [0]	
2] // INSTREAM COVER Indicate presence 0 to 3: 0-Absent: 1-Very small amounts of impress or present amounts, but not of highest quality; 3-Highest quality; 3-Highe	Score natura	I SUDSTRATES: Idnore Living 1911	NORMAL [0] 7. C 20
2] INSTREAM COVER Indicate presence 0 to 3. 0-Abbort: 1-Very small amounts or if more common of merginal and provided in the p	ME 3 or occ [0]	☐ SHALE [-1]	
Comments	Comments	☐ COAL FINES [-2]	
Check ONE (Or 2 & average) Check ONE in seach category (or 2 & average) Check ONE (Or 2 & average	21 INSTREAM COVER Indicate presence 0 to 3: 0-Absen	it; 1-Very small amounts or if more common	of merginal AMOLINT
diameter log that is stable, well developed rootwal in deep/ fast water, or deep, well-defined, functional pools.	quality; 2-Moderate amounts, but	not of highest quality or in small amounts of	f highest
OVERNANGING VEGETATION [1] OVERVANGE [1]	diameter log that is stable, well developed rootwad in deep / fa	st water, or deep, well-defined, functional p	ools. TEXTENSIVE >75% [11]
SHALLOWS (IN SLOW WATER) [1] BOULDERS [1] LOGS OR WOODY DEBRIS [1] NEARLY ABSENT - 5% [1] Comments	The first state of the company of the first state o		
Comments	/ SHALLOWS (IN SLOW WATER) [1] (BOULDER:	n vigot in the first the first of the first	
3] CHANNEL MORPHOLOGY Check ONE in each category (Or 2 & average) SINUOSITY DEVELOPMENT CHANNELIZATION STABILITY HIGH [3]	100 100 100 100 100 100 100 100 100 100		Cover
SINUOSITY DEVELOPMENT CHANNELIZATION STABILITY HIGH [4]	Comments		
SINUOSITY DEVELOPMENT CHANNELIZATION STABILITY HIGH [4]	21 CHANNEL MORRHOLOGY Check ONE in each cate	non (Or 2 & average)	
MODERATE [3]			
Channel Poor			
NONE [1]			
A BANK EROSION AND RIPARIAN ZONE Check ONE in each category for EACH BANK (Or 2 per bank & average)			Channel
A BANK EROSION AND RIPARIAN ZONE Check ONE in each category for EACH BANK (Or 2 per bank & average)	Freedministration control of the con	it op de 1900 patro patro de 1919 en 1919 en 1919.	
RIPARIAN WIDTH GROSION	AL DANK EDOCION AND BIBARIAN TONE Objects	ONE :	
EROSION	-		
NONE / LITTLE [3]	EDONON L R	I R	_ L R
HEAVY / SEVERE [1]		□ □ SHRUB OR OLD FIELD [2]	☐ ☐ URBAN OR INDUSTRIAL [0]
Comments OPEN PASTURE, ROWCROP [0] Dest 100m riparian. Riparian Maximum 10		RESIDENTIAL, PARK, NEW FIELD [* □ FENCED PASTURE [4]	23
Somments			past 100m riparian. Riparian
MAXIMUM DEPTH CHANNEL WIDTH CURRENT VELOCITY Check ONE (Or 2 & average) Check ALL that apply Check ONE (Or 2 & average) Check ALL that apply Check ONE (Or 2 & average) Check ALL that apply Check ONE (Or 2 & average) Check ALL that apply Check ONE (Or 2 & average) Check ALL that apply Check ONE (Or 2 & average) Check ALL that apply Check ONE (Or 2 & average) Comments Current Curr	Comments		Maximum 🔏 🕽
MAXIMUM DEPTH Check ONE (ONLY!) □ 1m [6] □ 0.4 < 0.7m [2] □ 0.2 < 0.4m [1] □ 0.2 < 0.4m [1] □ 0.2 = 0.4m [1] □ 0.4 = 0.7m [2] □ 0.2 = 0.4m [1] □ 0.2 = 0.4m [1] □ 0.3m [0] Comments Indicate for functional riffles; Best areas must be large enough to support a population of riffle-obligate species: Check ONE (Or 2 & average). Recreation Potential Primary Contact Secondary Contact (circle one and comment on back) Pool / Current Maximum Indicate for functional riffles; Best areas must be large enough to support a population of riffle-obligate species: Check ONE (Or 2 & average). RIFFLE DEPTH RUN DEPTH RUN DEPTH RIFFLE / RUN SUBSTRATE RIFFLE / RUN EMBEDDEDNESS □ MAXIMUM > 50cm [2] □ BEST AREAS > 10cm [2] □ BEST AREAS > 10cm [2] □ BEST AREAS > 5.0cm [1] □ MAXIMUM > 50cm [2] □ MAXIMUM > 50cm [2] □ STABLE (e.g., Cobble, Boulder) [2] □ MAXIMUM > 50cm [2] □ MODERATE [0] □ MAXIMUM > 50cm [0] □ MODERATE [0] □	EL BOOL / OLIDE AND BIFFLE / BUN OUALITY		10
Check ONE (ONLY!) > 1m [6]		CURRENT VELOCITY	Recreation Potential
O.7-<1m [4]			Primary Contact
Dock Pool width Riffle width Dock		7077 — Listania de la companya de l	
O.2-<0.4m [1]			
Indicate for functional riffles; Best areas must be large enough to support a population of riffle-obligate species: Check ONE (Or 2 & average). RIFFLE DEPTH RUN DEPTH RIFFLE / RUN SUBSTRATE RIFFLE / RUN EMBEDDEDNESS BEST AREAS > 10cm [2]		MODERATE [1] 🔲 EDDIES [1]	Pool /
Indicate for functional riffles; Best areas must be large enough to support a population of riffle-obligate species: Check ONE (Or 2 & average). RIFFLE DEPTH RUN DEPTH RIFFLE / RUN SUBSTRATE RIFFLE / RUN EMBEDDEDNESS BEST AREAS > 10cm [2]	de a consideración con a T. a The October	indicate for reach - pools and riffic	
of riffle-obligate species: Check ONE (Or 2 & average). RIFFLE DEPTH BEST AREAS > 10cm [2]	,		
RIFFLE DEPTH BEST AREAS > 10cm [2] BEST AREAS 5-10cm [1] BEST ARE			population ☐NO RIFFLE [metric=0]
BEST AREAS > 10cm [2] MAXIMUM > 50cm [2] STABLE (e.g., Cobble, Boulder) [2] DEST AREAS 5-10cm [1] MAXIMUM < 50cm [1] MOD. STABLE (e.g., Large Gravel) [1] DOW [1] MODERATE [0] Riffle / Run Maximum STABLE (e.g., Fine Gravel, Sand) [0] STABLE (e.g., Fine		· - ,	
UNSTABLE (e.g., Fine Gravel, Sand) [0] S MODERATE [0] Riffle / Run Comments 6] GRADIENT (☐ BEST AREAS > 10cm [2] ☐ MAXIMUM > 50cm [2] ☐ ST.	ABLE (e.g., Cobble, Boulder) [2]	
6] GRADIENT (ft/mi) UVERY LOW - LOW [2-4] WODERATE [6-10] WPOOL: 90 WGLIDE: Gradient Maximum Maximum	BEST AREAS 5-10cm [1] MAXIMUM < 50cm [1] MC	DD. STABLE (e.g., Large Gravel) [1]	LOW [1]
6] GRADIENT (ft/mi) UVERY LOW - LOW [2-4] WODERATE [6-10] WPOOL: 90 WGLIDE: Gradient Maximum Maximum	[metric=0]	O IMPER Je. 9. Time Graver, Sand) [0]	EXTENSIVE [-1] Run 2
DRAINAGE AREA MODERATE [6-10]	Comments		Wiaximum
DRAINAGE AREA MODERATE [6-10]	6] GRADIENT (ft/mi) □ VERY LOW - LOW [2-4	¶ %POOL:(ዓለ)	%GLIDE: Gradient
(mi ²) \square HIGH VERY HIGH [10-6] %RUN: \square /%RIFFLE: (ω)		a	RIFFI F: VA Maximum

) 	ا ي
Lug Fit	F] MEASUREMENTS
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of steam?, Recreation/Observed - Interred, Other/Sampling observations, Concerns, Access directions, etc. Mile Oxferst Strom is drew down corsesting Jeals-Hylothe, Ether Still Flan, se Most Low Occurity, "Ret Lyositize Common through o un top correr of Dries bed	EJ ISSUES WWTP / CSO / NPDES / INDUSTRY HARDENED / URBAN / DIRT&GRIME CONTAMINATED / LANDFILL BMPs-CONSTRUCTION-SEDIMENT LOGGING / IRRIGATION / COOLING BANK / EROSION / SURFACE FALSE BANK / MANURE / LAGOON WASH H20 / TILE / H20 TABLE ACID / MINE / QUARRY / FLOW NATURAL / WETLAND / STAGNANT PARK / GOLF / LAWN / HOME ATMOSPHERE / DATA PAUCITY
her Samplin	_
Wobserved - Inferred, Olderson Yolkeit Yolkeit	Circle some & COMMENT
reach typical of steam?, Recreation/Observed-Interred, Other/Sampling observations of Milve & Years, of them, is drew of the Still of the Sampling observations of the Sampling of the Sam	DJ MAINTENANCE PUBLIC / PRIVATE / BOTH / NA ACTIVE / HISTORIC / BOTH / NA YOUNG-SUCCESSION-OLD SPRAY / SNAG / REMOVED MODIFIED / DIPPED OUT / NA LEVEED / ONE SIDED RELOCATED / CUTOFFS MOVING-BEDLOAD-STABLE ARMOURED / SLUMPS ISLANDS / SCOURED IMPOUNDED / DESICCATED FLOOD CONTROL / DRAINAGE
Comment RE: Reach consistency Is reach typical of steam?, Recreation/Observed - Interred, Other/Sampling observations, Concerns, Access directions, etc. 157 5:10 USTream of MINE PYLLUST. STRUM STUDGES 414 - of Scurred 130 Wet Jeals - Hylothe, 2 Hzll Still Flan, 24 Moth Re amoxic with Oxidether Occurity, Reflect Lyositize Common through fouch: Single 2 200 m 229 Ctream of Division Very be 2 beginning.	ARITY BJAESTHETICS PUB. PASSET: 2nd NUISANCE ALGAE O cm
	CL 2007 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1
AJ SAMPLED REACH Check ALL that apply METHOD STAG! BOAT 1st -sample pas WADE UP ULINE UP CHER DISTANCE LOW	0.5 Km

Stream Drawing:

Cambarus callainus/Cambarus veteranus Survey Data Sheet

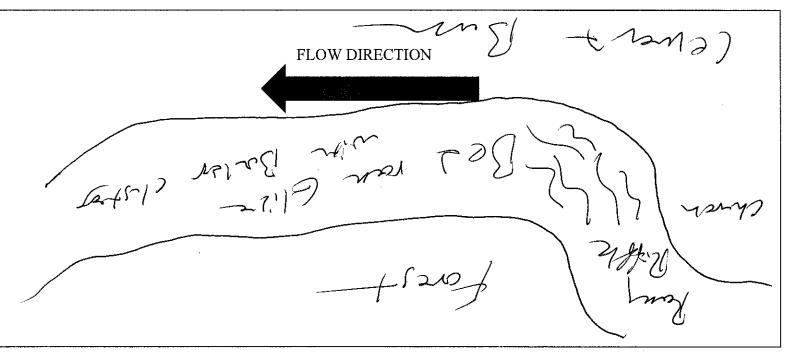
Date: 30 / Seft / 2017 Project Name: DOT - India (year							
Stream name: Indian Creek - Coment Collection #: 170930-10							
Trib. of: Gyandotte Basin: Gyandotte Co: Lyoning							
Town: WOONLY Geographic marker: Cementes Rt Bonn							
Omiles (NSEW) of Levent Byne Elevation: 1478 Stream Order:							
Road/bridge: 5R 16 Specific Location: # Indian Creen							
al Jacont to SR16 at Shentell industries							
Northing: 37.50233 Easting: -81.5533'4 (NAD83, Zone 17)							
Stream Width: 9-10 Stream Depth: 25 Total # Seine Hauls: 21							
Investigators/Firm: WLU/Mansain State							
Collectors: Layshmen et al.							
Temp(C) SpCon(mS/cm) TDS(g/L) Sal(ppt) pH Turb(NTU) %DO							
15.7 1603 - 0.4 8.61							

Species Collected

Species	I♂	Πζ	<u> </u>	B♀	Juv.	Total
1.) Faxonics evistivaries	5	3	7		Z	17
2.) Campans theefierss	150	4	5	<u></u>	-	9
3.)						
4.)						
5.)						

Species	Number of Species Per Seine Haul									
	1	2	3	4	5	6	7	8	9	10
O. cristivarius	l	1	1	5	5	(t	3	+12	
C. theepiensis	2	2	1	l	1	2	+ 13			
C. hatfieldi										
C. callainus										
C. veteranus										

Species	Sex	TCL	Species	Sex	TCL	Species	Sex	TCL
						·		
		-						



Please attach a topographic map identifying survey sites (include photos of sites), photos of specimens.

Also attach auy additional comments.

Qualitative Habitat Evaluation Index and Use Assessment Field Sheet

QHEI Score: 69

Stream & Location: In 2 in Creek - DOT-170930-10 RM: Date: 30 54 1 2017
Scorers Full Name & Affiliation: River Code: STORET #: Lat./Long.:31.5023 / Storers Full Name & Affiliation: Control
11 SUBSTRATE Check ONLY Two substrate TYPE BOXES;
BEST TYPES POOL RIFFLE OTHER TYPES POOL RIFFLE ORIGIN QUALITY BLDR /SLABS [10]
2] INSTREAM COVER Indicate presence 0 to 3: 0-Absent; 1-Very small amounts or if more common of marginal quality; 2-Moderate amounts, but not of highest quality or in small amounts of highest quality; 3-Highest quality in moderate or greater amounts (e.g., very large boulders in deep or fast water, large diameter log that is stable, well developed rootwad in deep / fast water, or deep, well-defined, functional pools. OUNDERCUT BANKS [1]
3] CHANNEL MORPHOLOGY Check ONE in each category (Or 2 & average) SINUOSITY DEVELOPMENT CHANNELIZATION STABILITY HIGH [4] EXCELLENT [7] NONE [6] HIGH [3] MODERATE [3] GOOD [5] RECOVERED [4] MODERATE [2] LOW [2] FAIR [3] RECOVERING [3] LOW [1] NONE [1] POOR [1] RECENT OR NO RECOVERY [1] Comments
4] BANK EROSION AND RIPARIAN ZONE Check ONE in each category for EACH BANK (Or 2 per bank & average) River right looking downstream RIPARIAN WIDTH ROSION WIDE > 50m [4] SHRUB OR OLD FIELD [2] WIDE > 50m [3] SHRUB OR OLD FIELD [2] WIDE > 50m [4] SHRUB OR OLD FIELD [2] WIDE > 50m [4] SHRUB OR OLD FIELD [2] WIDE > 50m [4] SHRUB OR OLD FIELD [2] WIDE > 50m [4] SHRUB OR OLD FIELD [2] WIDE > 50m [4] SHRUB OR OLD FIELD [2] WIDE > 50m [4] SHRUB OR OLD FIELD [2] SHRUB OR OLD FIELD [1] WINING / CONSTRUCTION [0] Indicate predominant land use(s) past 100m riparian. Riparian Maximum Naximum 10
Solution Pool File Fil
Indicate for functional riffles; Best areas must be large enough to support a population of riffle-obligate species: RIFFLE DEPTH RUN DEPTH RIFFLE / RUN SUBSTRATE RIFFLE / RUN EMBEDDEDNESS MAXIMUM > 50cm [2] STABLE (e.g., Cobble, Boulder) [2] REST AREAS 5-10cm [1] MAXIMUM < 50cm [1] MOD. STABLE (e.g., Large Gravel) [1] REST AREAS 5-10cm [1] MOD. STABLE (e.g., Fine Gravel, Sand) [0] Comments Riffle / Run Maximum Maximum Maximum Riffle / Run Moderate [0] Riffle / Run Maximum Maximum Maximum Riffle / Run Maximum Maximum Maximum Riffle / Run Maximum Maximum Maximum Riffle / Run Maximum Maximum Maximum Riffle / Run Maximum Maximum Maximum Riffle / Run Maximum Maximum Maximum Riffle / Run Maximum Maximum Riffle / Run Maximum Maximum Riffle / Run Maximum Maximum Maximum Riffle / Run Maximum Maximum Riffle / Run Maximum
6] GRADIENT (ft/mi) ☐ VERY LOW - LOW [2-4]

Comment RE: Reach consistency/ Is reach typical of steam?, Recreation/Observed - Inferred, Other/Sampling observations, Concerns, Access directions, etc. Rest at reach completed at large Legan give with The white with a large as the with a large section of the with a large section	ARITY BJAESTHETICS DJ MAINTENANCE Circle some & COMMENT BJAESTHETICS DJ MAINTENANCE Circle some & COMMENT WWTP / CSO / NPDES / INDUSTRY WWTP / CONTROL / BRITH ANDUSTRY WWTP / CSO / NPDES / INDUSTRY WWTP / CONTROL / BRITH ANDUSTRY WWTP / CSO / NPDES / INDUSTRY WWTP / COSO / NPDES / INDUSTRY WWTP / CSO / NPDES / INDUSTRY WWTP / CONTROL / BRITH ANDUSTRY WWTP / CSO / NPDES / INDUSTRY WWTP / CONTROL / BRITH ANDUSTRY WASH / CONTROL / BRITH ANDUSTRY WWTP / CONTROL / CONTROL / BRITH ANDUSTRY WWTP / CONTROL / CONTROL / BRITH ANDUSTRY WWTP / CONTROL / CONTROL / CONTROL / CONTROL / CONTROL / CONT
AJ SAMPLED REACH Check ALL that apply METHOD STAGE BOAT 1st-sample pass-2nd WADE DIP COTHER DOTHER DISTANCE DAY	0.5 Km

Stream Drawing:

Appendix B

Sample Site Pictures

Tug Fork Pictures



Tug Fork Site 1



Tug Fork Site 2



Tug Fork Site 3



Tug Fork Site 4



Tug Fork Site 5





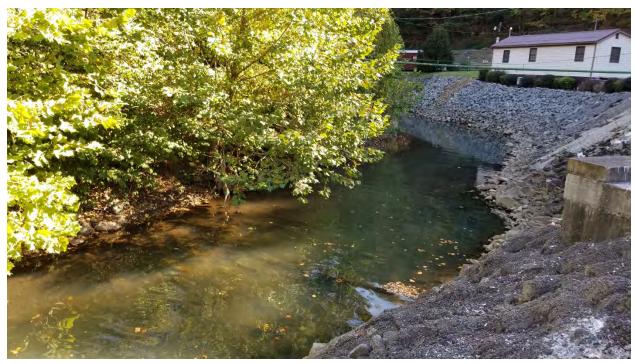
Tug Fork Site 7





Tug Fork Site 9





Tug Fork Site 11

Indian Creek Pictures



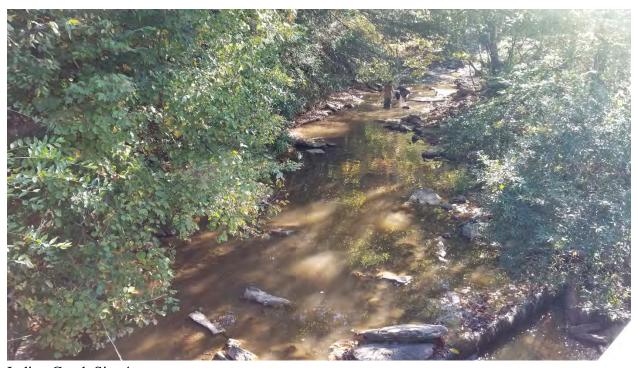
Indian Creek Site 1



Indian Creek Site 2



Indian Creek Site 3



Indian Creek Site 4



Indian Creek Site 5



Indian Creek Site 6



Indian Creek Site 7



Indian Creek Site 8



Indian Creek Site 9



Indian Creek Site 10

Appendix C

C. callainus Pictures





C. callainus at site 171001-02



C. callainus at site 171001-03



C. callainus at site 171001-04

Appendix D

Scientific Collecting Permit



DIVISION OF NATURAL RESOURCES

Wildlife Resources Section
Operations Center
P.O. Box 67
Elkins, West Virginia 26241-3235
Telephone (304) 637-0245
Fax (304) 637-0250

Jim Justice Governor Stephen S. McDaniel Director

NUMBER 2017,229

SCIENTIFIC COLLECTING PERMIT

Under Authority Conferred by Chapter 20, Article 2, Section 50, Code of West Virginia, As Amended

Zachary Loughman West Liberty University 208 University Drive College Union Box 139 West Liberty, WV 26074

is hereby permitted to collect specimens according to the attached application and the Special Provisions on the reverse side of this permit.

This permit is not transferable and expires on December 31, 2017.

A complete list of all specimens collected will be kept and reported to the Director of the Division of Natural Resources of West Virginia no later than 45 days after the expiration date of this permit.

PERMIT PROVISIONS

I understand that (1) The privileges granted under this permit are not transferable, and to allow anyone other than myself to use my permit is unlawful and will be considered cause for revocation of said permit; (2) A Federal Scientific Collection Permit issued by the U.S. Department of Interior must be obtained before any migratory birds, or their nests or eggs, are collected or held in captivity; (3) The Federal Permit does not extend the privileges of the permittee beyond those granted by the Division of Natural Resources; (4) Permission must be obtained from either the owner or the custodian of any fenced or posted land before entering same for the purpose of collecting scientific specimens; (5) It is unlawful to carry a revolver or pistol contrary to Article VII, Chapter 61, Code of West Virginia; (6) It is unlawful to collect specimens with a gun on a Sunday; (7) It is unlawful to sell, offer for sale, barter, or offer to barter any wild animals, wild birds, fish or frogs collected; (8) When traps or nets or other devices are used UNATTENDED while exercising the privileges of this permit, said traps, nets, or devices must have attached thereto a tag bearing the name, address and number of the Scientific Collecting Permit; (9) It is unlawful to take or attempt to take any wild animals, wild birds, fish or frogs under said permit except for scientific and propagation purposes; (10) A hunting or fishing license must be obtained before specimens may be taken for sport; (11) Only those species or classes of wild birds, wild animals, fish or frogs listed below, and in the numbers stated, may be lawfully taken under said permit; and (12) I am required by law to carry my Scientific Collecting Permit, on my person while exercising the privileges granted thereunder, and to exhibit the permit to anyone requesting to see the same.

Must be signed before valid.

ignature of permittee

Chief Wildlife Resources, WVDNR

Date of issue

<u>IMPORTANT</u>

THE ATTACHED APPLICATION FORM INDICATING SPECIES TO BE COLLECTED, LOCATIONS OF COLLECTIONS, MANNER OF COLLECTION, AND PURPOSE OF COLLECTION IS TO BE CONSIDERED A PART OF THIS PERMIT AND SHOULD REMAIN ATTACHED.

YOU ARE SUBJECT TO THE FOLLOWING COLLECTING AND REPORTING PROVISIONS. FAILURE TO MEET THESE CRITERIA IS GROUNDS FOR REVOCATION OF THE PERMIT AND/OR DENIAL OF FUTURE PERMIT APPLICATIONS AND/OR PENALTIES OR OTHER STRICTURES.

SPECIAL PROVISIONS:

If any work is planned to occur in a State Park or State Forest, a permit must be obtained from WVDNR – Parks and Recreation.

If any work is planned to occur on National Forest or National Park Service lands, a permit must be obtained from the appropriate agency.

Please provide disposition of any voucher specimens, including the collection number if available.

The WVDNR requests a copy of any papers, reports or theses published as a result of this research.

Reporting: Please provide a report detailing your survey work within 45 days after the expiration date of your permit. The WVDNR prefers a report in electronic format using Microsoft Excel or Access. The following information must be included: date, species name, number of each species observed, number of each species kept, location (county, quadrangle name, and directions), and habitat information. Also include the site coordinates (latitude/longitude or UTMs), or attach a topographical map with the site marked if possible. This information can be emailed to barbara.d.sargent@wv.gov or provided on a CD.

APPLICATION FOR WEST VIRGINIA SCIENTIFIC COLLECTING PERMIT

	ıghman					
Institution\Affiliation:_	West Liberty University					
Street: 208 University Drive College Union Box 139						
City: West Liberty	y: West Liberty State; West Virginia Zip; 26074					
Telephone: (304) 336	3-8 <u>923 Email: zloug</u> h	man@cecinc.com				
	Major Professor:					
Specific Manner of Co	llection:	•				
Crayfish - Seine netting	and dip nets and snorkeling					
Purpose for which spe	ecimens are to be collected (atta	ch abstract):				
Crayfish will be collecte	d for continued monitoring activitie	s on imperilled species, and continued				
data collection of the V	<u>Vest Virginia Crayfish Atlas Project</u>					
How will specimens be disposed? Crayfish will be preserved in the field in 80% ETOH, and transferred to 70% ETOH in the laboratory for long term storage.						
	See to 45 how May 20, 2047	Documber 21, 2017				
Date on Which collect	ing is to be: May 20, 2017	December 31, 2017 (Terminate)*				
	(Commence)*	•				
Location(s) where collections are to be taken (be specific):						
	D (O(-13-1-					
County(s) If aquatic, in						
	ndicate: <u>Statewide</u> Vest Virginia watersheds potentiall	y may be surveyed.				
		y may be surveyed.				
		y may be surveyed.				
		y may be surveyed.				
• • • • • • • • • • • • • • • • • • • •		y may be surveyed.				
		y may be surveyed.				
		y may be surveyed.				
Stream(s): All major V						
Stream(s): All major W	Vest Virginia watersheds potentiall	outh):				

Attach separate pages if additional space is required.

7

(Over)

Report that will result from studies and additional comments or information which may be pertinent to issuing this permit: Permit applications, Monitoring Reports; Reports generated for crayfish surveys/ relocation submitted to WVDNR and USFWS (if required)

Have you received a WV permit in previous years? Yes Most recent year: 2016

Send application to: Scientific Collecting Permit

Wildlife Resources

P.O. Box 67, Ward Road Elkins, West Virginia 26241

SPECIES TO BE COLLECTED OR HANDLED SCIENTIFIC NAME

GENUS	SPECIES	NUMBER
Fishes and Macro		
Crayfish (Cambar	us callainus,Cambarus veteranus) (T&E)	
Crayfish (commor	species)	
		Min. C.
		and the second s
Signature	m M	Date 5/5/ 2017

11/18/03

Please include these individuals as Assistants on the Permit: Zachary Dillard, Katie Scott, Emmy Deleketa, Riley Aulick, Adam Bert, Christopher Vopal, Audrey Sikes.



DIVISION OF NATURAL RESOURCES

Wildlife Resources Section Operations Center P.O. Box 67 Elkins, West Virginia 26241-3235 Telephone (304) 637-0245 Fax (304) 637-0250

Jim Justice Governor Stephen S. McDaniel Director

ADDENDUM TO SCIENTIFIC COLLECTING PERMIT NO. 2017.229

Permittee: Address: Zachary Loughman West Liberty University

208 University Drive College Union Box 139 West Liberty, WV 26074

THE FOLLOWING PROVISIONS ARE ADDED TO THIS PERMIT: Crayfish surveys may be conducted in Horsepen Creek and Gilbert Creek, near Gilbert, Mingo County; Spice Creek and Tug Fork, near Welch, McDowell County; and Indian Creek, Wyoming County.

Written concurrence from the US Fish and Wildlife Service is required prior to surveys.

THIS ADDENDUM MUST BE ATTACHED TO ORIGINAL PERMIT.

Must be signed before valid.

Signature of permittee

Scientific Collecting Permit Coordinator

Date of issue

Appendix E

USFWS Protocol

Big Sandy and Guyandotte River Crayfish Survey Protocol

Project-specific survey plans shall be coordinated with and approved by the lead U.S. Fish and Wildlife Service (USFWS) Field Office at the address below prior to conducting any surveys within potential habitat for the Big Sandy crayfish (*Cambarus callainus*) or the Guyandotte River crayfish (*C. veteranus*). Survey plans should be submitted at least 30 days prior to the proposed start of surveys. When surveys are conducted to evaluate whether a proposed project may affect the species, surveys should be conducted early in project planning so that project modifications can be made to avoid and minimize project effects. Surveyors must hold all appropriate State and Federal collection permits prior to conducting the work.

Surveys are not permitted from July 20 through September 10 due to egg extrusion and rearing of juveniles by females. Surveys must be conducted when water conditions/temperatures are conducive to detecting *C. callainus/C. veteranus*. Water temperature must be above 50° F/ 10° C and surveys cannot be completed for 72 hours after a precipitation greater than 0.5in/1.3cm to ensure clear water and that suitable sampling conditions are present.

Surveys should be conducted throughout the entire reach of stream that may be affected by a potential project; total upstream and downstream distance to be sampled from the point of direct impact will be determined for each project by the USFWS. Once the survey area has been delineated, the area should be divided into sampling reaches and each reach sampled following the approved protocol.

Each sampling reach should be approximately 125 meters (m) in length and include at least one riffle, run, or both riffle and run habitats. Crayfish sampling shall be performed using an 8'x4' seine, with double leads and double floats, and 1/8" netting. Sampling shall be performed by hauling a seine at a minimum of 10 locations within the 125m stream reach. Seine hauls will be completed by overturning every slab boulder (rocks approximately 1m wide x 1m long; 5cm high) present per 2m linear upstream/downstream distance in riffles and runs. One to two slab boulders can be sampled per seine haul.

Seine hauls should be completed with at minimum a two-person team using the seine. One crew member will hold both handles/brails, with the seine spread approximately 2m in width. Handles should be held at a 40°-50° angle from the stream surface. The other crew members should ensure that the seines lead line is making contact with the stream substrate and that the lead line is not resting on substrate items that are planned to be sampled in the ensuing haul. Once these conditions are met, surveyors charged with flipping substrate items should do so quickly and assertively. When each substrate item is overturned, the surveyor should kick in the direction of the seine over the area of stream substrate uncovered by moving rocks being sampled.

Slab boulders should always be given sampling priority given *C. callainus/C. veteranus*' association with them. If a sampling reach does not contain sufficient slab boulders, the following substrate features should be given sampling priority in the following order of importance: boulders, large cobble, course woody debris, and artificial cover. All substrate items should be placed back in their original position immediately following the seine hauls in which they were dislodged from the substrate.

At the end of each haul, surveyors must ensure that the lead line is removed from the water prior to the float line so all captured organisms remain in the net bellows and are not dumped back into the stream following sampling. At this time, crayfishes should be removed from the net and placed into trolling buckets. All substrate items should be placed back in their original position immediately following the seine hauls in which they were dislodged from the substrate.

All crayfishes collected shall be housed temporarily in trolling bait buckets that do not leave the stream proper until processing begins. No more than five adult *C. callainus/C. veteranus* are to be housed in one bucket at one time; multiple buckets are suggested. Buckets are to be anchored in the stream or attached to collectors during active sampling.

Data must be recorded on the standardized datasheets provided with your collecting permit. A minimum of ten seine hauls per sampling reach is required; the total number of seine hauls employed at a reach shall be recorded as well as the total number of crayfish collected of each species per seine haul. Electric fishing gear <u>should never</u> be used at potential *C. callainus* and *C. veteranus* sites. Electric fishing gear is not considered efficient gear for the collection of stream crayfishes.

When sampling is completed, collectors are required to identify all captured crayfish to species, sex all captured crayfish (Form I, Form II, Female, Female Glair, Female-Ovig, Female-Attached Juveniles), and record total carapace length (TCL) in millimeters for each *C. callainus/C. veteranus* encountered using calipers. Data shall be recorded on the standardized WVDNR Crayfish Morphometric Datasheet. A photographic voucher is required for all *C. callainus/C. veteranus* captured prior to release; representatives of other crayfish species should also be photographed. Every effort should be undertaken to ensure animals are outside of water for the briefest period of time possible (5 minute maximum, but a shorter period is preferred). Following data collection, animals are to be returned to the stream bottom upstream of their home rocks and guided back to their rock or other substrate debris.

Collection of water quality and physical habitat metrics are required at each collection locale. At each sampling site, pH, temperature, percent dissolved oxygen, turbidity, and conductivity are to be measured. In addition to water quality, physical habitat will be evaluated through completion of a Qualitative Habitat Evaluation Index (QHEI; OEPA 2006).

If any C. *callainus* or C. *veteranus* are captured, the appropriate State wildlife agency in which the surveys were conducted and the appropriate USFWS Field Office(s) shall be notified within 48 hours of collection via a reporting spreadsheet developed by the WVDNR. Written reports of all survey efforts shall be provided to the appropriate State wildlife agency in which the surveys were conducted and the appropriate USFWS Field Office(s) and shall include, at a minimum, information on the survey dates and water conditions, who conducted the survey, the methods used, survey results including results per seine haul, photographs of C. *callainus or C. veteranus* specimens and of the survey area, and all water quality and QHEI data gathered.

Agency Contact Information:

States:

Kentucky Department of Fish and Wildlife Resources #1 Sportsman's Lane, Frankfort, KY 40601 (502) 564-7109

Virginia Department of Game and Inland Fisheries 7870 Villa Park Drive, Suite 400, Henrico, VA 23228 (804) 367-1000

West Virginia Division of Natural Resources PO Box 67, Elkins, WV 26241 (304) 637-0245

U.S. Fish and Wildlife Service:

Kentucky Ecological Services Field Office 330 West Broadway, Suite 265, Frankfort, KY 40601 (502) 695-0468

> Virginia Ecological Services Field Office 6669 Short Lane, Gloucester, VA 23061 (804) 693-6694

West Virginia Ecological Services Field Office* 694 Beverly Pike, Elkins WV 26241 (304) 636-6586

*denotes lead recovery office