Zoogeography, conservation, and ecology of crayfishes within the Cheat River basin of the Upper Monongehela River drainage, West Virginia.

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ABSTRACT

During summer 2008, we studied the geographic distribution and conservation status of crayfishes within the Cheat River basin of the upper Monongahela River drainage. Stream sites (n = 73) were selected with a probabilistic sampling design, whereas one reservoir (Cheat Lake) and seven terrestrial sites for burrowing crayfishes were selected non-randomly. Stream crayfishes were seined or hand-collected following standardized protocols, and physical habitat and physiochemical water quality parameters were recorded at each site. *Cambarus b. bartonii*, *C. carinirostris*, and *Orconectes obscurus* were initially documented within the Cheat River basin in 1956. Surveys conducted in the late 1980s documented the presence of *C. carinirostris*, *C. dubius, C. monongalensis,* and *O. obscurus*. Our data on crayfish distributions from 2008 are consistent with those of the late 1980s. Survey data from 1956, however, indicated depauperate populations of *Cambarus* throughout the basin during a time period of basin-wide habitat and water quality degradation. Currently, *C. carinirostris* is abundant throughout the Cheat River system, except in areas with low pH and elevated conductivity. *Orconectes obscurus* populations within the Cheat River basin are stable and occur primarily in higher stream orders. Future astacological efforts in the Cheat River basin, however, are needed to define the distribution of the basins two burrowing species, *C. dubius* and *C. monongalensis*.

INTRODUCTION

The recent decline and extirpation of crayfish populations in the Appalachian region are a cause for conservation concerns (Taylor et al. 2007; Simon et al. in press). Critical needs for crayfish conservation assessments include information on the abiotic and biotic causes of change in species distributions and faunal compositions, as well as basic natural history data. In the Appalachian region of the eastern United States, land use practices, particularly mining and timbering, have degraded water quality and altered the distribution and composition of crayfish faunas. Also, water quality is impacted by acid precipitation within the region, particularly in watersheds with poor buffering capacity.

The Cheat River basin of the upper Monongahela River drainage is an example of a poorly buffered watershed within the Appalachian region with a history of water quality degradation from mining, timbering, and acidic precipitation. The crayfish fauna of the Cheat River watershed was first studied by Ortmann (1906) and Hay (1914). Ortmann (1906) described the distribution of three *Cambarus* species, as well as *Orconectes obscurus (= Cambarus obscurus)* within the greater Monongahela River system. Hay (1914) collected *Cambarus dubius (= Cambarus carolinus)* and *Cambarus bartonii bartonii*, and described a new subspecies, *Cambarus bartonii carinirostris*, with the type locality of Gandy Creek, Randolph County. Nearly a half century later, Schwartz and Meredith (1960; 1962a) conducted the first comprehensive basin-wide crayfish survey of the Cheat River during the summer of 1956. Their survey data from 218 sites in West Virginia's section of the Cheat River drainage supported *Cambarus b. bartonii* as the dominant species, and both *C. dubius* and *C. b. carinirostris* as extirpated species (Schwartz and Meredith 1960; Schwartz and Meredith1962b). Also, Schwartz and Meredith (1962b) reported the presence of *O. obscurus,* and predicted that environmental degradation would extirpate this species. In the late 1980's, Jezerinac et al. (1995) conducted surveys within the Cheat River basin and documented the presence of *C. b. carinirostris*, *C. dubius*, *Cambarus monongalensis*, and *O. obscurus*. Following this study, Thoma and Jezerinac (1999) elevated *C. b. carinirostris* from subspecies to species status *(C. carinirostris)*.

The Cheat River basin within West Virginia has experienced extreme environmental degradation (Schwartz and Meredith 1962; Pauley 2008). Mining efforts began in the late 1800's and continue to the present (Schwartz and Meredith 1962; Stewart and Skousen 2003). As a result, the mainstem and tributaries of the Cheat River watershed have experienced acid mine drainage (AMD) and acidification (Schwartz and Meredith 1962; Stewart and Skousen 2003; Pauley 2008). During the first half of the 1900's, both the Cheat River basin's Appalachian plateau hardwood forests and spruce/fir forests of the Allegheny Mountains were clear-cut twice (Pauley 2008). Following clear-cutting, forest debris throughout the higher elevations was burned, causing wide-scale soil degradation and erosion (Pauley 2008).

Water quality improvements within the Cheat River watershed began in the 1970's in response to the Clean Water Act (CWA) and the Surface Mine Reclamation Act (SMRCA) (Stewart and Skousen 2003). The addition of limestone sand as a remediation approach neutralized acidified headwater streams and increased pH in many watersheds (Stewart and Skousen 2003; Freund and Petty 2007). Protection of forests aided in limiting siltation and decreased the impacts of floods. Portions of the Cheat River are still in need of remediation efforts; however, the Cheat River in the 21st century is an environmentally improved watershed compared to that surveyed by Schwartz and Meredith (1960; 1962a; 1962b).

In order to determine crayfish recovery and response to changing environmental conditions, we initiated a crayfish study of the Cheat River basin, West Virginia. Our study objectives were as follows: (1) determine the distribution, faunal composition, and life history of crayfish species within the Cheat River basin,(2) define potential conservation threats to crayfishes occurring in the watershed, and (3) evaluate faunistic changes over the past 52 years.

METHODS

STUDY AREA

The Cheat River, with a catchment area of 3,686 km^2, flows from south to north in Randolph, Tucker, and Preston counties, West Virginia. The basin includes portions of the Appalachian Plateau north of Parsons, Tucker County, while southern portions of the basin include the Allegheny Mountain province. Elevations are lower in the northern headwaters than that of the southern headwaters. Hardwood forests consist of maples, oaks, hickories, and birches in the northern basin. Hardwood forests are present at elevations up to 914 m, but higher elevations are dominated by red spruce, balsam fir, and yellow birch forests (Schwartz and Meredith 1962b; Pauley 2008).

Stream gradients throughout the Cheat watershed are moderate to high (Schwartz and Meredith 1962). Tributaries in the northern reaches of the basin drain directly into the Cheat River mainstem and include Buffalo Creek, Saltlick Creek, Big Sandy Creek, and Roaring River (Schwartz and Meredith 1962b). The Cheat River is formed by the confluence of Shavers Fork and Black Fork River in the southern basin (Schwartz and Meredith 1962b). Higher elevation tributaries in the southern watershed include Shavers Fork, Black Fork, Glady Fork, Dry Fork River, and Blackwater River (Schwartz and Meredith 1962). The Blackwater River and portions of Dry Fork River are naturally acidic from plant tannins (Schwartz and Meredith 1962).

STUDY DESIGN AND SITE SELECTION

Stream sites were selected following a probabilistic sampling design (Figure 1). Forty non-weighted, randomly chosen stream reaches were generated with GIS for each 10 digit Hydrologic Unit Code (HUC) within the basin. From these 40 sites, 10 sites were selected based on equal coverage of all stream orders and land owner permission. Sites at Cheat River Reservoir and those for burrowing crayfish were selected based on access, and were not randomly selected due to the difficulty of predicting suitable habitats.

PHYSIOCHEMICAL VARIABLES

Physiochemical stream parameters were measured at each stream collection site with a YSI 6920V2 data sonde (pH, temperature, percent dissolved oxygen, turbidity, and conductivity). Two treatment groups were established for *C. carinirostris* and *O. obscurus* sites based on species presence or absence at a site. Unpaired t tests ($\alpha = 0.05$) were used to test for differences in mean values of physiochemical data between treatment groups.

CRAYFISH COLLECTION METHODS

Crayfish sampling occurred in June, coinciding seasonally with Schwartz and Meredith's collections and including 73 stream sites, five sites in Cheat River Reservoir, and seven sites with terrestrial burrows (Appendix 1). Ten seine hauls were performed at each stream site with 2.4 x 1.3-meter seines, and typically included riffles, runs, and pools. Unbaited minnow traps were deployed in Cheat River reservoir for a 48-h sampling period. Burrowing crayfish were sampled adjacent to randomly-selected stream sites or at other sites based on the presence of burrow portals. Burrowing species were excavated or hand-collected at night during periods of surface activity following precipitation. All animals collected at each site were vouchered in 70% ethanol.

LIFE AND NATURAL HISTORY

Only stream crayfishes had sample sizes adequate for life history analysis. Each specimen was identified and assigned to a demographic group: non-ovigerous female, ovigerous female, form I male, or form II male. Total carapace lengths (TCL), measured to the nearest 0.1 mm with dial calipers, were used to generate size frequency histograms for each stream species. Ovigerous female egg compliments were counted to estimate fecundity, and the average egg diameter (mm) was estimated from of a sub-sample of 30 randomly chosen eggs. All specimens were deposited in the West Liberty University astacology collection.

RESULTS

DISTRIBUTION AND COMPOSITION OF THE STREAM FAUNA

We collected two stream species from the Cheat River basin; *Cambarus carinirostris* and *Orconectes obscurus*. *Cambarus carinirostris* was the most abundant species, present at 80.3% of sites (Figure 2). *Cambarus carinirostris* was present in all major tributaries and headwaters of the Cheat. Large populations were present in the Blackwater River, Shavers Fork, Sandy Creek, and Dry Fork. *Cambarus b. bartonii* was not collected within the basin. *Orconectes obscurus* was collected infrequently, occurring at 11.4% of sites (Figure 3). We found *O. obscurus* populations in the same streams as documented by Schwartz and Meredith (1960, North Fork, Blackwater River, Mill Run, Sand Run, Little Sandy Creek, and Shavers Fork). Mean values of stream order, water temperature, conductivity, pH, turbidity, and percent dissolved oxygen for sites that did and did not harbor *C. carinirostris* and *O. obscurus* are presented in Table 1. Sites harboring *C. carinirostris* had significantly lower conductivity ($t_{(42)}$ = 1.59, p = 0.0002) and higher pH ($t_{(42)}$ = 4.95, p = 0.0001). The presence of *Orconectes obscurus* was associated with stream order; median stream order was four for *O. obscurus* and one for *C. carinirostris* (Figure 4).

LIFE HISTORY

A total of 415 *C. carinirostris* were collected in this study, with a 1.05/1.0 male: female ratio. The mean TCL of form I males (= 32.3 mm, n= 5, range = 21.3-39.0 mm, SE = 2.7) was larger than that of form II males (= 23.6 mm, n = 215, range = 9.2-38.6, SE 5.9). Mean TCL of females (= 24.0 mm, n= 209, range = 11.7-42.2 mm, SE = 6.6) was slightly larger than that of form II males, but smaller than that of form I males. The largest individual captured was a female with a 42.2 mm TCL from Shavers Fork, Randolph County. Mean TCL for the pooled sample was 23.5 mm (n= 415, range = 9.2-42.2 mm, SE = 2.7). Seven size cohorts were present in this population: 12, 15, 21, 26, 30, 35 and 38 mm (Figure 5). One ovigerous female was collected on 25 June 2008 from under a large sandstone slab in Buck Run, Randolph County. Total egg compliment numbered 132, with a mean egg diameter of 2.1 mm.

We collected 118 *O. obscurus* with a male to female ratio of 1.0:2.11. Zero form I males were collected, though several recently form I to form II molted individuals were collected early in the study (10 – 15 June 2008). The mean TCL of form II males was 25.6 mm (n = 38, range = 14.8-33.7 mm, SE = 4.4). Female mean TCL was 25.0 mm (n = 80, range = 11.5-41.0, SE = 5.43); zero ovigerous female were collected. The largest individual captured was a female with a 41.0 mm TCL from the Cheat River, Preston County. Mean TCL for the pooled sample was 24.9 mm (n = 118, range 11.5-41.0, SE = 5.44). Seven size cohorts were present within the population: 14, 19, 24, 26, 30, 33, and 38 mm (Figure 6).

DISTRIBUTION AND COMPOSITION OF BURROWING CRAYFISHES

Two burrowing species (*C. dubius* and *C. monongalensis*) were collected in the Cheat River basin. Burrowing species were not the main focus of this study, so the low numbers of locations do not represent the overall density or geographic distribution of these species within the drainage (Figure 7). Schwartz and Meredith (1960; 1962b) concluded that *C. dubius* was extirpated from the Cheat River basin. Jezerinac et al. (1995) were the first to document *C. monongalensis* in the Cheat River basin and collected *C. dubius* at several locations reaffirming its presence in the basin. Both *C. dubius* and *C. monongalensis* were collected during our efforts.

Cambarus dubius and *C. monongalensis* do not occur syntopically within the Cheat River basin. *Cambarus dubius* is present in the northern and central portions of the system, and *C. monongalensis* frequents the southern headwater portions of the basin. Habitats for the two species, however, were similar and included forested seeps, roadside ditches, and high elevation wetlands. *Cambarus dubius* colonies were observed in yards and ditches in the city limits of Kingwood, Rowlesburg, and Albright. Large populations of *C. monongalensis* were present throughout Canaan Valley, Tucker County.

DISCUSSION

Schwartz and Meredith (1962b) predicted a dire future for crayfishes within the Cheat River basin; two taxa appeared to be extirpated (*C. carinirostris* and *C. dubius*) from the watershed and *O. obscurus* was experiencing severe decline. In the late 1980s, however, Jezerinac et al (1995) found all three species present in the Cheat River basin (*C. carinirostris, C. dubius*, and *O. obscurus*) in addition to a fourth species, *C. monongalensis*. Our study documented all four species across multiple sites and streams, and did not support conservation concerns relative to fragmented populations or low population sizes. We attribute the recovery of crayfish taxa within the Cheat River basin to improvements in water quality since the study of Schwartz and Meredith (1962b); however, stream stressors such as acidification and sedimentation are still present within the basin. Schwartz and Meredith (1960) identified all *Cambarus* from streams as *Cambarus b. bartonii* and questioned the taxonomic validity of *C. b. carinirostris*. Schwartz and Meredith (1960) used the presence of a medina carina on the rostrum as the only character to identify *C. carinirostris*. The presence of a rostral carina varies tremendously across the geographic range of *C. carinirostris*, and use of this single character would likely lead to species misidentification (Jezerinac et al 1995; Thoma and Jezerinac 1999). Thoma and Jezerinac (1999) relied on chelae morphology to differentiate between the two species. We also used chelae morphology (large 4th tubercle on the propodus, presence of adpressed tubercles on the mesial margin of the palm) to differentiate between *Cambarus b. bartonii* and *Cambarus carinirostris*.

Cambarus carinirostris were present in 80.3% of the sites in our study compared to 59.2% of collections by Schwartz and Meredith (1960). Mining impacts influence the distribution of *C. carinirostris* within the Cheat River drainage (Appendix I). All sites lacking *C. carinirostris* were impacted by acid mine drainage with lower pH and higher conductivity levels relative to those sites with *C. carinirostris* present. The lower percentage of collections of *C. carinirostris* by Schwartz and Meredith (1960) may have resulted from poor water quality, but may also be associated with species misidentification.

Several researchers have shown that members of the *C. b. bartonii* complex (which includes *C. carinirostris*) often tolerate streams acidified by acidic deposition (DiStefano et al. 1991; Gallaway and Hummon 1991; Griffith et al. 1996). In our study, the presence of *Cambarus carinirostris* in the Blackwater River and Red Creek, two naturally acidic streams within the Cheat River watershed, demonstrates the physiological ability of *C. carinirostris* to persist in acidic streams. Griffith et al. (1996) determined that annual production of young-of-the-year *C. carinirostris* in an acidified Cheat River stream (i.e., Crouch Run, Randolph County) was 200 times that of *C. b. bartonii* in a circumneutral stream in North Carolina. Stream acidification can eliminate crayfish competitors and predators, which increases ecological opportunities for crayfishes in some streams (Kimmel et al. 1985; Kobuszewski and Perry 1993).

Streams impacted by AMD typically have low pH and high conductivities. Stream conductivity may have a larger influence on crayfish populations than that of stream pH within the Cheat River basin. Benthic macroinvertebrate populations are reduced or extirpated in mining-impacted streams with high conductivity (Hartman 2005; Pond et al. 2008). In our study, sites with *C. carinirostris* had lower conductivity (mean = 0.079, SE = 0.09) than those without *C. carinirostris* (mean = 0.44, SE = 0.48); hence, conductivity may explain *C. carinirostris* absence. Schwartz and Meredith (1962) indicated that within the Cheat River basin conductivity levels were elevated throughout the central and northern portions of the watershed. Efforts to neutralize pH has returned conductivity to normal levels in several streams (Stewart and Skousen 2000; Freund and Petty 2007). In our study, conductivity values of some streams within the basin were within the range for normal physiological function in benthic macroinvertebrates, a possible explanation for the abundance of sites harboring *C. carinirostris*.

Orconectes obscurus were collected during our study at 11.4% of sites compared to 12.7% of sites visited by Schwartz and Meredith (1960). The low site presence of this species in our study may be an artifact of the sampling regime; relatively few large (4^{th} - 5^{th}) order streams were sampled during this study. Our large order streams comprised only 4.3% of collection sites while 44% of *O. obscurus* were collected in 4^{th} order streams. The largest catch-per-unit-efforts (CPUE) for any species captured in our study were for *O. obscurus* from 4^{th} order streams. If additional large order streams were surveyed, then we would have likely documented additional records of *O. obscurus*.

Our data do not support extirpation or near-extirpation status of crayfishes within the Cheat River watershed. Acid mine drainage, however, is still the most immediate concern regarding negative-impacts on crayfishes within the Cheat River basin. Water quality improvements have resulted from the cumulative effects of many remediation efforts within the watershed, specifically the addition of limestone sands within the headwaters of many tributaries. Other forms of environmental degradation, such as timbering occur in the Cheat, but are reduced from levels observed in the past (Pauley 2008). Future research efforts in the basin should determine the distribution of the watershed's two primary burrowers. Little is known of *C. dubius* and *C. monongalensis* distribution. Given their apparent inability to occur sympatrically, opportunities exist in the Cheat to better understand what governs niche occupation in montane burrowing crayfishes. Though the Cheat River crayfishes have recovered from the environmental destruction of Schwartz and Meredith's era, efforts to preserve this fauna should be incorporated into subsequent research pursuits.

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Table 1. Stream order and mean water quality variables for sites harboring and not harboring *Cambarus carinirostris* and *Orconectes obscurus*. Brackets indicate relative percentage of variable, parentheses indicate one standard error.

Species	n sites	Stream - order range	$\bar{X}$ Temp (^oC)	$\bar{X}$ Conductivity (mS/cm)	$\bar{X}$ pH	$\bar{X}$ Turbidity (ntu)	$\bar{X}$ Oxygen saturation (%)
C. carinirostris present	49 [80.3%]	1-3	15.5 (1.71)	0.079 (0.09)	7.79 (0.78)	8.06 (10.97)	93.75 (3.89)
C. carinirostris absent	12 [19.7%]	1-4	15.94 (1.33)	0.44 (0.48)	5.98 (1.75)	3.65 (2.85)	96.56 (4.44)
O. obscurus present	7 [11.4%]	3-4	17.98 (3.12)	0.093 (0.073)	7.38 (0.44)	10.78 (13.54)	96.27 (6.12)
O. obscurus absent	54 [88.6%]	1-3	15.45 (1.29)	0.14 (0.25)	7.54 (1.31)	8.54 (10.78)	93.18 (3.82)

Figure 1. Historic and recent sites of crayfish collections in the Cheat River basin.

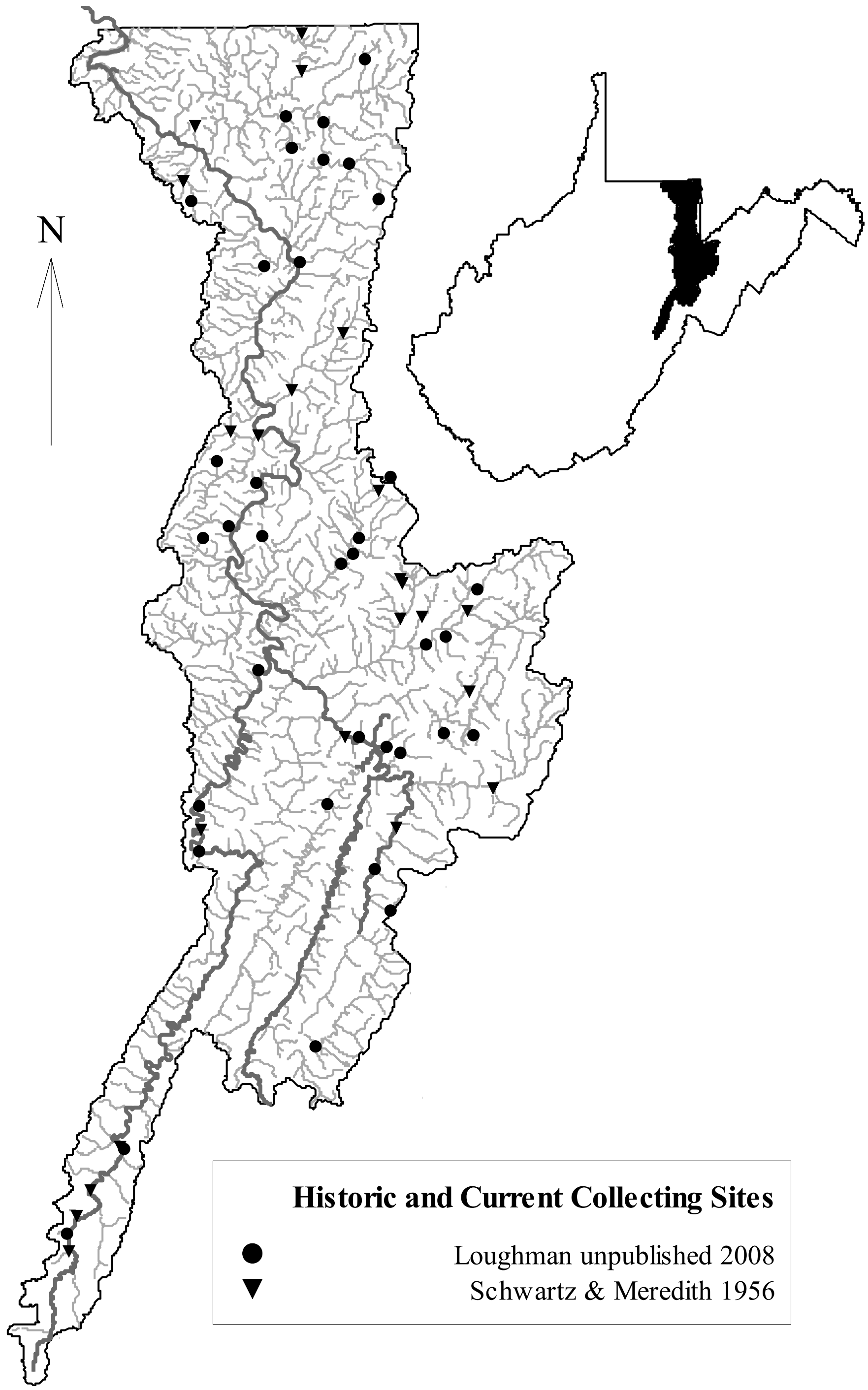

Figure 2. Historic and recent collection sites of *Cambarus carinirostris* within the Cheat River basin.

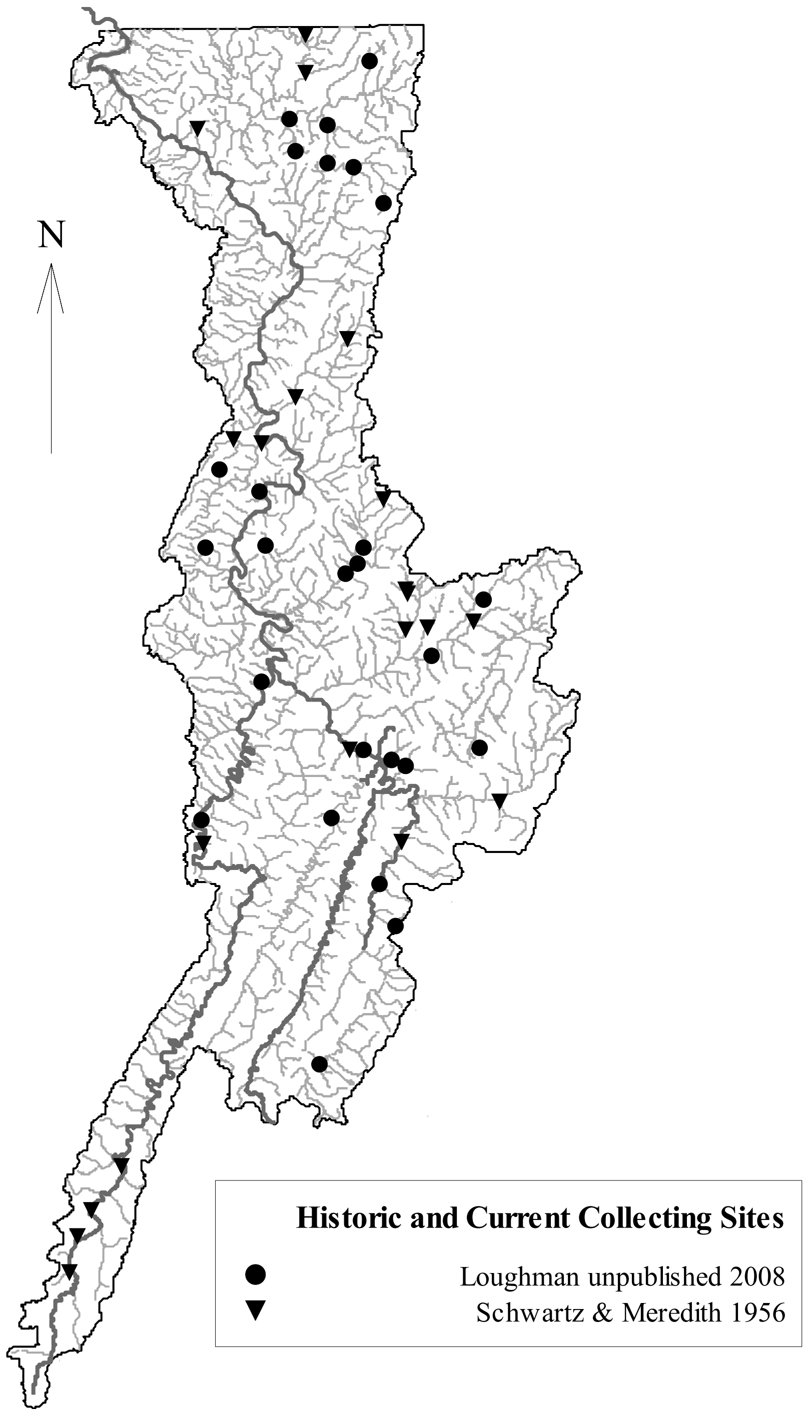

Figure 3. Historic and recent collection sites of *Orconectes obscurus* within the Cheat River basin.

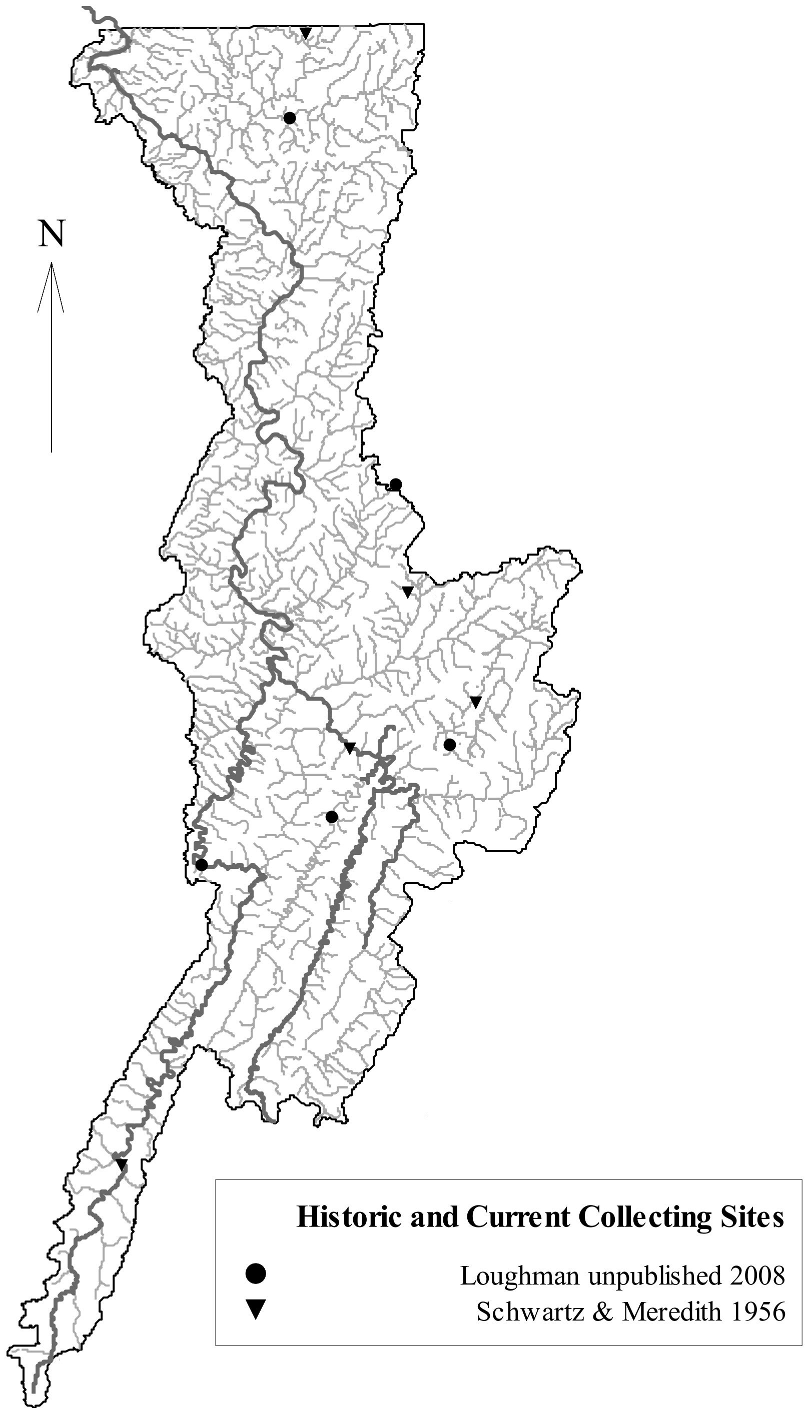

Figure 4. The relative percent of captures of *Cambarus carinirostris* and *Orconectes obscurus* by stream order.

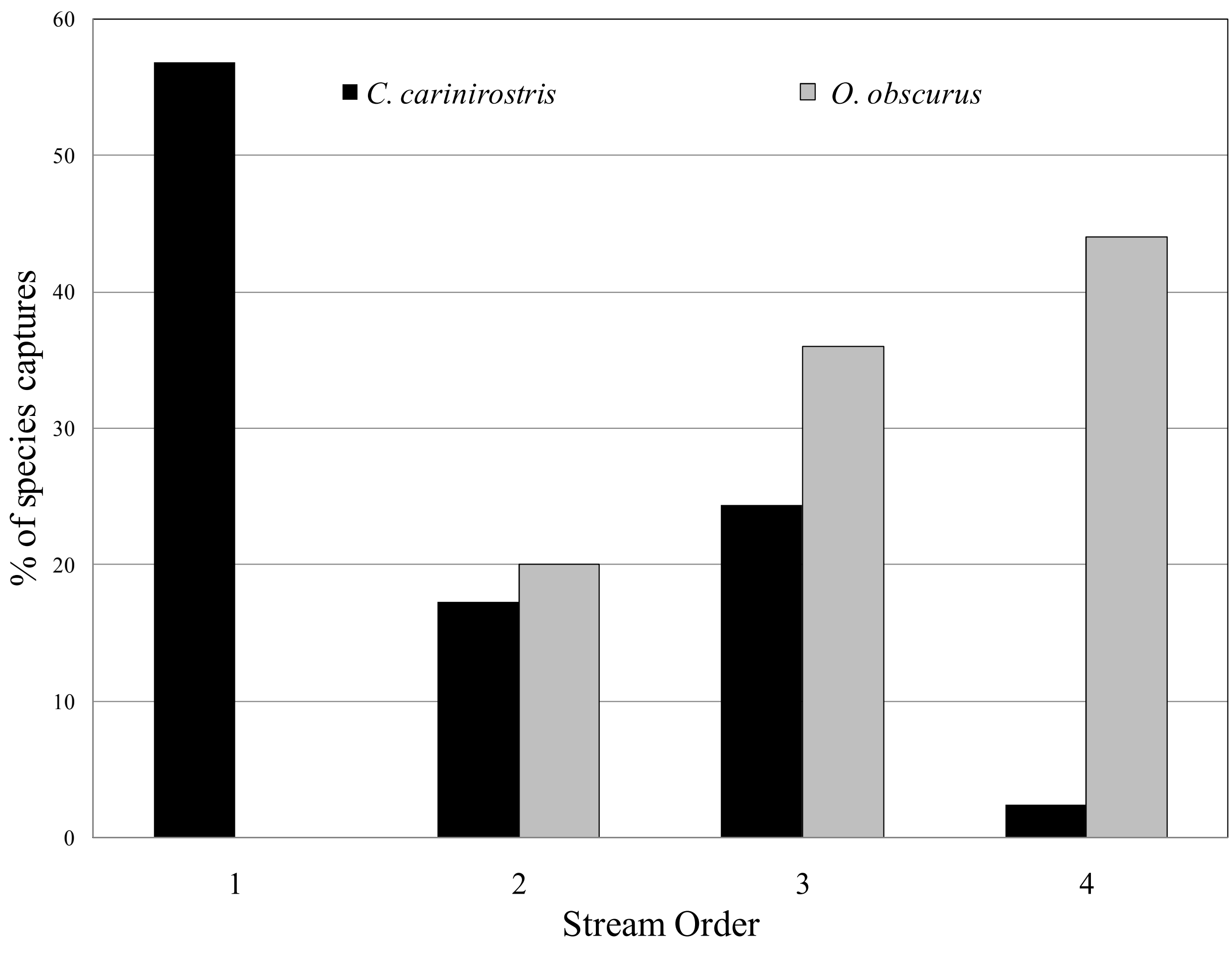

Figure 5. The distribution of total carapace length (TCL) for *Cambarus carinirostris* from the Cheat River basin, West Virginia.

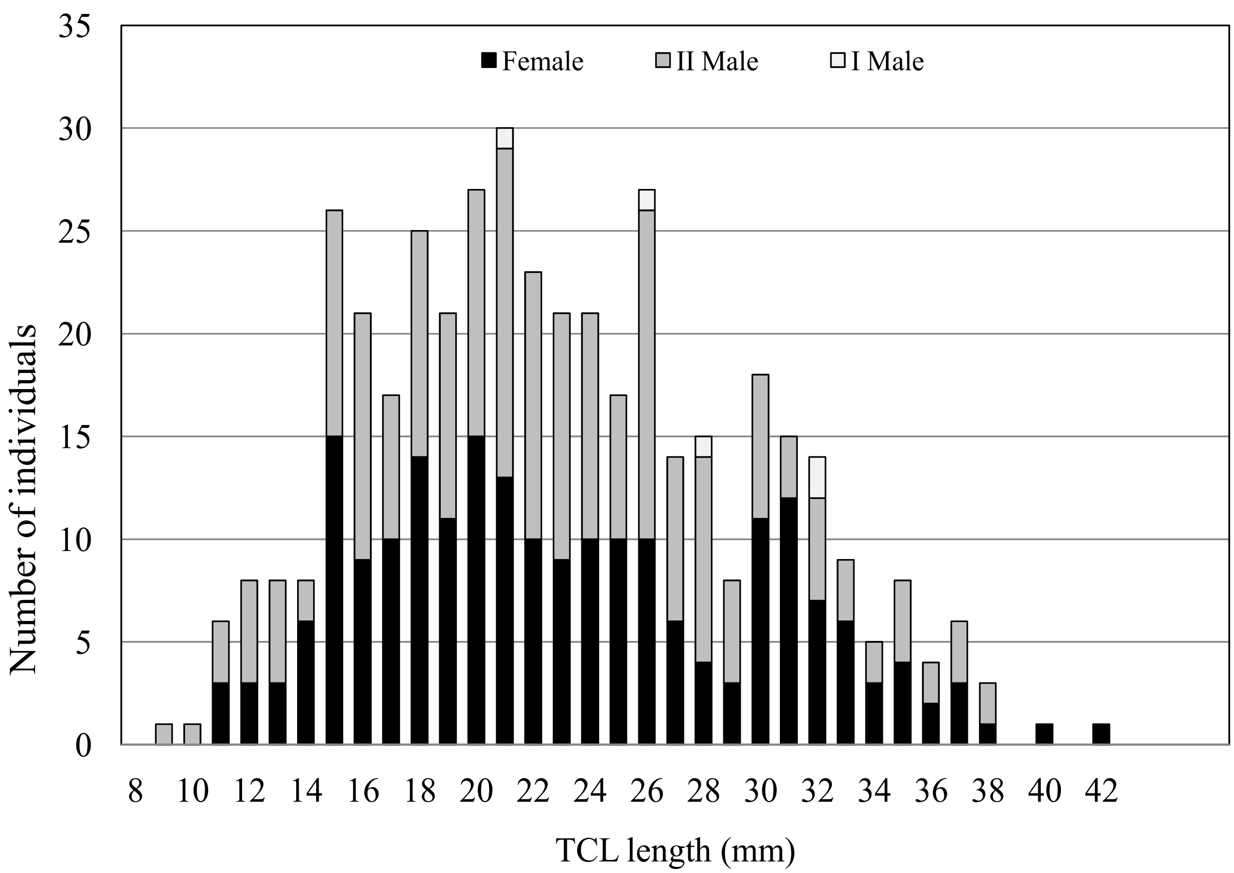

Figure 5. The distribution of total carapace length (TCL) for *Cambarus carinirostris* from the Cheat River basin, West Virginia.

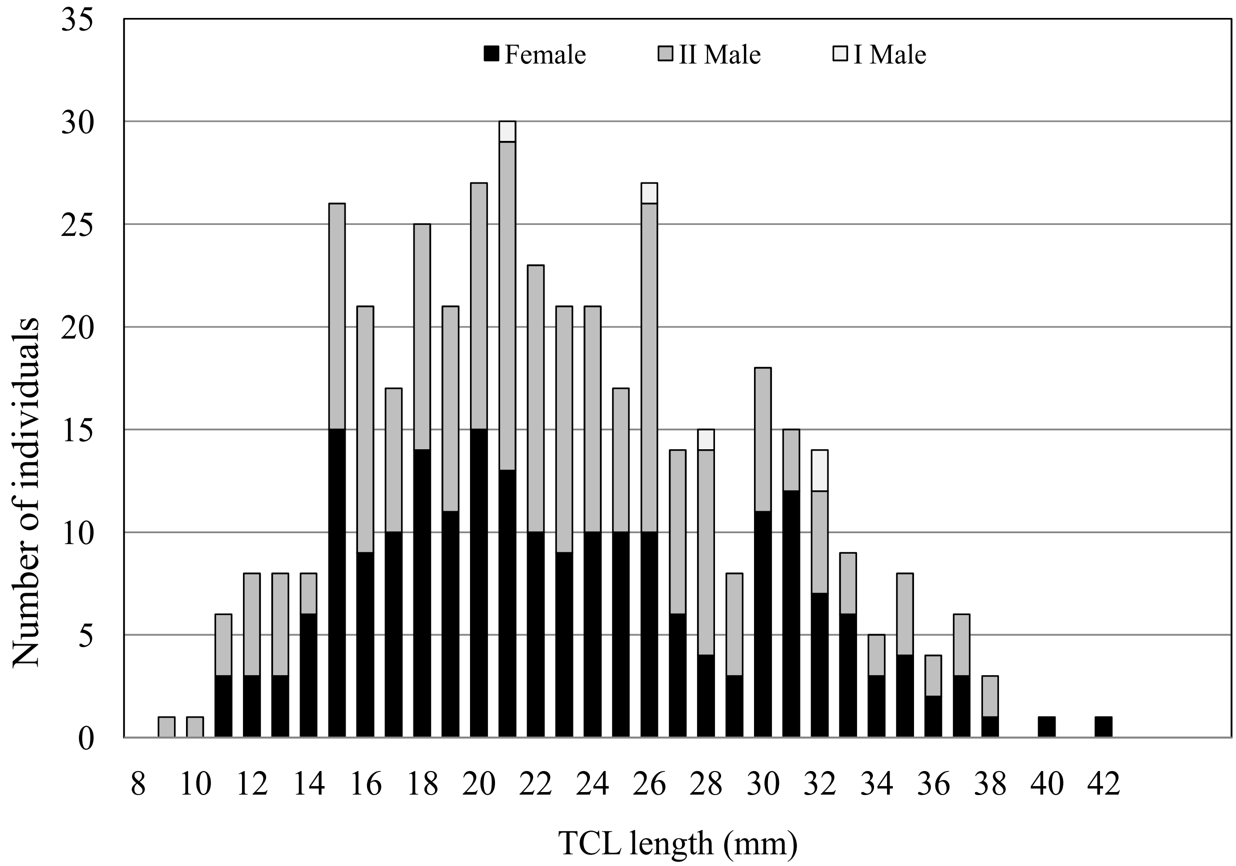

Figure 7. Collection sites of *Cambarus dubius* and *Cambarus monongalensis* in the Cheat River basin.

Appendix I: 2008 Cheat River basins crayfish collection sites. The following abbreviations apply to counties: G = Grant, P = Preston, R = Randolph, T = Tucker.

Site #	Stream Name	County	UTM N	UTM E	*Cambarus carinirostris*	*Cambarus dubius*	*Cambarus monongalensis*	*Orconectes obscurus*
1	Mill Run	G	633405	4320766	0	0	0	2
2	Beaver Creek	P	620240	4387288	11	0	0	0
3	Big Run	P	606400	4386734	1	2	0	0
4	Birchroot Creek	P	608726	4350423	18	0	0	0
5	Buffalo Creek	P	613122	4353043	12	0	0	0
6	Bull Run	P	605058	4380698	0	0	0	0
7	Bull Run	P	605058	4380698	0	0	0	0
8	Flag Run	P	610235	4353494	10	0	0	0
9	Glade Run	P	617812	4392806	6	0	0	0
10	Hog Run	P	624670	4394021	13	0	0	0
11	Laurel Run	P	629037	4359367	10	0	0	0
12	Laurel Run	P	609442	4395566	0	0	0	0
13	Little Sandy Creek	P	617869	4396766	12	0	0	2
14	Little Sandy Creek	P	616200	4387777	9	0	0	5
15	Maple Run	P	627496	4348635	0	0	0	22
16	Mountain Run	P	605058	4380698	0	0	0	0
17	Mountain Run	P	605058	4380698	0	0	0	0
18	Muddy Creek	P	626201	4378721	14	0	0	0
19	Muddy Creek	P	620338	4383100	3	0	0	0
20	Muddy Creek	P	620338	4383100	3	0	0	0
21	Muddy Creek	P	623082	4382664	6	0	0	0
22	N. Br. Snowy Creek	P	627552	4368297	16	0	0	18
23	Pine Run	P	626391	4363196	2	0	0	0
24	Saltlick Creek	P	616758	4358120	6	0	0	0
25	Saltlick Creek	P	622391	4364228	2	0	0	0
26	S. Fk. Bull Run	P	605846	4378524	0	0	0	0
27	S. Fk. Bull Run	P	605846	4378524	0	0	0	0
28	S. Fk. Greens Run	P	613787	4371444	0	0	0	0
29	S. Fk. Greens Run	P	613787	4371444	0	0	0	0
30	UNT Cheat River	P	612983	4347947	28	0	0	0
31	UNT Webster Run	P	616869	4384431	1	1	0	0
32	Beaver Creek	R	592590	4264290	5	0	0	0
33	Buck Run	R	593540	4268161	10	0	0	0
34	Dry Fork	R	625887	4305907	4	0	1	0

Site #	Stream Name	County	UTM N	UTM E	*Cambarus carinirostris*	*Cambarus dubius*	*Cambarus monongalensis*	*Orconectes obscurus*
35	Dry Fork	R	628200	4310523	10	0	0	0
36	Gandy Creek	R	619345	4286752	9	0	1	0
37	Glady Fork	R	620790	4313138	8	0	0	3
38	Johns Run	R	606691	4312792	1	0	0	0
39	Left Fork Files Creek	R	604190	4298353	16	0	0	0
40	Shavers Fork	R	592328	4266247	8	0	0	0
41	Shavers Fork	R	598577	4275631	5	0	0	0
42	Shavers Fork	R	606699	4307864	0	0	0	2
43	Shavers Fork	R	598277	4275785	5	0	0	2
44	Shavers Fork	R	594909	4271024	3	0	0	0
45	Stinking Run	R	627637	4301393	1	0	0	0
46	UNT Shavers Fork	R	606951	4310332	1	0	0	0
47	Beaver Cr.	T	636894	4336313	2	0	0	0
50	Blackwater River	T	622555	4320269	1	0	0	1
51	Cherry Run	T	607237	4341935	5	0	0	0
52	Devils Run	T	633561	4331249	0	0	0	0
53	Devils Run	T	633561	4331249	0	0	0	0
54	Eugiene Run	T	631399	4330397	1	0	1	0
55	Eugiene Run	T	631399	4330397	1	0	0	0
56	Ford Run	T	613570	4342268	10	0	0	0
57	Glade Run	T	628608	4337507	8	0	0	0
58	Glady Fk.	T	627138	4319344	6	0	0	0
59	Horseshoe Run	T	623394	4340183	6	1	0	0
60	Laurel Run	T	622215	4339200	13	0	0	0
61	Leadmine Run	T	626360	4347047	13	0	0	0
62	Licking Cr.	T	609939	4343306	0	0	0	0
63	Blackwater R.	T	636553	4320540	24	0	2	0
64	Blackwater R.	T	624056	4320346	5	0	0	0
65	N. Fork Blackwater	T	628681	4333205	18	0	0	0
66	N. Fork Blackwater	T	636011	4325174	0	0	0	23
67	Pendleton Creek	T	630897	4333297	6	0	0	0
68	Red Creek	T	638591	4314830	2	0	0	0
69	Sand Run	T	628724	4337134	7	0	0	31
70	Sugar Camp Run	T	613238	4327654	23	0	0	0
71	Wolf Run	T	624018	4342007	3	0	0	0
72	Yellow Creek	T	635833	4333949	9	0	0	0
73	Yellow Creek	T	635833	4333949	9	0	0	0