

**Summary of Stream Habitat and Macroinvertebrate Inventories on the
Conasauga Ranger District of the Chattahoochee National Forest, Georgia
2009**



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Introduction

The Conasauga Ranger District (CRD), located in the Chattahoochee National Forest (CNF), Georgia, is close to several major metropolitan areas, including Atlanta, GA and Chattanooga, TN, resulting in high visitation. Located in the CRD, the Mountaintown Creek watershed contains popular blue ribbon trout streams (Mountaintown Creek, Crenshaw Branch, Heddy Creek, and Dyer Branch), hiking trails (Mountaintown Creek Trail and Pinhoti Trail), and mountain bike trails (Mountaintown Creek Trail). Much of the existing trail system follows abandoned logging roads, now maintained by the CNF and various trail clubs. The popularity of the multiple-use trail system and emerging access challenges prompted an environmental assessment and subsequent scoping notice proposing re-routed trails for anglers, hikers, and cyclists (USFS 2008 & 2009).

In summer 2009, the Chattahoochee National Forest (CNF) requested assistance from the USDA Forest Service, Southern Research Station, Center for Aquatic Technology Transfer (CATT) with stream habitat and macroinvertebrate inventories on Mountaintown Creek, Crenshaw Branch, and Heddy Creek in the Conasauga Ranger District (Figure 1). Our goals were: 1) quantify current stream habitat conditions; and 2) describe water quality using macroinvertebrate metrics. The CATT deployed a 4-person crew to the Conasauga Ranger District on the CNF from September 5-7, 2009 to inventory stream habitat and collect macroinvertebrate samples.

Methods

Habitat Inventory

We performed a basinwide visual estimation technique (BVET) habitat inventory on Mountaintown Creek, Crenshaw Branch, and Heddy Creek (Figure 1) (Dolloff et al. 1993).

We recorded the following attributes:

- Habitat unit type (pool, glide, riffle, run, or cascade)
- Habitat unit wetted width (visually estimated)
- Distance
- Dominant and subdominant substrate
- Percent fines
- Large wood

At a subset of habitat units we measured:

- Habitat unit wetted width

We noted, photographed, and recorded GPS coordinates for stream features including:

- Waterfalls
- Tributaries
- Side channels
- Braided channels
- Bridges
- Fords
- Dams
- Culverts

Mountaintown Creek

The habitat inventory on Mountaintown Creek began at the USFS Boundary (just north of Hills Lake) and ended 3.9 km upstream at the confluence with Heddy Creek and Crenshaw Branch.

Crenshaw Branch

The habitat inventory on Crenshaw Branch began at the confluence with Heddy Creek and ended 4.7 km upstream at the final trail-crossing (an old log bridge) with the Mountaintown Creek Trail.

Heddy Creek

The habitat inventory on Heddy Creek began at the confluence with Crenshaw Branch and ended 2.4 km upstream at the confluence with an unnamed tributary (NHD reach code 03150102000682).

Macroinvertebrates

We randomly selected 3 non-overlapping sample sites within 4 separate reaches for a total of 12 sample sites (Figure 1 and Table 1):

Reach 1 (Mountaintown Creek)	USFS Boundary upstream to confluence with Dyer Creek
Reach 2 (Mountaintown Creek)	Confluence with Dyer Creek upstream to confluence with Heddy Creek
Reach 3 (Crenshaw Branch)	Confluence with Heddy Creek upstream to confluence with Unnamed tributary 1464
Reach 4 (Heddy Creek)	Confluence with Crenshaw Branch to the confluence with Betty Creek

We collected macroinvertebrate samples using a methodology developed in collaboration with Dr. Reese Voshell, Department of Entomology, Virginia Polytechnic Institute and State University (Roghair et al. 2002). At each sample site we collected a sample every 3 m within a 100 m reach, for a total of 33 samples per site. We used a random numbers table to determine the location of each of the 33 samples within the wetted channel (distance from wetted stream edge). All 33 samples collected within the 100 m reach were combined to form a single composite sample for each site.

A two-person team collected the samples using a D-frame dipnet. One person held the dipnet with the opening facing upstream while the other disturbed the substrate within a 0.3 m² area in front of the dipnet. If the substrate in front of the net was completely sand, it was agitated to a depth of 5-10 cm

(finger length) for 5 seconds. All other samples were collected by disturbing the area in front of the net for 15 seconds; cobbles, boulders, woody debris, and large organic materials were lifted and thoroughly rubbed, and smaller substrates were agitated, taking care to sweep sample materials into the dipnet.

We preserved the entire composite sample in ethyl alcohol and returned the samples to the lab for sorting and identification. At the lab, we sorted the entire composite sample and preserved the macroinvertebrates in ethyl alcohol for identification. George Annis, USDA Forest Service identified specimens to genus or species, when possible. We entered the macroinvertebrate counts into an Excel workbook provided by the Aquatic Entomology Lab at Virginia Tech. The workbook uses tolerance values (Overton 2006, Marchal 2005, Lenat 1993), functional feeding groups (Taxa Dictionary, VT Aquatic Entomology Lab), and habits (Taxa Dictionary, VT Aquatic Entomology Lab) to generate standard macroinvertebrate metrics and biotic indices.

Results

Habitat Inventory

Mountaintown Creek

We completed 3.9 km of habitat inventory on Mountaintown Creek (Table 2). Mountaintown Creek is 83% riffle habitat (i.e. fast-water) with an average wetted width of 6.3 m in pools and 7.0 m in riffles (Figure 2 and Table 2). Large wood was distributed throughout the reach (Figure 4) at a density of 152 pieces per km (Figure 3 and Table 2). The most commonly encountered substrates in pools were cobble and sand (Figure 5); in riffles, cobble and large gravel were the most common size classes (Figure 5). In Mountaintown Creek, 52% of pools (i.e. slow water) had fines (i.e. sand, silt, or clay) covering 31-60% of the streambed, and no pools were covered with more than 60% fines (Figure 6). The majority of riffles (92%) had less than 30% fines. Throughout the inventoried reach, the percentage of the streambed covered by fines was greater in pools than in riffles (Figure 7).

Crenshaw Branch

We completed 4.7 km of habitat inventory on Crenshaw Branch (Table 2). Crenshaw Branch is 88% riffle habitat (i.e. fast-water) with an average wetted width of 3.6 m in pools and 3.9 m in riffles (Figure 2 and Table 2). Large wood was distributed throughout the reach (Figure 4) at a density of 205 pieces per km (Figure 3 and Table 2). The most commonly encountered substrate in pools was sand (Figure 5); in riffles, cobble was most common size class (Figure 5). In Crenshaw Branch, 44% of pools (i.e. slow water) had fines (i.e. sand, silt, or clay) covering 31-60% of the streambed, and 9% of pools were covered with more than 60% fines (Figure 6). The

majority of riffles (96%) had less than 30% fines. Throughout the inventoried reach, the percentage of the streambed covered by fines was greater in pools than in riffles (Figure 7).

Heddy Creek

We completed 2.4 km of habitat inventory on Heddy Creek (Table 2). Heddy Creek is 86% riffle habitat (i.e. fast-water) with an average wetted width of 4.4 m in pools and 4.9 m in riffles (Figure 2 and Table 2). Large wood was distributed throughout the reach (Figure 4) at a density of 188 pieces per km (Figure 3 and Table 2). The most commonly encountered substrates in pools were small gravel and cobble (Figure 5); in riffles, cobble and small gravel were the most common size classes (Figure 5). In Heddy Creek, 15% of pools (i.e. slow water) had fines (i.e. sand, silt, or clay) covering 31-60% of the streambed, and 9% of pools were covered with more than 60% fines (Figure 6). All riffles had less than 30% fines. Throughout the inventoried reach, the percentage of the streambed covered by fines was greater in pools than in riffles (Figure 7).

Macroinvertebrates

We present a summary of metrics for all macroinvertebrate sample sites in Table 7. The North Carolina Biotic Index (NCBI) was less than 4 (excellent rating) at all sample sites (Figure 10). Percent clingers ranged from 25-58% in Mountaintown Creek, 48-53% in Crenshaw Branch, and 16-54% in Heddy Creek (Figure 11, Table 7).

Discussion

Water quality is generally good in all 3 streams, but there are localized areas of degraded stream habitat. The North Carolina Biotic Index (NCBI), an index frequently used to rate water quality, rated all macroinvertebrate sample sites as excellent, but the NCBI is not sensitive to impacts from sedimentation (Overton 2006). Metrics such as percent clingers, which are more sensitive to sediment impacts (Longing et al. 2010), varied widely within and among streams, suggesting localized sediment impacts.

Our results are not surprising given the habitat conditions in these streams. Long riffles with a variety of substrate sizes and a scattering of large wood dominate the stream habitat. In Mountaintown Creek and Crenshaw Branch pools are relatively rare and are often covered by fine substrate material, typically sand. Pools in Heddy Creek are equally as rare, but often have lower percentages of fine substrates. However, where fines are present they cover the majority of the pool bottoms in Heddy Creek too. Such heterogeneous habitat conditions make it particularly difficult to detect perturbation using macroinvertebrate metrics (Longing et al. 2010).

Past land management practices have left these streams with a background level of legacy sediment, resulting in the localized sediment impacts we see today (low pool:riffle ratio, sediment in pools, etc). Without careful management these localized effects will become more widespread, filling the remaining pools with more sediment, and causing more additional negative biological impacts to macroinvertebrates and fish (Waters 1995). We noted several manageable sources of sediment on each stream, including exposed soil along abandoned logging roads, hog wallows, and trail fords (see notes in Tables 3 – 6). Additionally, the watershed can be managed for maximum large wood recruitment and retention to encourage natural pool formation.

Data Availability

Habitat and macroinvertebrate data are ready for migration into the Natural Resource Information System water module (NRIS). We will format the data according to the Regional NRIS Water standards and migrate the data as the new NRIS water module comes online. As data are migrated into NRIS Water the CATT will coordinate development of custom query and reporting tools for the CNF. In the interim, the CATT is available to assist with data analysis and report preparation. Charlene Breeden, CNF Hydrologist, received a copy of all data in electronic format.

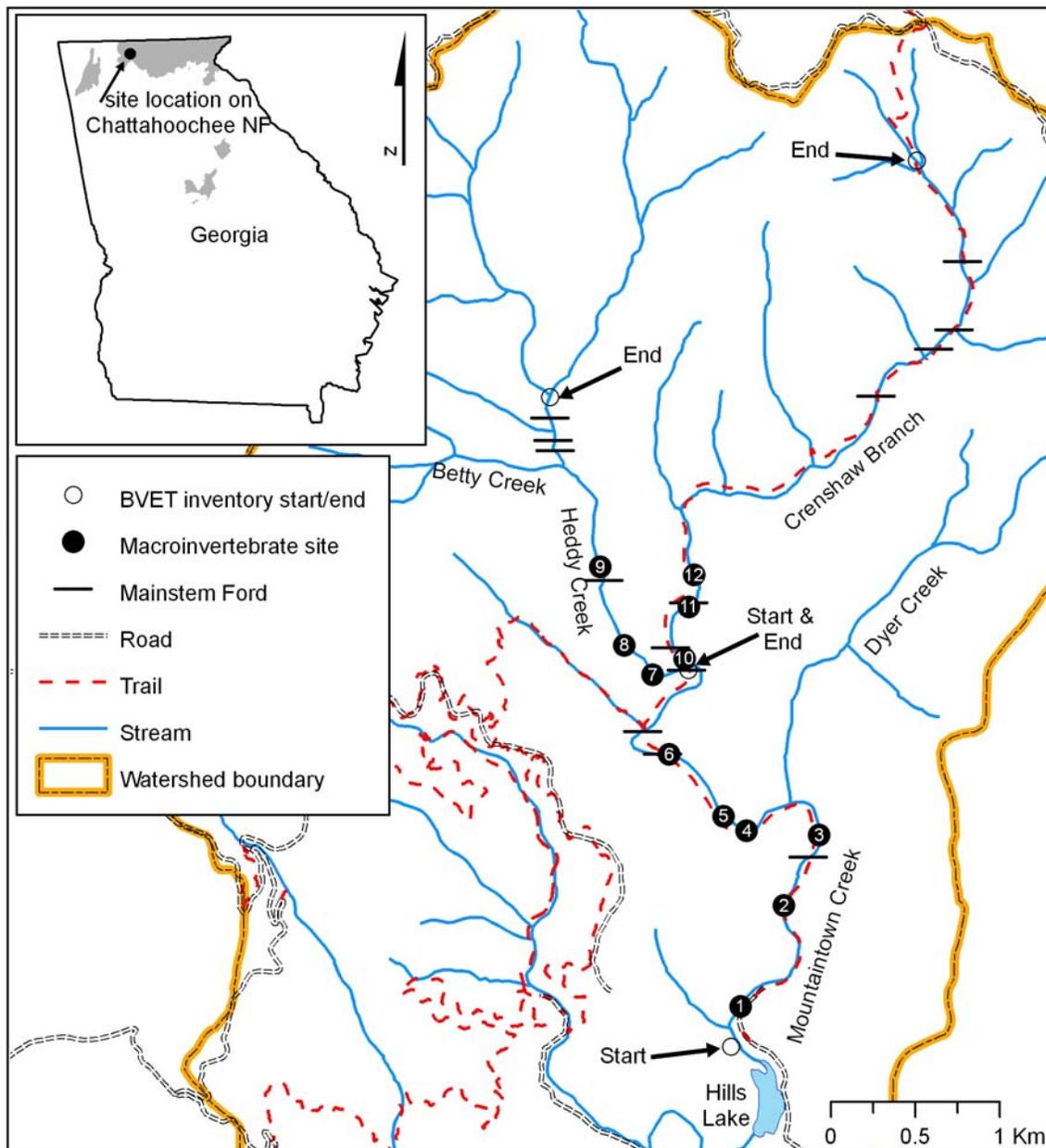


Figure 1. Location of habitat inventories (BVET) and macroinvertebrate sample sites on Mountaintown Creek, Crenshaw Branch, and Heddy Creek (Conasauga Ranger District, Chattahoochee National Forest, GA).

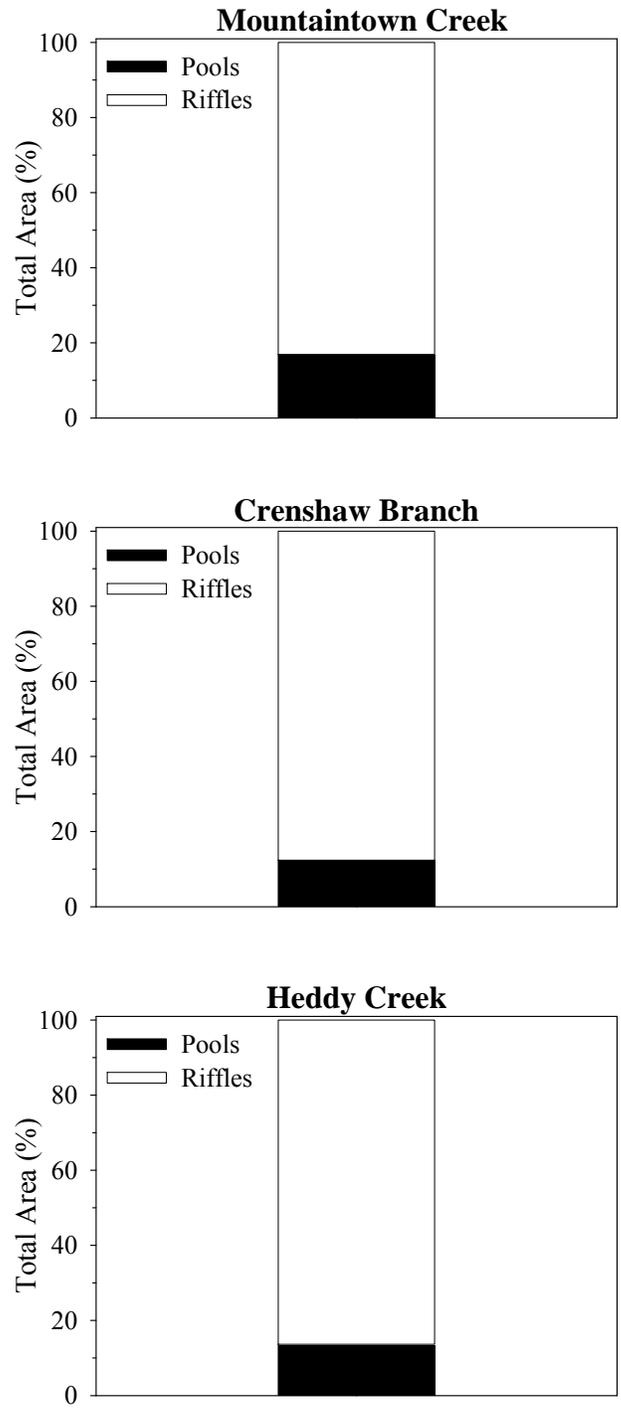


Figure 2. Estimated stream area in pools and riffles.

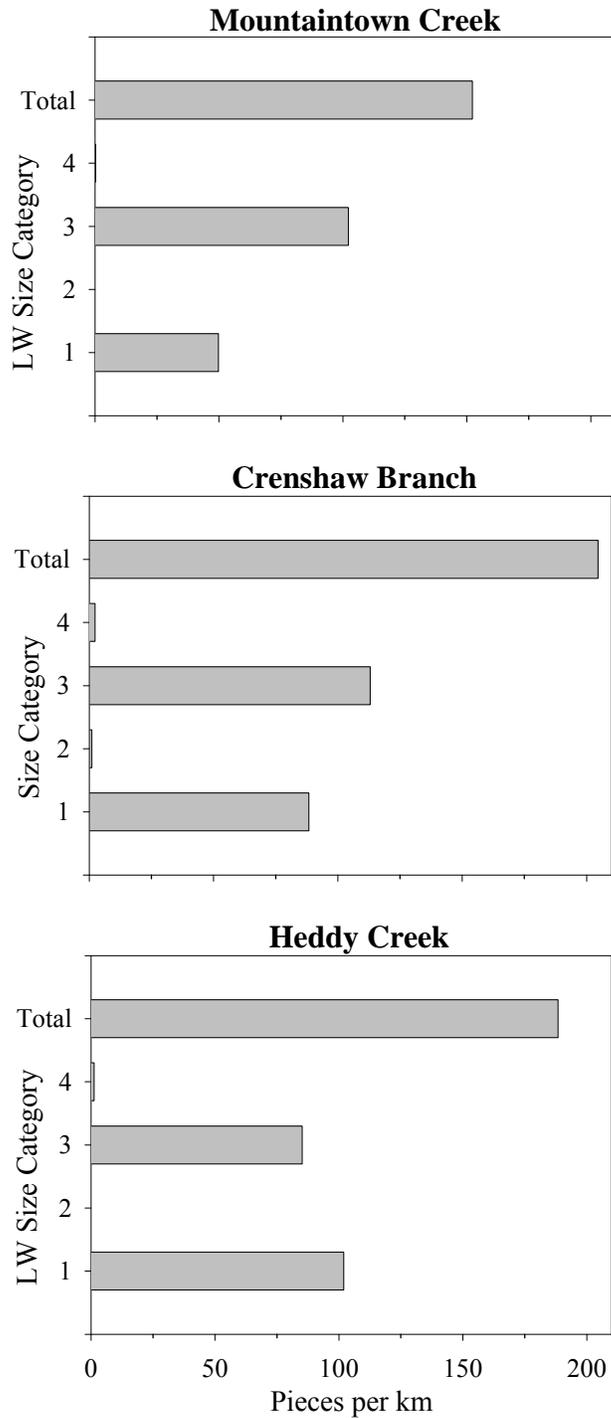


Figure 3. Large wood (LW) per kilometer. Y-axis labels are LW size classes described below:

- Size 1: < 5 m long, 10-55 cm diameter
- Size 2: < 5 m long, > 55 cm diameter
- Size 3: > 5 m long, 10-55 cm diameter
- Size 4: > 5 m long, > 55 cm diameter

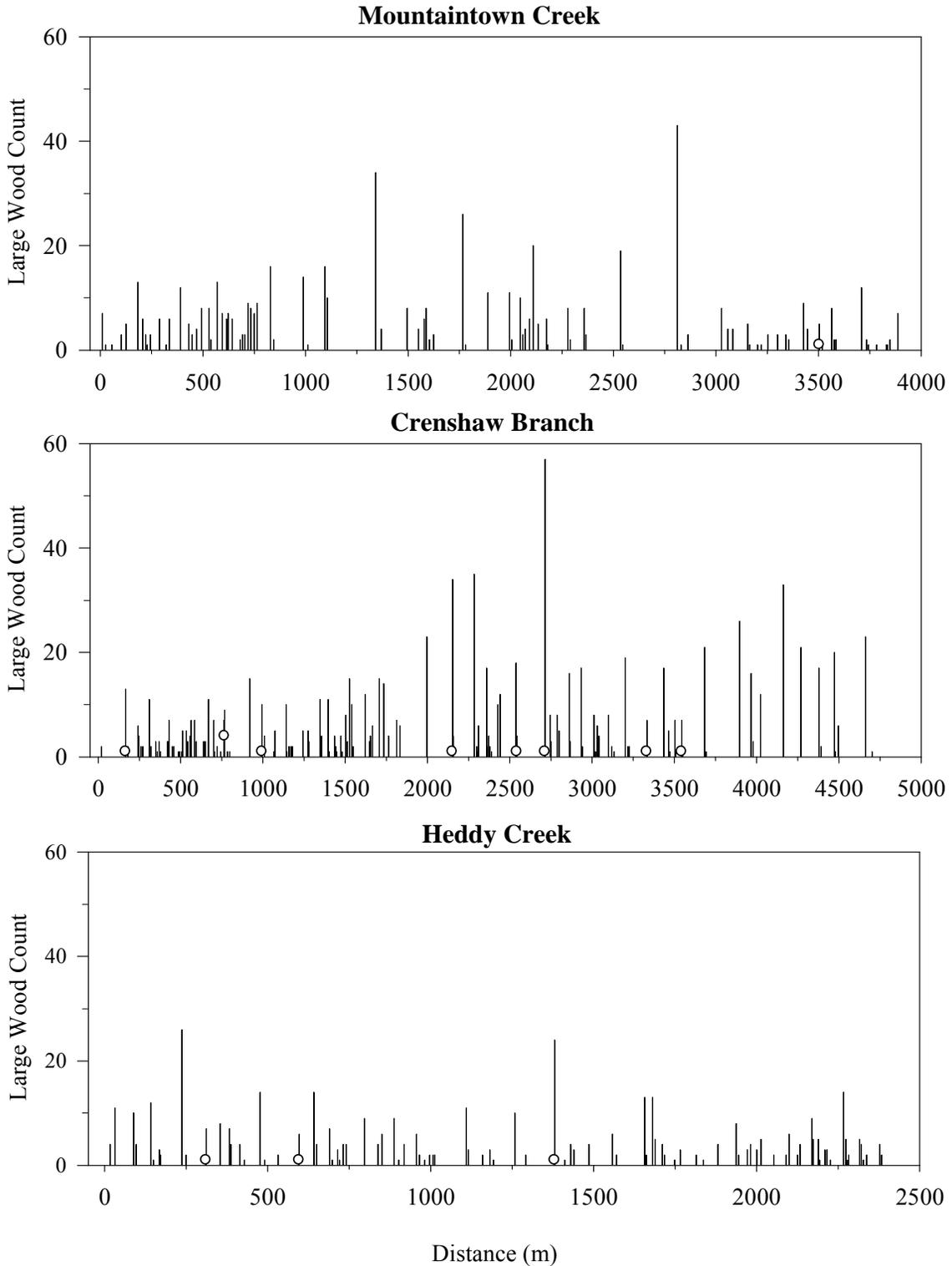


Figure 4. Distribution and abundance of large wood, which was recorded for each habitat unit. X-axis indicates distance upstream from start of inventory. Open circles on the large wood chart represent the amount of the total large wood that was >5 meters in length and >55 cm in diameter (size 4).

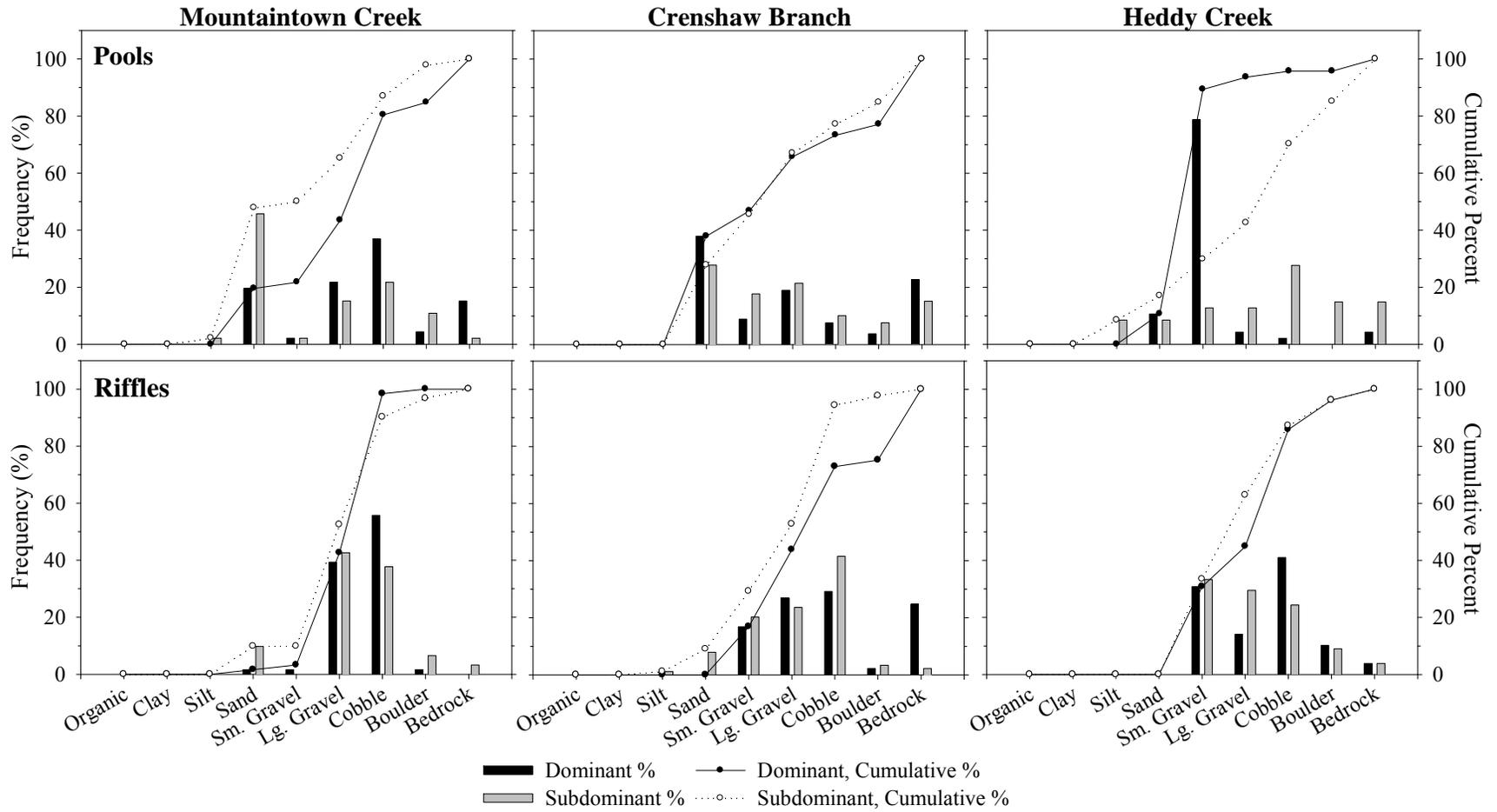


Figure 5. Frequency (percent) and cumulative percent of dominant and subdominant substrate occurrence for pools and riffles in Mountaintown Creek, Crenshaw Branch, and Heddy Creek.

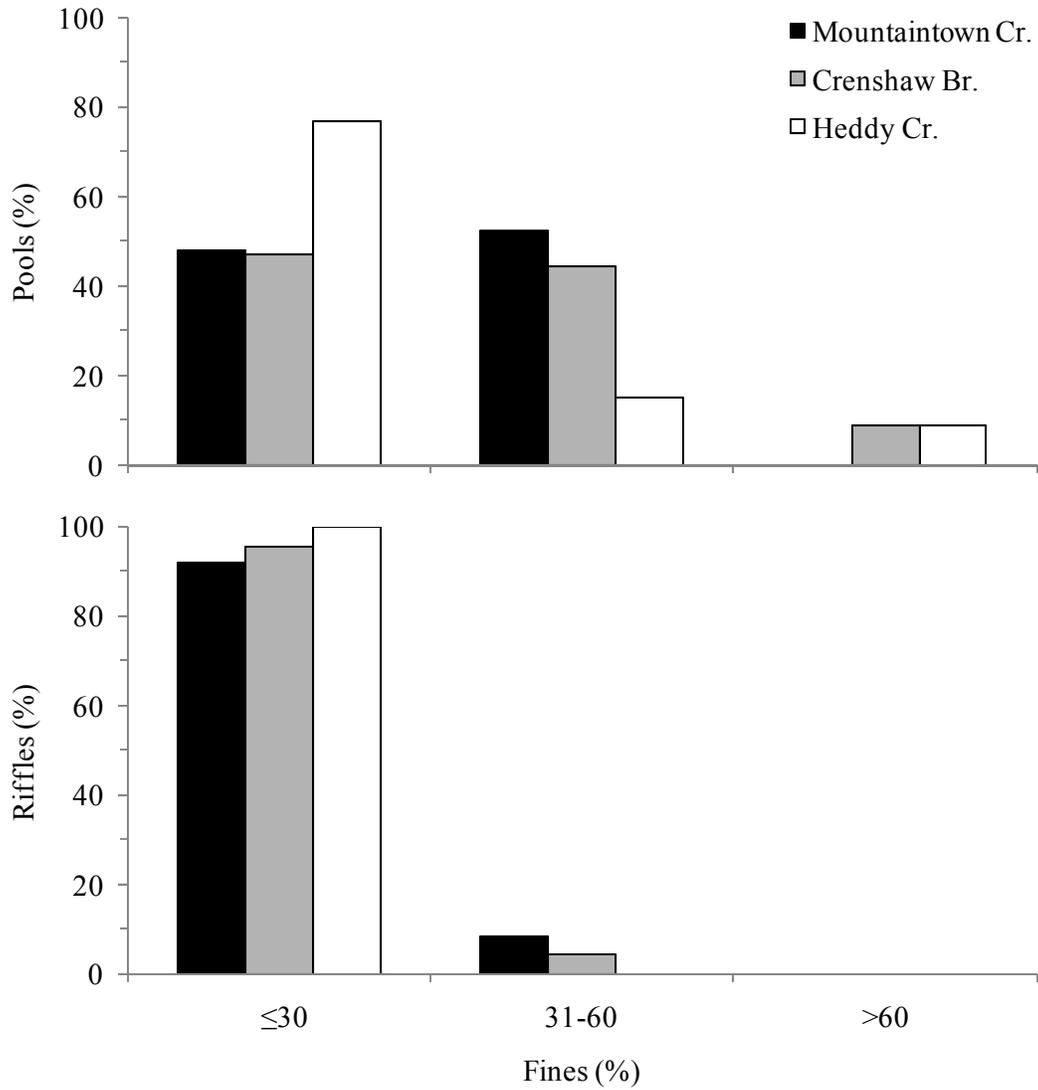


Figure 6. Percent of pools (upper chart) and riffles (lower chart) with fine sediment (sand, silt, or clay) covering ≤ 30 , 31-60, or >60 percent of the streambed in a habitat unit in Mountaintown Creek, Crenshaw Branch, and Heddy Creek.

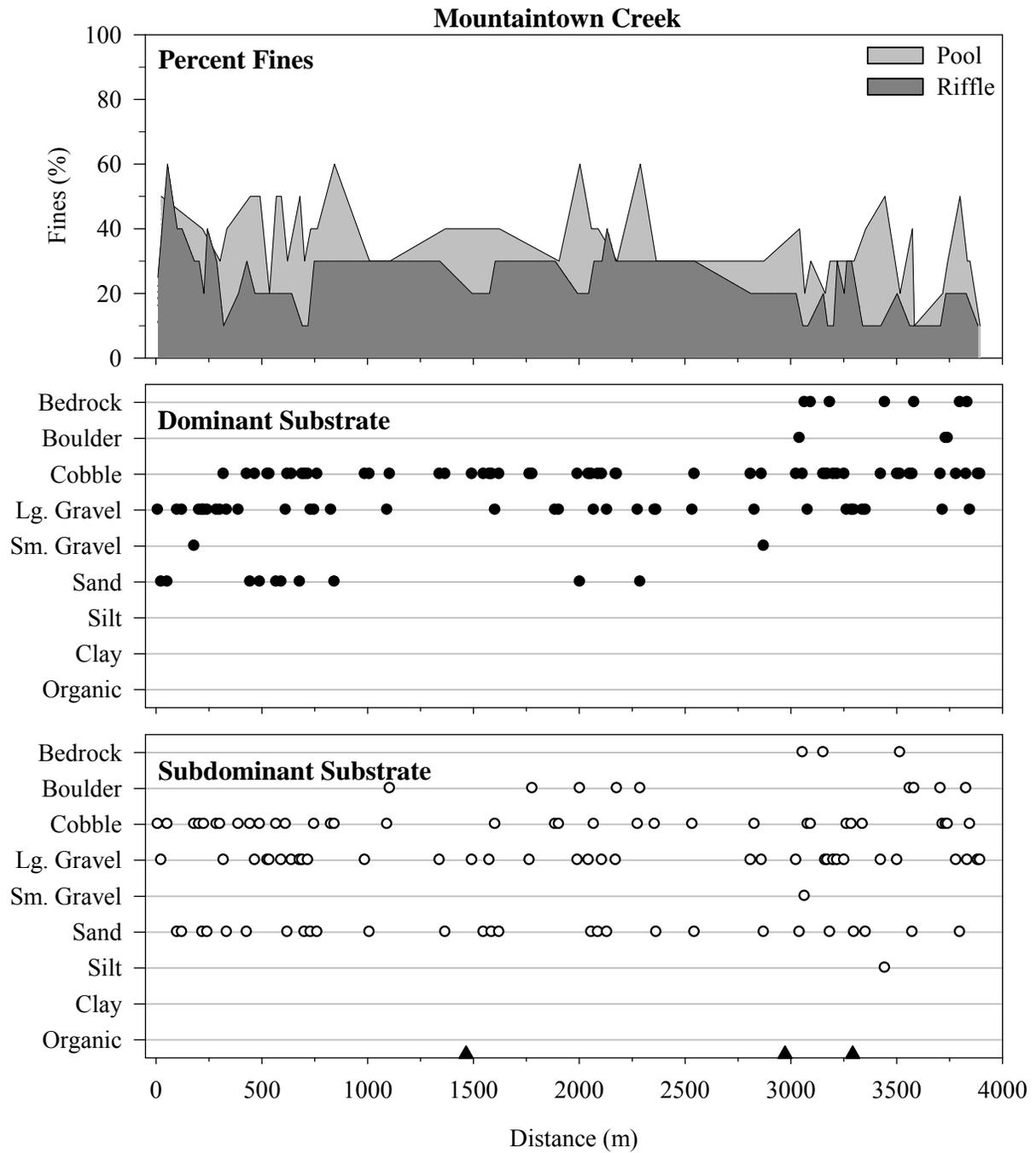


Figure 7. Distribution and abundance of percent fines and substrates recorded for each habitat unit in Mountaintown Creek. X-axis indicates distance upstream from USFS boundary. Triangles on the subdominant substrate chart represent the location of fords (e.g. trail crossings).

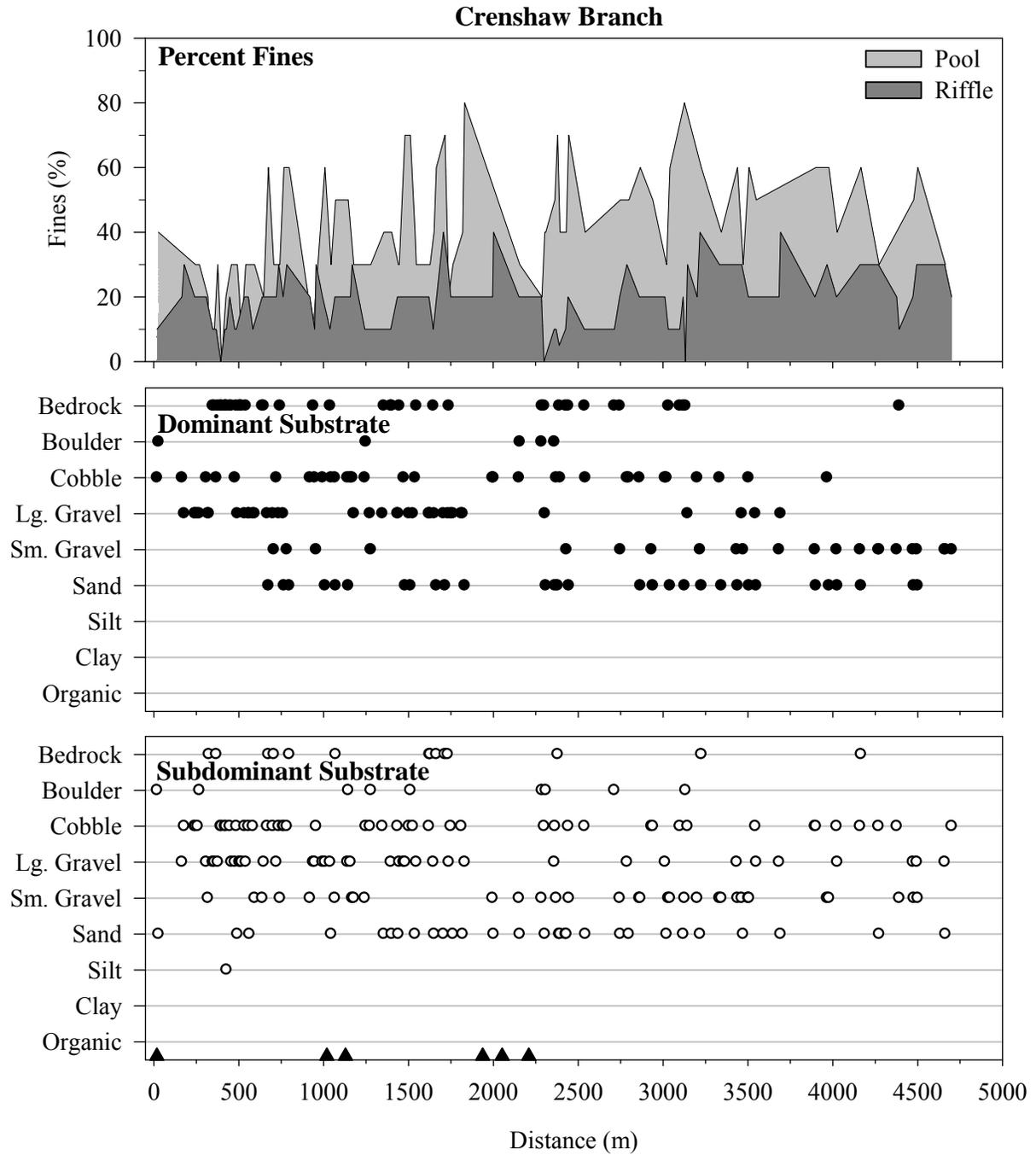


Figure 8. Distribution and abundance of percent fines and substrates recorded for each habitat unit in Crenshaw Branch. X-axis indicates distance upstream from confluence with Heddy Creek. Triangles on the subdominant substrate chart represent the location of fords (e.g. trail crossings).

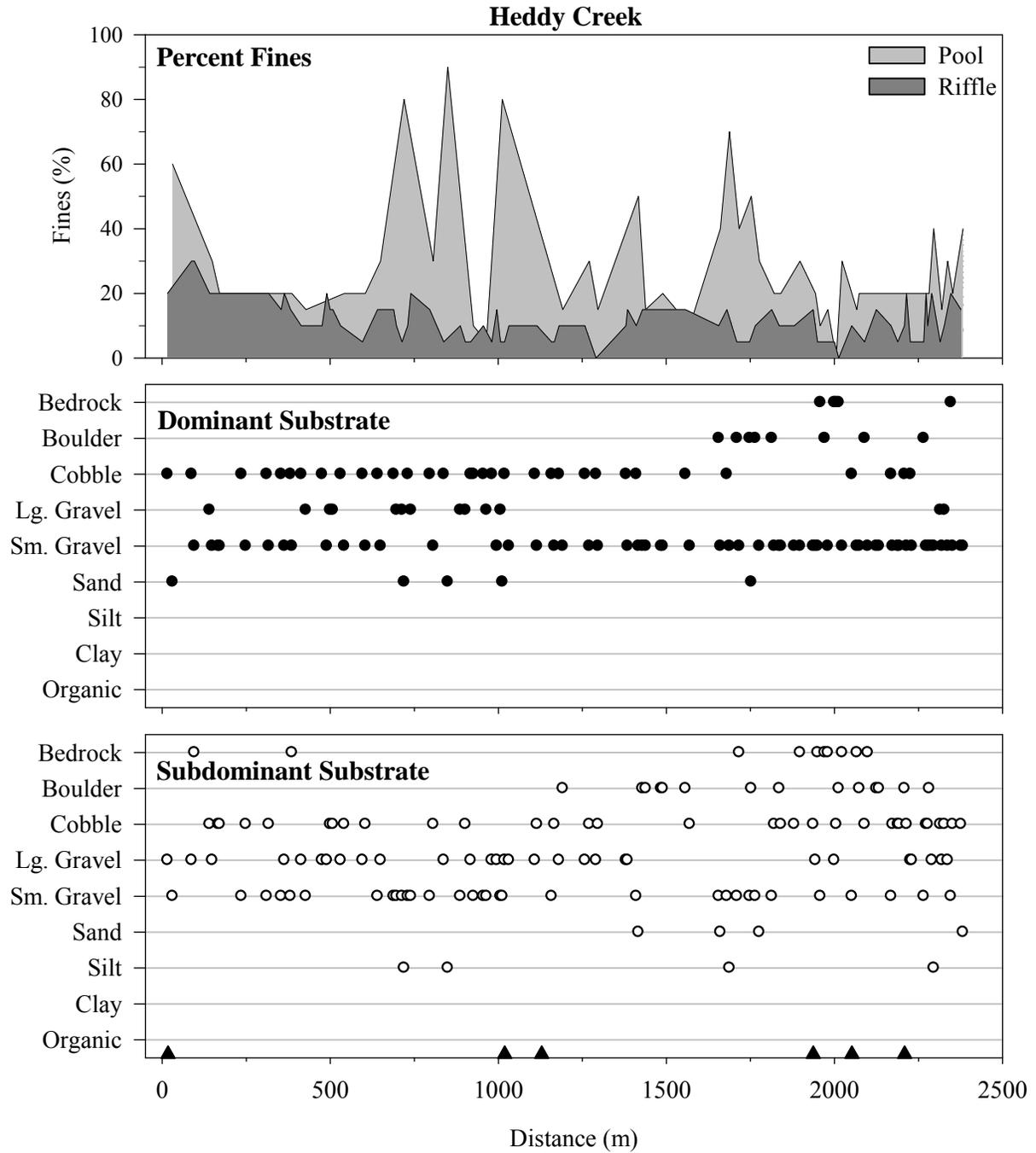


Figure 9. Distribution and abundance of percent fines and substrates recorded for each habitat unit in Heddy Creek. X-axis indicates distance upstream from confluence with Crenshaw Branch. Triangles on the subdominant substrate chart represent the location of fords (e.g. trail crossings).

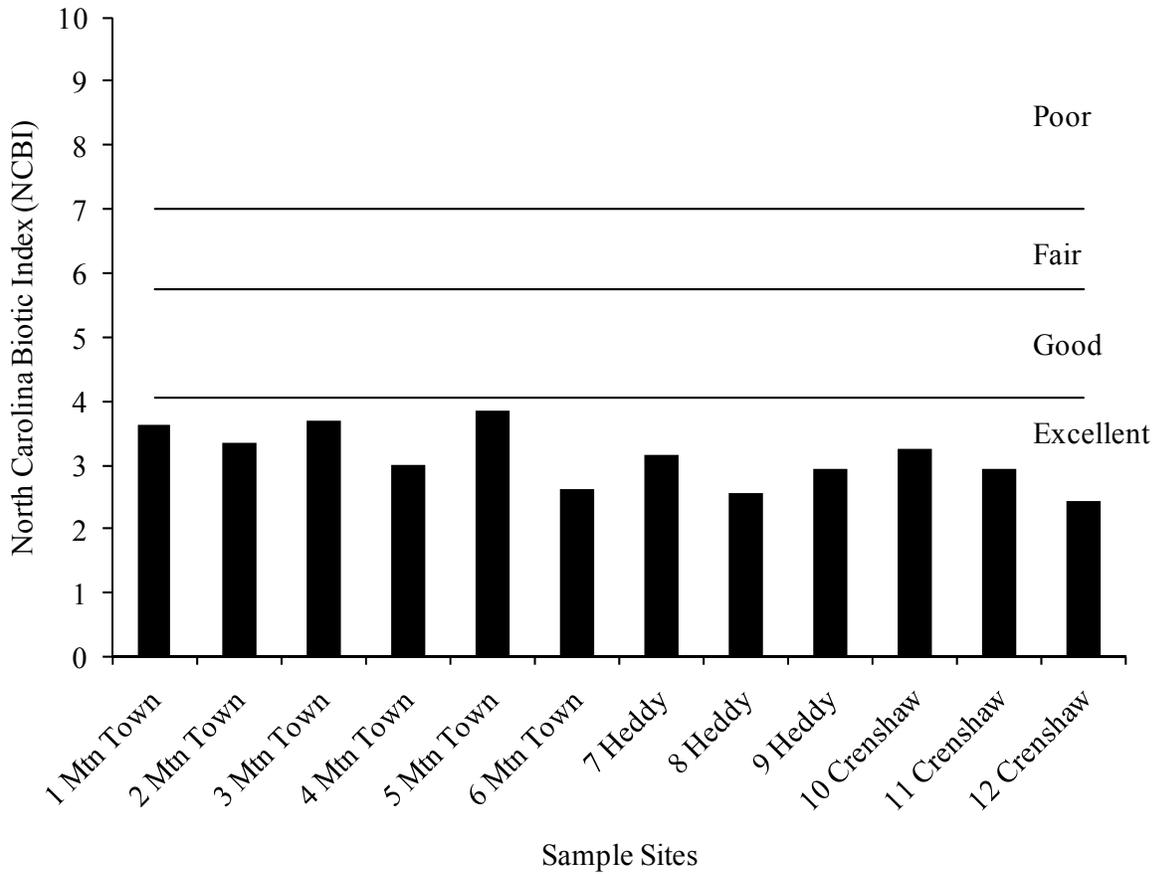


Figure 10. North Carolina Biotic Index (NCBI) ratings for macroinvertebrate samples collected on Mountaintown Creek, Crenshaw Branch, and Heddy Creek (Conasauga Ranger District, Chattahoochee National Forest, GA), September 2009.

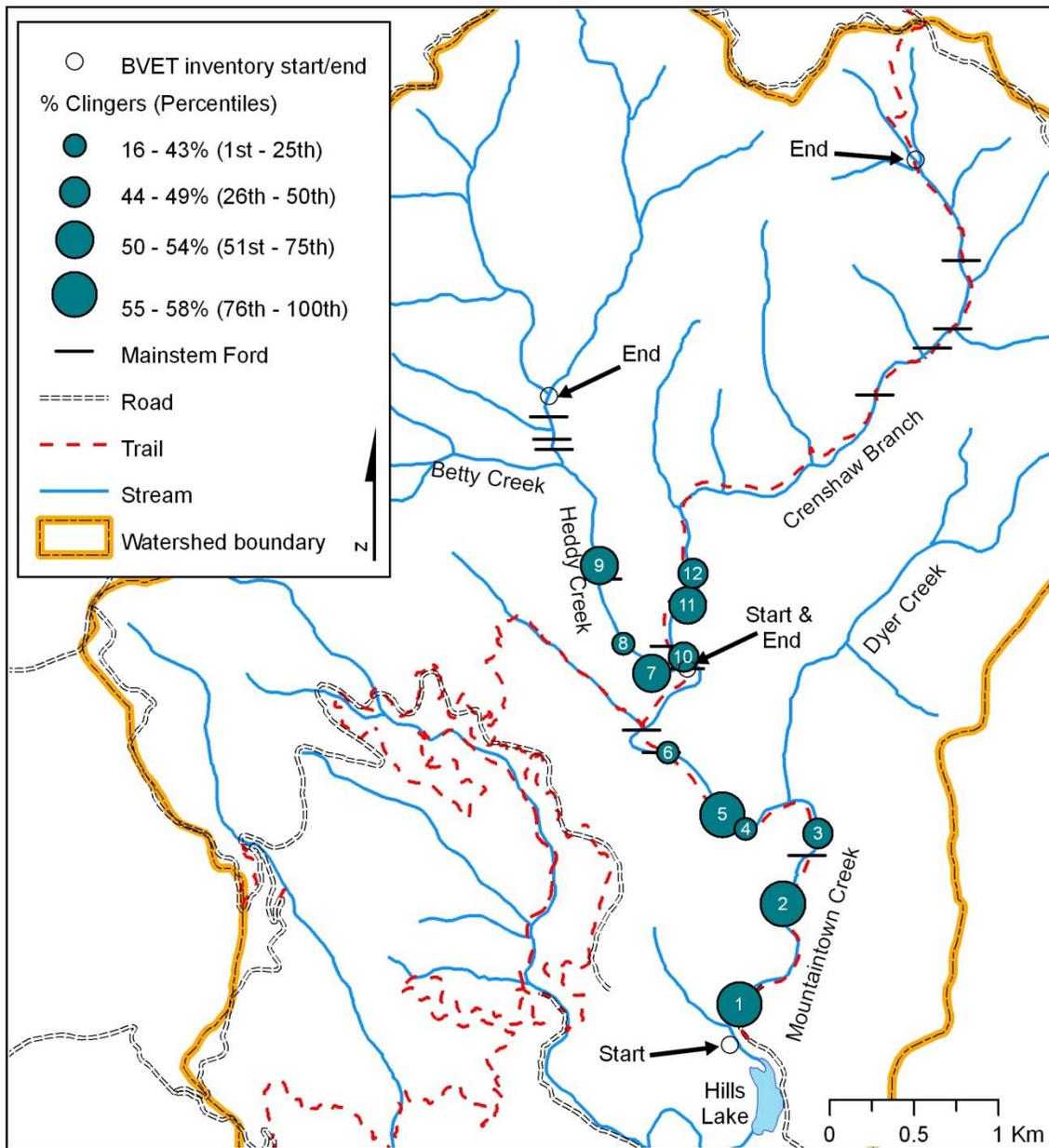


Figure 11. Percent clingers in macroinvertebrate samples collected on Mountaintown Creek, Crenshaw Branch, and Hedly Creek (Conasauga Ranger District, Chattahoochee National Forest, GA), September 2009.

Table 1. Summary of macroinvertebrate sample sites in Mountaintown Creek, Crenshaw Branch, and Heddy Creek.

Stream	Stream Reach	Site #	UTM NAD83	Comments
Mountaintown Cr.	USFS Boundary upstream to confluence with Dyer Cr.	1	16 S 723808 3855742	A side-channel is in on the left within sample area
		2	16 S 724064 3856338	
		3	16 S 724275 3856755	
Mountaintown Cr.	Confluence with Dyer Cr. upstream to confluence with Heddy Cr.	4	16 S 723845 3856781	
		5	16 S 723708 3856867	
		6	16 S 723385 3857233	Mountaintown Cr Trail fords stream just upstream of sample area
Heddy Cr.	Confluence with Crenshaw Br. to the confluence with Betty Cr.	7	16 S 723289 3857703	
		8	16 S 723119 3857879	
		9	16 S 722977 3858342	Unnamed tributaries are in on the left and right within sample area
Crenshaw Br.	Confluence with Heddy Cr. upstream to confluence with Unnamed tributary	10	16 S 723476 3857800	Mountaintown Cr Trail fords stream just upstream of sample area
		11	16 S 723502 3858106	Mountaintown Cr Trail fords stream within sample area
		12	16 S 723533 3858295	An unnamed tributary is in on left within sample area

Table 2. Summary of stream characteristics for Mountaintown Creek, Crenshaw Branch, and Heddy Creek collected during the BVET habitat inventory.

	Mountaintown Cr.		Crenshaw Br.		Heddy Cr.	
District	Cohutta		Cohutta		Cohutta	
USGS Quadrangle	Dyer Gap		Dyer Gap		Dyer Gap	
6th Level HUC	031501020301		031501020301		031501020301	
Inventory Date	9/5/2009		9/6/2009		9/5/2009	
Downstream Starting Point	USFS Boundary		Conf. w/. Heddy Cr.		Conf. w/ Crenshaw Br.	
Total Distance Inventoried (km)	3.9		4.7		2.4	
	<u>Pools</u>	<u>Riffles</u>	<u>Pools</u>	<u>Riffles</u>	<u>Pools</u>	<u>Riffles</u>
Percent of Total Stream Area	17	83	12	88	14	86
Total Area (m ²)	4,512 ± 635	22,124 ± 2,226	2,125 ± 233	14,988 ± 2,514	1,682 ± 188	10,611 ± 2,263
Correction Factor Applied	1.01	1.05	0.86	1.05	1.03	1.02
Number of Paired Samples	4	6	8	7	7	7
Total Count of Habitat Units	46	61	79	89	47	78
Number per km	12	16	17	19	20	33
Mean Area (m ²)	98	363	27	168	36	136
Percent Inventoried as Glides	2	--	6	--	45	--
Percent Inventoried as Runs	--	18	--	9	--	21
Percent Inventoried as Cascades	--	0	--	12	--	1
Average wetted width (m)	6.3	7.0	3.6	3.9	4.4	4.9
Large Wood Size Classes	<u>Pieces per km</u>		<u>Pieces per km</u>		<u>Pieces per km</u>	
< 5 m long, 10 cm - 55 cm diameter	50		88		102	
< 5 m long, > 55 cm diameter	0		1		0	
> 5 m long, 10 cm - 55 cm diameter	102		113		85	
> 5 m long, > 55 cm diameter	0		2		1	
Total:	152		205		188	

Table 3. Stream features found on **Mountaintown Creek** during the BVET habitat inventory. Distance is meters upstream from start of inventory.

Feature	Distance (m)	Width (m)	Comment	Photo ID	UTM NAD83
Other	58		Some pocket water but mostly run; starts trout structure reach	85	16 S 723745 3855622
Tributary	64	0.5	Tributary is in on Left	84	16 S 723738 3855551
Side-Channel	313	1	Side-channel is In on the Left		
Dam	468		K dam structure, dam height 0.3 m	86	16 S 723934 3855869
Dam	537		K dam structure, dam height 0.5 m	87	16 S 724009 3855899
Side-Channel	679	1.3	Side-channel is In on the Right; trail on right crosses side channel		
Ford	1,465		Dirt trail #135	89-91	16 S 724210 3856627
Side-Channel	1,561	2	Side-channel is In on the Left		
Tributary	1,916	2	Tributary is in on Right; Dyer Creek	93	16 S 724125 3856955
Side-Channel	2,173	1	Side-channel is In on the Left		
Ford	2,972		Dirt trail #135; Bug06 site starts just downstream	96-98	16 S 723348 3857236
Ford	3,292		Dirt trail #135; Pinhoti trail joins here with Mntntown trail	100-103	16 S 723230 3857369
Tributary	3,306	1.5	Tributary is in on Left; unnamed	104	16 S 723249 3857389
Side-Channel	3,390	2.5	Side-channel is In on the Right		
Side-Channel	3,429	2.5	Side-channel is Out on the Right		
Tributary	3,700	0.5	Tributary is in on Right; very small but flowing; not on quad	107	16 S 723529 3857631
Tributary	3,899	6.5	Tributary is in on Left; Heddy creek (has more flow than Crenshaw)	109	16 S 723514 3857763

Table 4. Stream features found on **Crenshaw Branch** during the BVET habitat inventory. Distance is meters upstream from start of inventory.

Feature	Distance (m)	Width (m)	Comment	Photo ID	UTM NAD83
Ford	170		Dirt trail #135	110-112	16 S 723394 3857865
Ford	512		Dirt trail #135; end day 1	115-117	16 S 723504 3858130
Tributary	815	0.5	Tributary is in on Left; unnamed; not on quad	119	16 S 723503 3858395
Tributary	1,017	1.5	Tributary is in on Left; Probably NHD1464	121	16 S 723505 3858591
Tributary	1,445	1	Tributary is in on Left; Unnamed trib NHD1465	123-125	16 S 723721 3858752
Waterfall	1,738		Waterfall hieght (m) is 1	126	16 S 724001 3858755
Braid	1,885	1	Two channels in on right; each 1m wide; flat, wide riparian on right		
Side-Channel	2,082	1.5	Side-channel is In on the Right		
Tributary	2,082	1	Tributary is in on Left; Rich Knob	128	16 S 724240 3858948
Side-Channel	2,152	1.5	Side-channel is Out on the Right		
Ford	2,759		Dirt trail #135; gravel put at crossing	136-138	16 S 724613 3859355
Tributary	3,204	0.5	Tributary is in on Left	143	16 S 724903 3859586
Ford	3,280		Dirt trail #135; trail muddy-gravel added at ford	144-147	16 S 724955 3859631
Tributary	3,455	1	Tributary is in on Right; Unnamed NHD1468	148	16 S 725065 3859738
Ford	3,464		Dirt trail #135	149-152	16 S 725073 3859746
Side-Channel	3,587	1	Side-channel is In on the Left		
Tributary	3,721	1.5	Tributary is in on Right	153	16 S 725174 3859963
Tributary	3,871	0.5	Tributary is in on Left; not on quad; no photo		16 S 725134 3860070
Ford	3,928		Dirt trail #135; funneling trail sediment to stream	154-157	16 S 725124 3860150
Tributary	4,324	1.5	Tributary is in on Right	159	16 S 725051 3860476
Tributary	4,635	0.5	Tributary is in on Left; no photo, too small		16 S 724891 3860686
Tributary	4,680	1	Tributary is in on Right	160-162	16 S 724876 3860725
Bridge	4,705		Dirt trail #135; old log crossing; last trail crossing; End of Inventory	163-167	16 S 724853 3860745

Table 5. Stream features found on **Heddy Creek** during the BVET habitat inventory. Distance is meters upstream from start of inventory.

Feature	Distance (m)	Width (m)	Comment	Photo ID	UTM NAD83
Tributary	0	3.5	Tributary (Crenshaw Branch) is in on Right	16	16 S 723498 3857729
Ford	17		Mountain Creek Trail		16 S 723490 3857733
Tributary	733	0.5	Tributary is in on Right	18	
Tributary	929	0.5	Tributary is in on Left	19	
Ford	1,019		Hiking trail, probably from anglers	20	16 S 723001 3858264
Tributary	1,115	0.5	Tributary is in on Right	22	
Ford	1,129		Hiking trail, probably from anglers	23-25	
Tributary	1,250	0.5	Tributary is in on Left	26	
Tributary	1,419	0.5	Tributary is in on Left	27	
Tributary	1,517	1	Tributary is in on Right	28	
Tributary	1,800	1.5	Tributary is in on Left	29	16 S 722793 3858919
Ford	1,937		Old logging road; overgrown with vegetation	30-32	16 S 722712 3859032
Tributary	2,052	1	Tributary is in on Left	33	16 S 722699 3859093
Ford	2,052		Old logging road; overgrown with vegetation	34-36	16 S 722699 3859092
Ford	2,209		Old logging road; overgrown with vegetation	40-42	16 S 722679 3859225
Tributary	2,390	3	Tributary is in on Left. End of inventory	43	16 S 722682 3859349

Table 6. Photos associated with habitat units on Mountaintown Creek, Crenshaw Branch, and Heddy Creek taken during the BVET habitat inventory. Distance is meters upstream from start of inventory.

Stream	Unit Type	Distance (m)	Width (m)	Comment	Photo ID
Mountaintown Cr.	Riffle	749	8.5		88
	Riffle	1887	5.5		92
	Riffle	2535	7	Dead & dying Hemlock LW; Hemlock in riparian have wooly adelgid	94
	Run	2545	4.5	Deep run, almost a pool	95
	Run	3220	6.5		99
	Riffle	3503	7	Size 4 Hemlock LW	105
	Riffle	3563	5	Bank erosion; have seen several small areas like this	106
	Riffle	3782	9		108
Crenshaw Br.	Riffle	368	5		113
	Pool	425	10	Photo=Cascade at head of pool	114
	Riffle	639	4.5	Bedrock with pocket water	118
	Riffle	994	4.5	Still lower gradient	120
	Riffle	1435	4.5		122
	Riffle	1996	4.5	Very long, low gradient riffle with several side channels	127
	Riffle	2284	3	Old road bed on left; erosion on its cut bank; photo of trail and bank erosion	129
	Cascade	2389	3.5	Bedrock cascade	130-131
	Cascade	2537	3	No measured, no flag-too dangerous	132
	Cascade	2714	2	Salamander mid cascade; dangerous and long cascade	133-135
	Riffle	2861	3.5	Bank erosion	139
	Cascade	3099	5.5	Trout below cascade; trail 135 in this section is muddy, not like downstream	140-141
	Cascade	3133	3	Not flagged	142
	Riffle	4023	3	Missed last paired so added this	158
Heddy Cr.	Riffle	16	5	Start location	17

Table 7. Metrics for macroinvertebrate samples collected at sample sites on Mountaintown Creek, Crenshaw Branch, and Heddy Creek (Conasauga Ranger District, Chattahoochee National Forest, GA), September, 2009.

Metric	Mountain Town Creek						Heddy Creek			Crenshaw Branch		
	Site 1	Site 2	Site 3	Site 4	Site 5	Site 6	Site 7	Site 8	Site 9	Site 10	Site 11	Site 12
Total Number of Individuals	32	111	241	70	414	55	429	97	478	418	359	144
Number of Taxa	17	25	32	25	37	22	33	30	36	36	38	28
Number of EPT Taxa	10	14	20	15	19	11	18	16	22	22	22	17
Number of Clinger Taxa	6	13	13	10	18	8	12	9	16	15	18	12
Percent Clingers	56	55	45	37	58	25	50	16	54	49	53	48
Percent 1 Dominant Taxon	22	17	25	20	16	18	18	20	14	15	18	12
Percent 2 Dominant Taxa	44	32	38	39	32	33	34	28	26	28	33	22
Percent Tolerant Organisms	25	29	41	24	36	20	25	12	24	26	31	16
Number Intolerant Taxa	15	21	25	20	31	20	29	24	32	31	34	24
Percent Diptera	3	22	31	26	24	36	26	23	14	28	41	26
Percent Chironomidae	3	13	25	19	16	18	16	6	9	8	18	9
Percent EPT	56	53	52	49	62	49	38	63	49	61	41	52
North Carolina Biotic Index (NCBI)	3.6	3.4	3.7	3.0	3.9	2.6	3.1	2.6	3.0	3.3	2.9	2.4
Percent Collectors	9	16	34	21	24	18	24	13	34	21	21	18
Percent Filterers	28	18	18	6	26	11	14	3	14	16	22	20
Percent Scrapers	25	37	21	31	25	15	34	13	29	22	28	24
Percent Shredders	9	13	11	17	15	16	11	40	11	20	9	17
Percent Predators	25	16	8	23	8	40	17	20	12	15	16	19
Number Plecoptera taxa	3	5	6	6	6	6	7	5	7	6	6	5
Percent Plecoptera taxa	18	20	19	24	16	27	21	17	19	17	16	18
Percent Plecoptera individuals	16	16	11	26	15	33	16	41	15	23	11	24
Number Tricoptera taxa	3	7	8	5	7	4	6	9	9	11	11	8
Percent Tricoptera taxa	18	28	25	20	19	18	18	30	25	31	29	29
Percent Tricoptera individuals	28	31	27	14	23	15	15	19	17	13	21	19
Percent Intolerant individuals	75	71	51	74	63	80	75	78	76	68	65	84

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