A Survey of the Aquatic Macrobenthos

Of Waller Creek

by Stephen W. Ziser, Ph.D.
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INTRODUCTION

Austin area watersheds are under constant threat of degradation due to numerous human impacts related to urbanization. Waller Creek is a prime example of a typical urban watershed. Waller Creek drains into Town Lake in the heart of the downtown area. Construction along its banks includes high-rise hotels and the new convention center. Several parks including Palm, Centennial, Shipe and Reilly skirt its banks. Swimming pools in some of these parks drain water daily into Waller Creek during the summer months. A golf course, Hancock Golf Course, is bisected by the creek. The headwaters of the creek are bordered by commercial and residential areas.

Water monitoring efforts on Waller Creek have for the past two years consisted of monthly monitoring of selected water chemistry parameters by the "Water Watchdogs," a citizens' monitoring group sponsored by the City's Environmental and Conservation Services Department and Austin Community College. While macroinvertebrates were occasionally noted, no attempt was made to systematically sample the macrobenthos of Waller Creek. In fact, few streams in Austin's urban watersheds have been studied intensively for the aquatic life they contain. Only the macroinvertebrates of Blunn Creek and Dry Creek have been described briefly in an unpublished report (Ziser, 1989).

Additionally, the macrofauna of several other of Austin's aquatic habitats which make up the Austin Nature Preserve System have been briefly described in this same report.

The purpose of the current study was to further investigate the benthic macroinvertebrate fauna of Waller Creek. To identify individual taxa of aquatic macroinvertebrates inhabiting all identifiable habitats along the creek from source to mouth, to qualitatively characterize the macroinvertebrate communities and identify rare or unusual genera or species that might occur there and, primarily, in conjunction with separate reports on geology, botany, and land use practices, to establish a baseline of information on Waller Creek that might be useful in delineating future impacts of continued urbanization along the creek.

An important secondary goal of the project was to involve lay citizens in the process of aquatic research with a goal toward increased public awareness of environmental issues. Toward that end several people, primarily Austin Community College students, contributed to the study by helping to collect samples at various times throughout the project. These people include Patricia Maxwell, Audrey Pierce, Steve Garza and Cindy Goodwin. Glenn Jacobson deserves special credit as he not only helped to collect samples but spent many hours doing much of the preliminary sorting and identification of specimens collected.

MATERIALS AND METHODS

Macroinvertebrate collections were made at irregular intervals over a 10 month period from June, 1991, until March, 1992. Sampling began at the mouth and proceeded toward the headwaters. In the downtown area the sampling teams walked up the stream and sampled wherever there was a significant change in macrohabitat; for example, from riffle to pool, sunny to shady reaches, rock to muddy bottom, etc... In the residential area north of the University of Texas campus, access to the creek became much more limited and sampling points coincided with road overpasses which allowed access without crossing private land. For the period of study, the stream north of 41st Street was dry until spring of 1992 when frequent heavy rains allowed the stream to run in its uppermost reaches. Sampling north of this point was therefore delayed until this time.

Samples were collected with dip net, sieve and by forceps. An attempt was made to collect samples from every conceivable microhabitat at each locality. Specimens were collected from cobbles and rocks, sand and silt, algal mats and submerged and emergent vegetation along the shore. An average of three to five samples at each locality were collected and combined into a pooled site sample. All pooled samples were sorted, identified to the lowest practicable taxon (usually

genus) and counted. A species list was generated. An effort was also made to qualitatively correlate any differences in benthic community structure with habitat differences along Waller Creek. It should be emphasized that these data are not meant to provide quantitative information about the benthic fauna of the creek.

RESULTS AND DISCUSSION

The mouth of the stream (sites 1-7) was represented by lentic habitats separated by riffles. The stream was relatively wide with substrates of gravel with some sand or silt pools. Habitats also ranged from sunny to shady. The shores and stream bed had been heavily altered by downtown construction.

The midreach (sites 8-36) was characterized as a narrower, flat bottomed stream with roughly equal numbers of riffles and pools. Riffle areas tended to have gravel, rock or bedrock substrates. Pool substrates consisted of sand or silt. Wile some portions of the midreach were exposed to direct sunlight, most reaches were heavily shaded by the dense riparian vegetation and steep banks. Much of the midreach flows through parks and residential areas and, except for the lower portions, remains relatively unaltered by construction or channelization

projects.

The headwaters (sites 37-46) consisted of ephemeral wet weather stream runs, largely sunny, narrow, channalized and extremely shallow.

Overall, Waller Creek is similar in size, structure, substrate composition and flow to Blunn Creek and East Bouldin Creek.

A total of 876 individuals were collected from 44 pooled samples (approximately 44 x 4 = 176 total samples). Waller Creek was generally sparcely populated, probably due largely to the instability of streamflow which may vary between torrential spring floods to zero flow in summer and early fall over several seasons. Few macroinvertebrate species have life cycles short enough to cope with such extremes in discharge. Never more than 8 taxa were collected at a site, the average for all sites being 4 taxa/site.

Approximately 100 aquatic taxa have been identified in aquatic habitats in and around the city (Whiteside et al. 1991, Ziser 1989). The larger more permanent streams such as Walnut and Onion Creeks tend to harbor at least twice as many taxa as the smaller more ephemeral streams such as Blunn, Bee and Barrow Creeks (40-50 taxa/stream versus 10-20 taxa/steam). The Waller Creek fauna tend to be more similar to the fauna of ephemeral creeks, i.e. the creek is poor in both number of taxa and in density of most taxa. A few taxa, however, are locally

Table 1. Distribution and relative abundances of the aquatic Macroinvertebrates

	Relative Abundance	DISTRIBUTION Mouth (1-7)	Midreach (8-36)	Headwaters (37-46)
TURBELLARIA	*	|----------|		
OLIGOCHAETA				
Aeolosoma	**			|--------|
NAIDIDAE	*	|----|		
LUMBRICULIDAE		|----------|		
HIRUDINEA				
Rhynchobdellida (?)	**	|----------|		
Erpobdella	**	|----------|		
(unidentified)	*		|------|	
AMPHIPODA				
Hyalella azteca	*	|-----|		
DECAPODA				
CAMBARIDAE	*	|----------|		
HYDRACARINA	*		|------|	
EPHEMEROPTERA				
Baetis	***		|------|	
ODONATA				
Argia	***	|----------|		
Somatochlora	**		|------|	
Ishnura (?)	*	|-----|		
LIBELLULIDAE	*	|----------|		
Hetaerina	*		|------|	
TRICHOPTERA				
HYDROPTILIDAE	*		|------|	
HEMIPTERA				
Gerris	*	|-----|		
Limnophorus	*	|-----|		
CORIXIDAE	*			|-------|
VELIIDAE	*	|-----|		
COLEOPTERA				
ELMIDAE	*	|-----|		
DYTISCIDAE	*	|----------|		
DIPTERA				
ANTHOMYIIDAE (Ephydra?)	*		|-----|	
TIPULIDAE (Limonia?)	*		|-----|	
SIMULIIDAE	***			|-------|
PSYCHODIDAE (Pericoma)	*			|-------|
EMPIDIDAE	*			|-------|
CHIRONOMIDAE	***	|----------|		
GASTROPODA				
Physa	***	|----------|		
Lymnaea	**			|-------|
PLANORBIDAE	*		|-----|	
Ferissia	**		|----------|	
PELECYPODA				
Corbicula	*	|-----|		

*Relative Abundance: * present; ** common; *** abundant

abundant such as Baetis and chironomid larvae. These taxa are well adapted for such highly unstable stream environments. Taxa able to burrow or protect themselves against desiccation as the stream dries such as Cambaridae and Lumbriculidae were also represented.

Taxa were almost evenly divided between lotic and lentic species and the distribution of these two types of organisms were not correlated with distance from the mouth of the stream. Lotic versus lentic distributions were instead largely related to the microhabitat in which they were collected. More lentic species such as Aeolosoma, Hyalella, CAMBARIDAE, Somatochlora, CORIXIDAE, TIPULIDAE, Corbicula, etc. were found in slower moving areas of the stream often associated with detritus algae, or emergent vegetation. Taxa typically associated with lotic habitats such as HIRUDINEA, ELMIDAE, ANTHOMYIIDAE, Ferissia, TURBELLARIA were most commonly collected in the riffle areas of the same sites.

Only a weak relationship was noted between specific taxa and their distribution along specific stream reaches (i.e. mouth, midreach, headwaters). About one fourth of the taxa including LUMBRICULIDAE, Hyalella, Ishnura, GERRIS, Limnophorus, VELIIDAE, and Corbicula were collected only near the mouth. Both Hyalella and Corbicula are extremely common in Town Lake and indicate that at least some of these species have populated Waller Creek by migrating upstream from its mouth.

Another fourth of the taxa were collected only in the midreach sites. These taxa include HYDRACARINA, Baetis, Somatochlora, Heteraena, HYDROPTILIDAE, ANTHOMYIIDAE, TIPULIDAE, and PLANORBIDAE. Only a few taxa, Aeolosoma, CORIXIDAE, SIMULIIDAE, PSYCHODIDAE, and Lymnaea were collected exclusively in the headwater sites. The largest portion of taxa ranged over two or all three stream sections. LUMBRICULIDAE, CAMBARIDAE, DYTISCIDAE, CHIRONOMIDAE, and Physa were at least sporadically collected throughout the stream.

In terms of relative numbers, only five taxa were abundant in Waller Creek. (Table 1): Baetis, Argia, SIMULIIDAE, CHIRONOMIDAE, and Physa. All these taxa have short life cycles of less than one year. Species of Baetis, Chirronomidae (Merritt and Cummins, 1984) and Physa (Pennak, 1989) commonly produce 2-3 generations per years especially in southern states. Six additional species; Aeolosoma, Rhynchobdellida, Erpobdella, Somatochlora, Lymnaea and Ferissia were at least locally common. Again, at least some of these taxa have relatively short life cycles of less than one year. The Waller Creek aquatic fauna in general are comprised of rapidly growing taxa able to take most efficient advantage of ephemeral aquatic habitats.

Approximately two thirds of the taxa collected are detritivores or herbivores which feed on organic debris or scrape algae from rocks and stones. The other third of the

taxa represent predatory species. Generally, predatory taxa were much less common than collector/gatherers. Population sizes, particularly of the herbivores (eg. snails), fluctuated with food source. In the fall, collector and gatherers were most commonly found. In the spring when dense algal mats formed over much of the stream, herbivorous snails became extremely abundant. The Waller Creek taxa thus are represented by trophic generalists who can opportunistically exploit locally and temporally abundant food sources.

None of the taxa collected were rare or unusual on a regional basis and most have been collected from other area streams. Most of the taxa collected consist of generalist species that feed on detritus and algae, prefer warmer temperature waters, and lack strict water velocity requirement. Species with more restrictive microhabitat requirements such as true bugs, caddisfly, dragonfly and stonefly nymphs were only rare or were not collected during the study.

REFERENCES

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Pennak, R. W. 1989. Freshwater Invertebrates of the United States. 3rd edition. John Wiley and Sons. New York. 628 p.

Whiteside, B.G. et al. 1991. An Aquatic Biological Inventory of the Proposed Lindenae Resrvoir Site. Texas Parks and Wildlife. Austin. 49 p.

Ziser, S.W. 1989. A Preliminary Survey of the Aquatic Macroinvertebrates of the Austin Nature Preserve System. 12 p.

Financial Statement

I. Grant Awarded:		$500.00
II. Expenses:		
A. Materials		
1. Identification Manuals	$183.90	
2. Dip Net	24.25	
3. Screw Cap Vials and trays	95.25	
4. Collecting Jars	24.25	
5. Denatured alcohol	16.90	
B. Labor 64 hours @ $10/hr	640.00	
Total Costs:		$984.55