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Changes in the Adult Caddisfly *(Trichoptera)* Community of the Salt River, Kentucky

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ABSTRACT

A series of one-hour light trap collections was made between 4 June—30 July, 1979, from the Salt River and Brashears Creek, Spencer Co., Kentucky. Since 1971, both streams have received increased loads of suspended solids as a result of road and dam construction. Comparison of adult caddisflies collected in 1979 from the Salt River with 1971 Salt River samples revealed an increase in species richness (mean number of species per collection: 1971 = 24 ± 3; 1979 = 35 ± 7) and species diversity (1971 $\bar{H}$ = 2.0—3.0, $\bar{X}$ = 2.3 ± 0.3; 1979 $\bar{H}$ = 2.2—3.2, $\bar{X}$ = 2.7 ± 0.5). Changes also occurred in the seasonal pattern of species diversity values, from a mid-summer peak in 1971 to a mid-summer low in 1979. Major shifts occurred in relative abundance of net-spinning species. *Chimarra obscura* declined from 7.0% of all individuals in 1971, to 0.3% in 1979, possibly because *C. obscura's* capture net has small irregular pores that become occluded by the increased suspended solids. Comparison of changes in the Salt River fauna between 1971 and 1979 with data on annual variability (AV) from other localities revealed that fluctuations in the caddisfly community of the Salt River exceed those expected in the absence of sediment pollution. Comparison of 1979 Salt River and Brashears Creek collections emphasizes the similarity of sediment influences on the two streams.

INTRODUCTION

During a preimpoundment survey of the portions of the Salt River in Spencer and Anderson counties, Kentucky, extensive collections of benthic invertebrates were made from 1968 through 1975 (1, 2, 3). As a part of this survey, light-trap samples were taken during the summer of 1971. From these collections, the adult caddisfly community was studied, and a summary of the adults collected, their relative abundance, and their diversity was reported (4). From more than 87,000 specimens, 56 species, distributed in 11 families, were identified.

Beginning in 1975, construction of the outlet works for the Taylorsville Lake impoundment, along with a visitors' center and new access roads, resulted in the removal of much of the vegetational cover around the damsite, which exposed soil surfaces to erosion. Within the drainage basin, 4 sections of secondary road (Fig. 1; a, b, c, d) and a main highway with a bridge (Fig. 1, KY. 55) were relocated or modified. These construction and road projects contributed to the increased loads of suspended solids in surface runoff and, ultimately, in the Salt River and Brashears Creek. During the 1979 light-trap collections described below, some construction was still in progress. The dam and its appurtenances were completed in June 1981, and filling of the reservior began on January 4, 1983.

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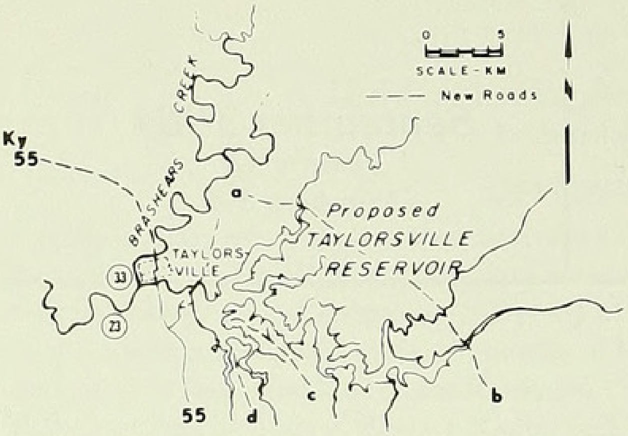

Figure 1: Map indicating the location of Brashears Creek, the Salt River, sampling sites (Station 23 and Station 33), and the proposed impoundment. Also shown are four sections of relocated secondary road (a - d) and KY Hwy. 55. See Resh et al. (4) for complete map of drainage basin.

Benthic sampling from 1968-1975 indicated that the freshwater sponge *Spongilla lacustris* (Linnaeus) was distributed widely in the Salt River, as was the sponge-feeding caddisfly, *Ceraclea transversa* (Hagen). Benthic collections in 1977-1978 indicated that sponge populations had been extirpated in the localities where they had been abundant. Since the sponge declined drastically, we speculated that abundance of the sponge-feeding caddisfly, along with other cadissfly populations, might be affected by the factors that reduced sponge abundance. Thus, a study was designed to compare the caddisfly community of the Salt River, 1979 with the community present in 1971, and to compare the caddisfly fauna of the Salt River with the fauna of Brashears Creek, a tributary stream below the damsite, that had been influenced by silation from bridge and road construction. In addition, we examined certain water-quality parameters to ascertain whether changes in caddisfly community structure may be related to the effects of dam construction and road relocation.

Materials and Methods

Site Description

The Salt River and its tributaries drain 7,563 km^2 in north-central Kentucky. The basin encompasses gently rolling topography of the outer Bluegrass Region, and the area above the damsite is characterized by steep ridges and narrow valleys. Slopes are generally heavily wooded, but the cleared areas are subject to heavy erosion and high runoff with little infiltation (5). Water-quality data for the Salt River, including physical, chemical, and biological parameters, have been reported (1,2,3, and 6).

Resh et al. (4) reported collecting results from a site (Fig. 1, Station 23) on the Salt River which is located 4.5 km downstream from Taylorsville. Here the river is approximately 30 m wide and 4 m deep during average flow conditions. A riffle is bordered by two pools, and substrate ranges from gravel to boulders over bedrock. A second site (Fig. 1, Station 33), located on Brashears Creek at Taylorsville and approximately 0.8 km from its confluence with the Salt River, also was examined in 1979. At this site, the creek is a meter or less in depth and averages 20 m in width. Several large beds of water willow grow in the stream channel on small gravel bars, and the stream bed is covered with gravel and small boulders.

Collection Procedures And Data Analysis

Rather than attempting to encompass the entire season of adult emergence, light-trap collections in 1979 were confined to the period of greatest flight activity, previously determined (4) as June through July. Adult insects were sampled biweekly at both Station 23 and Station 33 with the type of trap used in the 1971 collections — a modified Texas light trap equipped with an 8-watt fluorescent blacklight bulb. The traps were hung approximately 2.5 m off the ground on the steam bank and each collection began 20 minutes after sunset and continued for 1 hour. Insects were collected directly into 70% ethyl alcohol. Species diversity per individual ($\bar{H}$) was calculated using Brillouin's (7) equation. The collecting methods and statistical analyses of species diversity outlined here paralleled methods used in the 1971 light trap collections (4). This was done to permit comparison between the 2 studies.

Water samples were collected on each sampling date and analyzed to determine dissolved solids, suspended solids, and total solids. Other water quality parameters measured included pH, conductivity, alkalinity, hardness, and turbidity.

Results

Water Chemistry

The Salt River and Brashears Creek flow over limestones and shales of Clays Ferry and Calloway Creek Formations (Upper Ordovician) and alluvium derived from these deposits (8). The streams drain farm and pastureland and receive no industrial effluents. They are similar in type of substrate, water chemistry, macrophytic vegetation, and benthic fauna (9).

A comparison of water quality data collected in 1979 with data collected in 1971 indicates that changes have occurred in these streams.

Krumholz (1) described water chemistry characteristics of the Salt River at that time and reported the following ranges: pH (6.3—7.5), total dissolved solids (40-160 mg/1), and conductivity 100—300 umhos/cm). Data from the Salt River in 1979 indicate changes in pH (7.7—8.5), and increases in total dissolved solids (223—272 mg/1) and conductivity (270—440 umhos/cm.) Data from Brashears Creek in 1979 show pH from 7.4—8.6 conductivity from 340—530, and turbidity from 3.8 to 35 NTU. Although a continuous profile of water quality is not available for the seven-year period, these data and others (6,10) suggest that the changes in stream conditions are attributable to increased sediment load.

A comparison of the 1979 water quality data from Brashears Creek and the Salt River suggest that sediment pollution levels are somewhat higher in the Salt River. Suspended solids ranged from 23 to 88 mg/1 in the Salt River ($\bar{x}$ = 55 mg/1), and from 5 to 76 mg/1 in Brashears Creek ($\bar{x}$ = 33 mg/1). Turbidity levels in the Salt River ranged from 16-72 NTU ($\bar{x}$ = 36). Levels of alkalinity and hardness were quite similar in the two streams in 1979, ranging from 87 to 172 mg/1 in the Salt River, and 130 to 250 mg/1 in Brashears Creek.

Species Richness

In 1971, the collections made from the Salt River between 4 June and 30 July yielded 77,458 individuals and 44 species (Table 1). Salt River collections from this same time period in 1979 yielded 45,784 individuals and 49 species. The increase in species richness in the Salt River is reflected by the change in mean number of species per collection. The 1979 collection from the Salt River averaged 35 ± 7 species per collection, whereas collections from 1971 averaged 24 ± 3 species per collection.

Table 1. Species present, number of inviduals, and their abundance as percentage of total caddisflies collected in 1971 and 1979, from the Salt River and Brashears Creek, Kentucky.

	Salt River 1971		Salt River 1979		Brashears Cr. 1979	
	Number Collected	% of Individuals Collected	Number Collected	% of Individuals Collected	Number Collected	% of Individuals Collected
Family GLOSSOSOMATIDE						
Protoptila maculata (Hagen)	6,205	7.91	4,207	9.19	4,584	19.72
Family PHILOPOTAMIDAE						
Chimmara obscura (Walker)	5,816	7.41	104	0.23	100	0.40
Family POLYCENTROPODIDAE						
Nyctiophylax affinis (Banks)	246	0.31	7	0.02	5	0.02
Polycentropus cinereus (Hagen)	787	1.00	75	0.16	48	0.20
Polycentropus sp.	0	0	0	0	3	0.01
Cyrnellus fraternus (Banks)	118	0.15	237	0.52	172	0.70
Family PSYCHOMIIDAE						
Cernotina sp.	7	0.01	1	<0.01	0	0
Psychomyia flavida (Hagen)	0	0	3	<0.01	1	<0.01
Family HYDROPSYCHIDAE						
Hydropsyche betteni Ross	34	0.04	7	0.02	3	0.01
Hydropsyche cheilonis Ross	0	0	2	<0.01	2	0.01
Hydropsyche dicantha Ross	5	0.01	643	1.40	443	1.90
Hydropsyche incommoda Hagen	0	0	6	0.01	0	0
Hydropsyche orris Ross	8	0.01	0	0	0	0
Hydropsyche simulans Ross	202	0.26	119	0.26	26	0.11
Cheumatopsyche pettiti (Banks)	3.057	3.91	2,349	5.13	942	4.05
Cheumatopsyche campyla Ross	6,143	7.83	20,684	45.18	5,676	24.42
Cheumatopsyche pasella Ross	9	0.01	33	0.07	0	0
Cheumatopsyche speciosa (Banks)	9	0.01	0	0	0	0
Potamyia flava (Hagen)	13	0.02	12	0.03	3	0.01
Family HYDROPTILIDAE						
Hydroptila ajax Ross	7	0.01	16	0.03	0	0

continued

Table 1 continued

Hydroptila angusta Ross	82	0.10	119	0.26	80	0.34
Hydroptila armata Ross	23,106	29.45	647	1.40	1,044	4.49
Hydroptila consimilis Morton	6	0.01	10	0.02	6	0.02
Hydroptila hamata Morton	0	0	6	0.01	6	0.02
Hydroptila perdita Morton	12,170	15.51	4,503	9.84	6,172	26.56
Hydroptila waubesiana Betten	11	0.01	32	0.07	35	0.15
Hydroptila sp.	0	0	5	0.01	0	0
Ithytricia nr *mazon* Ross	16	0.02	2	◄0.01	2	0.01
Neothrichia okopa Ross	10	0.01	1	◄0.01	2	0.01
Neothricia vibrans Ross	0	0	701	1.53	756	3.25
Neotrichia riegeli Ross	0	0	0	0	1	◄0.01
Ochrotrichia spinosa (Ross)	7	0.01	1	◄0.01	0	0
Ochrotrichia tarsalis (Hagen)	6	0.11	466	1.02	61	0.26
Orthotrichia aegerfasciella (Cham.)	39	0.05	28	0.06	15	0.05
Orthotrichia cristata Morton	12	0.02	18	0.04	2	◄0.01
Oxyethira pallida (Banks)	284	0.36	148	.032	146	0.63
Stactobiella palmata (Ross)	62	0.08	25	0.05	1	◄0.01
Family LEPTOCERIDAE						
Ceraclea ancylus (Vorhies)	822	1.05	120	0.26	22	0.09
Ceraclea transversa (Hagen)	175	0.22	89	0.19	86	0.37
Ceraclea maculata (Banks)	804	1.02	244	0.53	119	0.51
Ceraclea tarsipunctatus (Vorhies)	10	0.01	735	1.61	311	1.33
Ceraclea cancellata (Betten)	15,604	19.89	7,049	15.40	1,781	7.66
Nectopsyche candida (Hagen)	0	0	1	◄0.01	0	0
Nectopsyche exquisita (Walker)	723	0.92	1,031	2.25	186	0.80
Nectopsyche sp.	10	0.01	20	0.04	41	0.18
Oecetis cinerascens (Hagen)	91	0.12	7	0.02	29	0.12
Oecetis ditissa Ross	24	0.03	105	0.23	4	0.02
Oecetis inconspicua (Walker)	890	1.13	230	0.50	188	0.80
Oecetis nocturna Ross	545	0.69	289	0.63	50	0.22
Oecetis persimilis (Banks)	26	0.03	614	1.34	61	0.26
Triaenodes connatus Ross	2	◄0.01	17	0.04	17	0.07
Triaenodes ignitus (Walker)	0	0	13	0.03	8	0.03
Triaenodes melacus Ross	180	0.23	0	0	0	0
Triaenodes tardus Milne	68	0.09	0	0	1	◄0.01
Triaenodes sp.	0	0	2	◄0.01	0	0
	78,458		45,784		23,240	

Species Diversity

In contrast to species richness, changes in species diversity values were less pronounced. Species diversity ranged from 2.0-3.0 ($\bar{x}$ = 2.3 ± 0.3) in 1971 Salt River collections, and 2.2—3.2 ($\bar{x}$ = 2.7 ± 0.5) in 1979 Salt River collections (Fig. 2). In 1971, the peak in species diversity values occurred in mid-July, with lowest diversity found in June. However, in 1979, diversity estimates were highest in early June and much lower in mid-July. These peaks are related to the phenology and population size of selected species in the community.

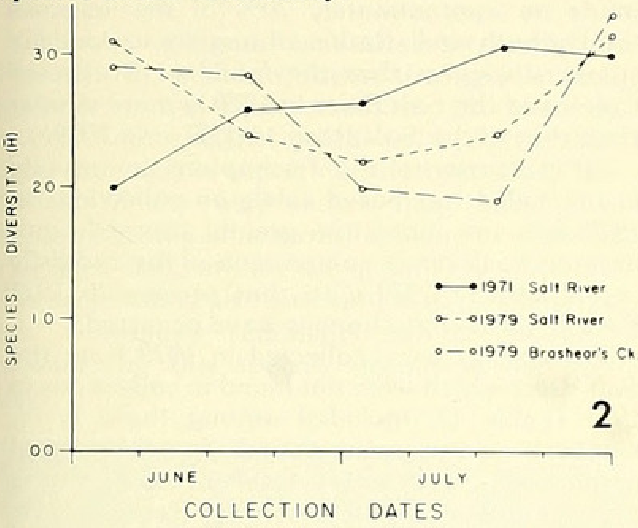

Figure 2: Comparison of species diversity in 1971 and 1979 from the Salt River and in 1979 from Brashears Creek adult caddisfly collections.

For example, in 1971, early June collections contained large numbers of *Hydroptila perdita, Cheumatopsyche pettiti,* and *Ceraclea cancellata,* which raised redundancy and lowered diversity to 2.0 (Fig. 2). Mid-July collections showed highest diversity values (3.0) which reflected peak emergence of the majority of the species and a decline in numbers of *C. cancellata*. Diversity remained relatively constant through July and did not decrease until early August when *Protoptila maculata* became more abundant and most other species declined in numbers.

In 1979, early June collections from the Salt River displayed highest diversity, with an estimated value of 3.1 (Fig. 2). Diversity values from mid-June to mid-July were lower, ranging from 2.2 to 2.4. During this period, *Cheumatopsyche campyla* comprised 45 to 55% of each hour's catch. *Ceraclea cancellata was abundant in mid-June (19% of total catch), but was surpassed in numbers by H. perdita* and *P. maculata* (emerging earlier than in 1971) in July. During most of July, these two species contributed 25 to 50% of each hour's collection and along with *C. campyla*, they constituted approximately 80% of each hour-long collection. The end of July brought a return to the higher diversity values seen earlier in the season. Numbers of *C. campyla, P. maculata,* and *H. perdita* decreased, along with the total number of individuals collected.

Populations

In terms of numbers of species present in 1979, the family Hydroptilidae was highest with 17 species; collections in 1971 contained 14 species. Although 45% of all caddisflies collected in 1971 were hydroptilids, only 15% were of this family in 1979. This decrease is due primarily to a reduced mid-July emergence in the number of *Hydroptila armata*. This species had only a brief emergence peak in 1971 (4). Since the sample collected on 28 May 1979, contained a very large number of *H. armata,* we believe that this species did not substantially decline in numbers from 1971 to 1979, but simply emerged earlier in 1979. The second most abundant hydroptilid in the Salt River in 1979 was *Neotrichia vibrans,* a species not found in the 1971 Salt River collections.

The family Leptoceridae had the second highest species richness with 16 species in the Salt River 1979 collections; the 1971 samples had 15 species. Species of the genus *Ceraclea* were numerically dominant in both 1971 and 1979. Within this genus, some changes in relative abundance of individual species did occur. *Ceraclea tarsipunctata* increased markedly in abundance, from 0.05% of all leptocerids in 1971 to 9.0% in Salt River 1979 collections. Although the sponge populations declined dramatically, abundance of adults of the sponge-feeding caddisfly, *C. transversa,* were similar in 1971 and 1979 (0.2%). Changes also occurred within the leptocerid genus *Triaenodes. Triaenodes melaca* and *T. tarda* were both present in 1971 collections but were completely absent in 1979 collections.

In the family Hydropsychidae, we found 9 species in both 1971 and 1979. Numerical dominance of this family is attributable to the very high numbers of *C. pettiti* and *C. campyla* collected, although the relative proportions of these 2 species changed dramatically. In 1971, the ratio of *C. pettiti* to *C. campyla* was 2:1, whereas, in 1979, the ratio was 9:1.

Examination of the various families of net spinners reveals other changes in their relative abundance between 1971 and 1979. Most notable was a shift in the ratio of Hydropsychidae to Philopotomidae, which was less than 2:1 in 1971 collections, but increased to more than 229:1 in 1979 collections. The ratio of Hydropsychidae to Polycentropodidae also increased from 4:1 in 1971 to 75:1 in 1979.

Comparison of Salt River and Brashears Creek Faunas

Brashears Creek collections between 4 June and 30 July contained 23,240 individuals and 44 species (Table 1). The caddisfly fauna of the Salt River and Brashears Creek in 1979 shared 41 species in common; 3 were present only in the Salt River and 3 were present only in Brashears Creek (Table 1). In most cases these unique species were represented by only 1 or 2 individuals, with the exception of *Cheumatopsyche pasella* which was represented by 33 individuals in the Salt River.

Species diversity estimates in Brashears Creek (range = 1.9—3.3, $\bar{X}$ = 2.4 ± 0.7), were slightly lower than those of the Salt River, although the pattern of these estimates showed the same general trend (Fig. 2). Diversity values were approximately 3.0 in early June but fell in late June to about 2.0 due to the numerical dominance of *C. campyla*, *H. perdita*, and *P. maculata*. The lowest diversity value of the season, 1.9, occurred when *P. maculata* and *H. perdita* comprised 58% and 19%, respectively, of the sample. Diversity values again rose at the end of July and returned to approximately 3.2, as total catch declined in numbers.

Individuals of the caddisfly family Hydroptilidae were more common in Brashears Creek (36% of all individuals collected) than in the Salt River (15%), and *N. vibrans* was also abundant in Brashears Creek collections. As in the Salt River, 15 species of leptocerid caddisflies occurred in Brashears Creek, making it the second highest family in species richness.

Examination of the net-spinning species in Brashears Creek in 1979 shows that the ratio of *C. pettiti*: *C. campyla* was 6:1 Hydropsychidae: Philopotamidae was 71:1, and Hydropsychidae: Polycentropodidae was 75:1. Although each of these ratios was higher than 1971 Salt River collections, they were lower than 1979 Salt River collections.

Protoptila maculata, a glossosomatid, was abundant in 1979 Brashears Creek collections, where it contributed almost 20% of the season's total. In the Salt River, it was also common (9.2%) and its relative abundance changed very little from 1971 to 1979.

Discussion

Within the Salt River drainage basin, paterns of land use and population distribution did not change appreciably from 1971 to 1979. The only significant activities to occur over the 8 year period were those associated with construction of the proposed dam outlet-works, visitors' center with access roads, bridges, and the construction of Kentucky State Hwy. 55. Beginning in 1975, these activities generated chronic low levels of suspended solids which eventually entered the Salt River.

In 1979, both Brashears Creek and the Salt River were characterized by moderate levels of suspended solids and turbidity, with levels in the Salt River usually higher than those in Brashears Creek. The caddisfly fauna was similar in these 2 streams, and species diversity values were comparable at the 2 sites with both communities demonstrating a mid-season low in species diversity. Four species, *P. maculata*, *C. campyla*, *H. perdita*, and *C. cancellata*, made up approximately 70% of the season's total at both sites. Ratios among the various net spinners suggest that the fauna of Brashears Creek and the Salt River in 1979 is more similar than that of the Salt River in 1971 and 1979.

An evaluation of the Trichoptera community in the Salt River based solely on collections in 1979 does not indicate a greatly stressed community; however, a comparison of the caddisfly community in 1979 with that present in 1971 does suggest that changes have occurred.

Ten species were collected in 1979 from the Salt River which were not found in collections in 1971 (Table 1). Included among these is *N. vibrans*, which was found in substantial numbers (1.5% season's total in 1979), and is apparently a new state record for Kentucky (11, 12). The remaining 9 species collected from the Salt River in 1979 that were absent in 1971 collections, were present in very low numbers, often as single specimens. Variations in emergence synchrony may be responsible for failure to collect these species in 1971; alternatively, these rare species may be inhabiting a marginal habitat in the collecting area or may represent immigrants from other breeding habitats, e.g., Crichton (13).

We found that species diversity did not change greatly from 1971 to 1979 (Fig. 2), although the season patterns of species diversity values is appreciably altered. For example, a midsummer low was present in 1979 Salt River collections, whereas in 1971 highest diversity values occurred in midsummer. The very large numbers of *C. campyla* collected in 1979 raised redundancy and consequently lowered diversity at this time, even though in both years the number of total species collected was highest in midsummer. Sorensen et al. (14) and others have noted that benthic communities are often maintained through succession of species; individual taxa may differ as sediment pollution persists, but estimates of diversity remain constant. We would expect this type of response in the benthos to be reflected in light-trap collections of adults (15).

Although we did not see a decrease in species diversity values in the Salt River, and species richness in fact increased, major shifts in species composition and abundance were observed within several families from 1971 to 1979. For example, the underlying reason for the dramatic change in the ratio of hydropsychids to philopotamids (2:1 to 299:1) is the decline in abundance of *Chimarra obscura*, from 7.0% of the season's total in 1971 to less than 0.3% in the Salt River in 1979. Turbidity and suspended solids levels in the Salt River frequently exceed the upper limits of tolerance observed for this species (2.5 to 51 NTU: 178—198 mg/1 total solids) that were reported by Harris and Lawrence (16).

Chimarra obscura has a small net mesh size (Fig. 3). In addition, near the middle and posterior end of the net shelter, the mesh is covered with a sticky, gelatinous secretion that apparently aids in capturing small particles. The strands of the net, rather than forming a regularly arranged network, appears to serve as a support structure for the gelatinous material. This secretion is also susceptible to occlusion of fine, suspended sediments, which probably accounts for this species' decline in the Salt River.

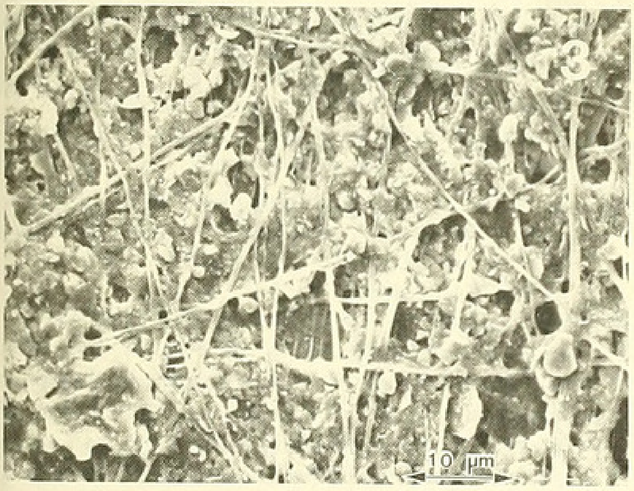

Figure 3: Chimarra obscura collecting net, inner surface at posterior end. Roughness of some strands due to dried secretion. 2000X.

Hydroptila perdita also showed a decline in relative abundance, from 15% in 1971 to 9% in 1979. Although little is known about the ecological requirements of species in the genus, it is generally thought that larvae feed on attached diatoms as well as on the contents of algal cells (17). Shading and abrasion of exposed surfaces by suspended solids may be particularly detrimental to larvae dependent on periphyton food sources.

Ceraclea cancellata appears to be proportionately less abundant in Salt River 1979 collections (15% of total catch) than in 1971 (20%). This species showed a 1979 emergence peak in June, similar to the peak seen in 1971, indicating that a difference in sampling schedules is not the source of the apparent change in abundance. Data on tolerance of this species to suspended solids are not available (16), but Resh and Unzicker (18), in their discussion of the genus *Ceraclea* (= *Arthripsodes*), suggested that some species in the genus may be more tolerant of pollution effects than others.

Although the freshwater sponge *Spongilla lacustris* is fairly pollution tolerant, it is intolerant of sediment pollution (19). Thus, siltation changes are probably responsible for its decreased abundance. The similarity in relative abundance of *C. transversa* in 1971 (0.22%) and 1979 (0.19%) probably also reflects the ability of this species to function as a detritus feeder (20).

Flynn and Mason (21) observed a decrease in the species number of hydropsychids in response to nonpoint sources of sediment pollution. In contrast, the number of species in the Salt River did not decline from 1971 to 1979, although relative proportions of species of *Cheumatopsyche* varied. For example, *C. campyla* was more abundant in 1979 than in 1971, whereas *C. pettiti* remained relatively constant. However, patterns of seasonal emergence for those 2 species remained similar in 1979 to those seen in 1971, with *C. campyla* more abundant earlier in the summer than *C. pettiti*. *Cheumatopsyche* spp. had been found in conditions of relatively high suspended solids (22). Thus, the population of *C. campyla* may be expanding in numbers to fill habitat vacated by other, less sediment-tolerant, net-spinning species.

An examination of observed changes in the caddisfly community from 1971 to 1979 raises the question of what can be expected in terms of temporal variability in the absence of perturbations. Wolda (23), in research with tropical insects, used a parameter called Annual Variability (AV) to measure fluctuation in numbers of individuals from one year to the next. McElravy et al. (24). applied this statistic to other data on temperate insect communities and found a range of values for AV from 0.080 to 0.325. Using AV to measure fluctuations seen in the Salt River from 1971 to 1979, we obtained a value of 0.925, which is several times greater than the maximum value reported above. The magnitude of this value suggests that, even though the data are not for successive years, the changes exceed those expected in the absence of increased siltation.

Further changes are anticipated once the Taylorsville project is completed and flow augmentation for improving potable water quality if begun. Although construction-related sediment generation will abate, suspended material will still enter the streams as runoff after precipitation. In the Salt River, as stream flow is regulated, the scouring effects of high flow conditions will no longer be available to help remove this accumulated material from the stream bed. Consequently, sediment may begin to fill in and cover over much of the benthic habitat. Continuing studies will examine further change in the Salt River caddisfly community.

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