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SECTION 4

YEAR TWO OF THE BENTHIC INVESTIGAT'ON OF THE BRAIDWOOD COOLING POND

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ABSTRACT

Results of the initial 2 years of the Braidwood cooling pond benthic investigation indicate the development of two distinct community types within the pond--a profundal community associated with the original stripmine basins and dominated by Paranais frici, Chaoborus punctipennis, Procladius, and Chironomus, and a littoral community associated with the more recently inundated areas and dominated by Cladotanytarsus, P. frici, Polypedilum, and Paratendipes. Significant increases in mean total macroinvertebrates and mean number of taxa per sample site occurred in both basin types from 1981 to 1982. Taxonomic composition of the stripmine basin communities remained relatively unchanged from 1981, but four of the five most abundant taxa of the newly flooded areas of 1981 were absent from the list of the ten most abundant littoral taxa of 1982. One-way analyses of variance among transect means of taxa densities and community indices detected only one significant difference in the 1982 data. T-tests between transect means of yearly taxa densities revealed significant increases in the abundance of several species. Benthic community composition and density within the original stripmine basins will probably remain fairly constant in the future; however, composition and abundance of the community of the more recently flooded areas may fluctuate for some time as the basin matures and a depositional layer develops upon the bottom.

YEAR TWO OF THE BENTHIC INVESTIGATION

OF THE BRAIDWOOD COOLING POND

INTRODUCTION

The primary emphasis of the second year of the Braidwood cooling pond benthic investigation was identification of maturational and/or successional changes which may have occurred within the macroinvertebrate communities since the initial year of the study. Specifically, the year two objectives were: (1) to continue to quantify the elements of community structure (distribution, taxonomic composition, and standing crop) for the whole lake community and to identify differences between the two study years among these elements, and (2) to continue to monitor differences existing between the old (stripmine basins) and new (more recently flooded basin) communities and to document the manner in which these communities have changed since year one of the study.

MATERIALS AND METHODS

The sampling strategies and methods employed during year two of the study were identical to those used during year one (Wiley and Warren 1981). During the two collections of 1982 (15 April and 14 July) samples were taken from sites along transect stations 1, 2, 3, and 4 (Figure 4-1). Transects 1-3 extended from old stripmine basins onto newly flooded (December 1980) areas. At these locations two replicate samples were obtained at each of sites A, B, and C (old stripmine basin) while one sample was taken at each of sites D, E, F, and G (newly flooded basin). Transect 4 was located completely along a newly flooded area; two replicates were taken at each of sites A-E during each collection.

Samples were obtained with a petite ponar dredge (area sampled = 0.024 m^{-2}), elutriated (mesh size = 600 µm), and preserved with 80% ethanol in quart jars. In the laboratory, each sample was examined under a stereo-dissecting microscope with magnification to 40X. Organisms were hand-picked from detritus and inorganic material, identified to the lowest positive taxonomic level utilizing the literature in Appendix 4A-1, and counted. Raw data were converted to number of organisms per square meter.

Organisms that required slide-mounting for identification, such as Oligochaeta and Chironomidae, were cleared in 10% KOH solution or Amman's lactophenol and mounted in polyvinyl lactophenol or Hydramount. Identifications were then made using a compound microscope with magnification to 1000X.

Ancillary measurements taken concurrently with each collection are recorded in Appendix 4B-1 and include depth, water temperature, and dissolved oxygen at each sampling site.

RESULTS AND DISCUSSION

OVERALL POND COMMUNITY

The two benthic collections obtained from Braidwood cooling pond during 1982 were dominated numerically, as in 1981, by Oligochaeta (Naididae and Tubificidae), Chironomidae, and Chaoboridae (Table 4-1). Fifty-two macroinvertebrate taxa were collected during both years (Table 4-2), but the pattern of species dominance differed slightly in 1982 and mean densities of many taxa increased substantially. The naidid *Paranais frici* was the most abundant taxon collected in year two of the study, occurring with a mean density of $445 \pm 151\ m^{-2}$ (henceforth, all densities reported herein will be in numbers of individuals per m^{-2}). In 1981 *P. frici* was not among the ten most abundant taxa and its year one mean of 10 ± 6 is significantly less than its 1982 population mean. For the second year the epifaunal midge *Cladotanytarsus* was the second most abundant taxon collected, its population tripling in size from 105 ± 26 in 1981 to 332 ± 66 in 1982. The phantom midge, *Chaoborus punctipennis*, which ranked first in abundance in 1981, was third most abundant in 1982, but increased its population by an average of $60\ m^{-2}$. The chironomids *Pseudochironomus* and *Dicrotendipes*, the fourth and fifth, respectively, most abundant taxa in 1981, declined very substantially (although not statistically significantly) in 1982.

They were replaced by two other midges *Polypedilum* (143±30) and *Procladius* (135±26) (Tables 4-2 and 4-3).

Several species were collected for the first time from Braidwood cooling pond during 1982. The most abundant of these were the naidid *Nais communis* (80±35), the tubificid *Aulodrilus pigueti* (59±32), and the chironomid *Parakiefferiella* (35±12). Other taxa appearing for the first time included the oligochaetes *Limnodrilus cervix* and *Chaetogaster diaphanus*, the Trichoptera *Oecetis* and *Polycentropus cinereus*, the alderfly *Sialis*, and the chironomid *Corynoneura* (Table 4-2). Taxa present in 1981 but absent in 1982 included the snail *Physa* and the chironomids *Nanocladius* and *Pseudosmittia*; of these only *Pseudosmittia* occurred in relatively large numbers in 1981 (6±5), and only in newly flooded areas. Competition for space among rapidly growing populations in the shallow areas of the pond flooded in 1980 may account for the decline of the *Pseudosmittia* population.

The mean number of macroinvertebrates per sample site in 1982 ranged from 82 at Station 4B in July to 12,222 at Station 2C in April, with an overall mean of 2,467±267. This mean is nearly double that of the older lakes Coffeen, Sangchris, and Shelbyville (Warren and Buckler 1981) and is significantly greater (T-test; α <0.05) than the overall density (943±98) of Braidwood cooling pond in 1981 (Table 4-4).

Coupled with the large increase in overall mean density in 1982 was a significant increase (nearly double) of the mean number of taxa present per sampling site (Table 4-4). Mean species diversity remained nearly equal to the values calculated for 1981, while mean evenness (a measure of the distribution of individuals among species) decreased significantly from the previous year (Table 4-4). These measures of community structure are indicative of a trend toward increasing numbers of organisms and taxa per sampling site, but of an overall dominance by one taxon or a very few taxa with large numbers of individuals.

COMMUNITIES OF OLD VERSUS NEW BASINS

During 1982, Naididae and Chironomidae dominated the relative abundance of both the original stripmine basins and the areas of the pond most recently flooded; in addition, Chaoboridae were dominant in stripmine basins only (Table 4-1). Despite this domination by similar major taxonomic groups, the striking dissimilarities in the species composition of the two basins demonstrated in 1981 were again very apparent in 1982. The stripmine basin communities were dominated by Paranais frici (609±305), Chaoborus punctipennis (516±179), Procladius (192±51), and Chironomus (150±48) (Table 4-3). In the pond areas first inundated in 1980, Cladotanytarsus predominated the community (524±109) and P. frici densities dropped to 311±115, ranking it second in abundance. Other taxa comprising more than 5% of the total shallow basin community were Polypedilum (191±50) and Paratendipes (136±44) (Table 4-3).

As in 1981, the vast difference in the taxonomic compositions of the two communities present in the pond is attributable to physical characteristics of the two basin types. The depth of the stripmine pits provides a habitat characterized by a homogeneous silt-clay substrate and low levels of dissolved oxygen during periods of thermal stratification. Taxa such as *Chaoborus punctipennis*, *Chironomus*, and *Procladius* are well adapted to such hypolimnetic stresses and are typical dominants of profundal communities (Brinkhurst 1974, Wetzel 1975). These three taxa were significantly more abundant in the originally flooded basins and significantly positively correlated with depth (Table 4-5). However, the predominance of the old stripmine basins by *Paranais frici* is somewhat puzzling. In general, naidid populations are confined to the littoral areas of lakes and thrive best on hard substrates (Learner et al. 1978). In Braidwood cooling pond during 1982, *P. frici* occurred in large numbers in silt and clay at depths of up to 17 meters. Little is known of the biology of individual naidid species, and *P. frici* may have exceptional habitat preferences.

The recently inundated basins of Braidwood cooling pond lack a substantial silt and detritus depositional layer on the bottom and offer a littoral habitat ideal for domination by an epifaunal taxon such as *Cladotanytarsus*. The other dominant chironomids of the newer basins, *Polypedilum* and *Paratendipes*, are also common constituents of littoral assemblages (Coffman 1978). Of all the taxa present in the more recently flooded areas, only Cladotanytarsus occurred in significantly greater numbers than in the stripmine basins; however, densities of several other chironomids were negatively correlated with depth (Table 4-5).

Although the difference in taxonomic compositions of the two basins was great, no significant differences were found between the 1982 basin means of diversity, evenness, number of taxa per site, or total macroinvertebrates (Table 4-5).

Mean total macroinvertebrates and the mean number of taxa collected per site from both the original stripmine basins and the most recently flooded basins increased significantly from 1981 to 1982 (Table 4-4); year-to-year differences in the taxonomic compositions of both basin types were also quite apparent. The greatest change evident in the stripmine basin communities was the previously noted increase (although not statistically significant) of the Paranais frici population. Other stripmine basin [illegible]ants whose populations increased significantly from 1981 included Procladius, Chironomus, and Caenis (Table 4-3). Noteworthy taxa which decreased in density between the two study years in the originally flooded basins included ceratopogonids of the Palpomyia complex. These predaceous biting-midge larvae may have been unable to compete for food with the rising populations of two other predators, Chaoborus punctipennis and Procladius.

Four of the five most abundant taxa present in the newly flooded basins in 1981 (Pseudochironomus, Dicrotendipes, Chaoborus punctipennis, and Palpomyia complex) were absent from the list of the ten most abundant taxa in 1982 (Table 4-3). Larvae of Pseudochironomus, Dicrotendipes, and the Palpomyia complex are often associated with aquatic macrophytes or periphyton growing upon macrophytes (Saether 1977, Coffman 1978, Simpson and Bode 1980). Populations of these taxa may have declined due to the disappearance (decomposition) of the substrate provided by terrestrial plants and stubble present on the old field portion of the basin prior to lake fill. The rapidly expanding Cladotanytarsus population may also have displaced the former dominants by more efficiently competing for available space. The C. punctipennis population may have declined due to the decrease of preferred food organisms (zooplankters) associated with the aforementioned decaying vegetation. Dominant taxa whose populations increased significantly from 1981 to 1982 in the recently flooded basins of the pond included Cladotanytarsus, Paranais frici, Polypedilum, and Paratendipes (Table 4-3).

TRANSECT EFFECTS

One-way analysis of variance revealed a significantly larger population of Chironomus at Transect 1 than at any other transect in 1982. No other significant differences among 1982 transect means of taxa densities or indices of community structure were detected.

The taxonomic make-up of transects 1, 2, and 3 during 1982 was quite similar. Paranais frici, Chaoborus punctipennis, and Cladotanytarsus dominated all three locations; no other taxon accounted for more than 9.6% of the total community density at any of the three transects (Table 4-6). Transect 4 differed slightly from the other transects in that C. punctipennis was not among the three most abundant taxa and accounted for only 5% of the total assemblage. The lack of a profundal zone at this location explains the depressed Chaoborus density.

T-tests between yearly density means of each transect detected significant increases in total macroinvertebrates at transects 1, 2, and 3 from 1981 to 1982. The mean number of taxa per sample site also increased significantly at all transects during the same period. Species diversity and evenness remained statistically unchanged at all four sampling locations from 1981 to 1982, with the exception of a significant decrease in diversity at Transect 2 (Table 4-4).

Dominant taxa increasing significantly in abundance from 1981 to 1982 included total Oligochaeta at transects 1, 2, and 4; total Chironomidae at transects 1 and 2; Cladotanytarsus at transects 1 and 3; and Procladius at transects 2, 3, and 4 (Table 4-6).

Results of the initial 2 years of the Braidwood pond benthic investigation indicate the development of two distinct community types within the pond--a profundal community associated with the original stripmine basins present prior to construction of the cooling pond and a littoral community associated with the shallow, more recently inundated areas. Benthic community composition and density within the stripmine basins will probably remain reasonably stable, but the community of the new basins may fluctuate greatly in constitution and abundance for several years as a depositional layer develops on the pond bottom. Diversity index values are typical for those of a relatively new reservoir; evenness indices indicate a fairly strong dominance by a single or very small number of species (*Paranais frici* in the stripmine basins and *Cladotanytarsus* in the shallow basins). Mean total densities in Braidwood cooling pond during 1982 were much higher than those of several other central Illinois reservoirs, but the rapid population growth which occurred from 1981 to 1982 in the pond will level off or even begin to decline in the future as the carrying capacity of the more recently flooded areas is reached and a more mature community develops.

SUMMARY

1. Fifty-two macroinvertebrate taxa were collected in both 1981 and 1982 from the Braidwood cooling pond. The overall benthic community was dominated by Oligochaeta, Chironomidae, and Chaoboridae each year.

2. Benthic population densities per sample site ranged from 84 to 12,222 during 1982. The mean total density of 2,467 was a statistically significant increase over the 1981 mean total of 943, and is substantially greater than the mean densities recorded for lakes Coffeen, Sangchris, and Shelbyville.

3. As in 1981, two distinct benthic community types were present in the pond--a profundal community in the stripmine basins dominated by *Paranais frici*, *Chaoborus punctipennis*, *Chironomus*, and *Procladius*, and, in the most recently flooded areas, a littoral community dominated by *Cladotanytarsus*, *P. frici*, *Polypedilum*, and *Paratendipes*.

4. Calculated values for indices of diversity and evenness were indicative of the strong domination by a single taxon in both of the community types present in the pond. Both *Paranais frici* and *Cladotanytarsus* overwhelmingly predominated their respective communities.

5. Significant increases in mean total macroinvertebrates and mean number of taxa per sample site occurred in both basin types from 1981 to 1982. Taxonomic composition of the stripmine basin communities remained relatively stable except for the explosion of the Paranais frici population. Four of the five most abundant taxa in the newly flooded areas of 1981 were absent from the list of the ten most abundant littoral taxa of 1982.

6. One-way analyses of variance among transect means of taxa densities and community indices detected only one significant difference (in Chironomus densities) in 1982. T-tests between transect means of yearly taxa densities revealed significant increases in numbers for several species.

7. Benthic community composition and density within the original stripmine basin will probably remain fairly constant in the future; however, composition and abundance of the community of the more recently flooded areas may fluctuate for some time as a depositional layer develops upon the pond bottom.

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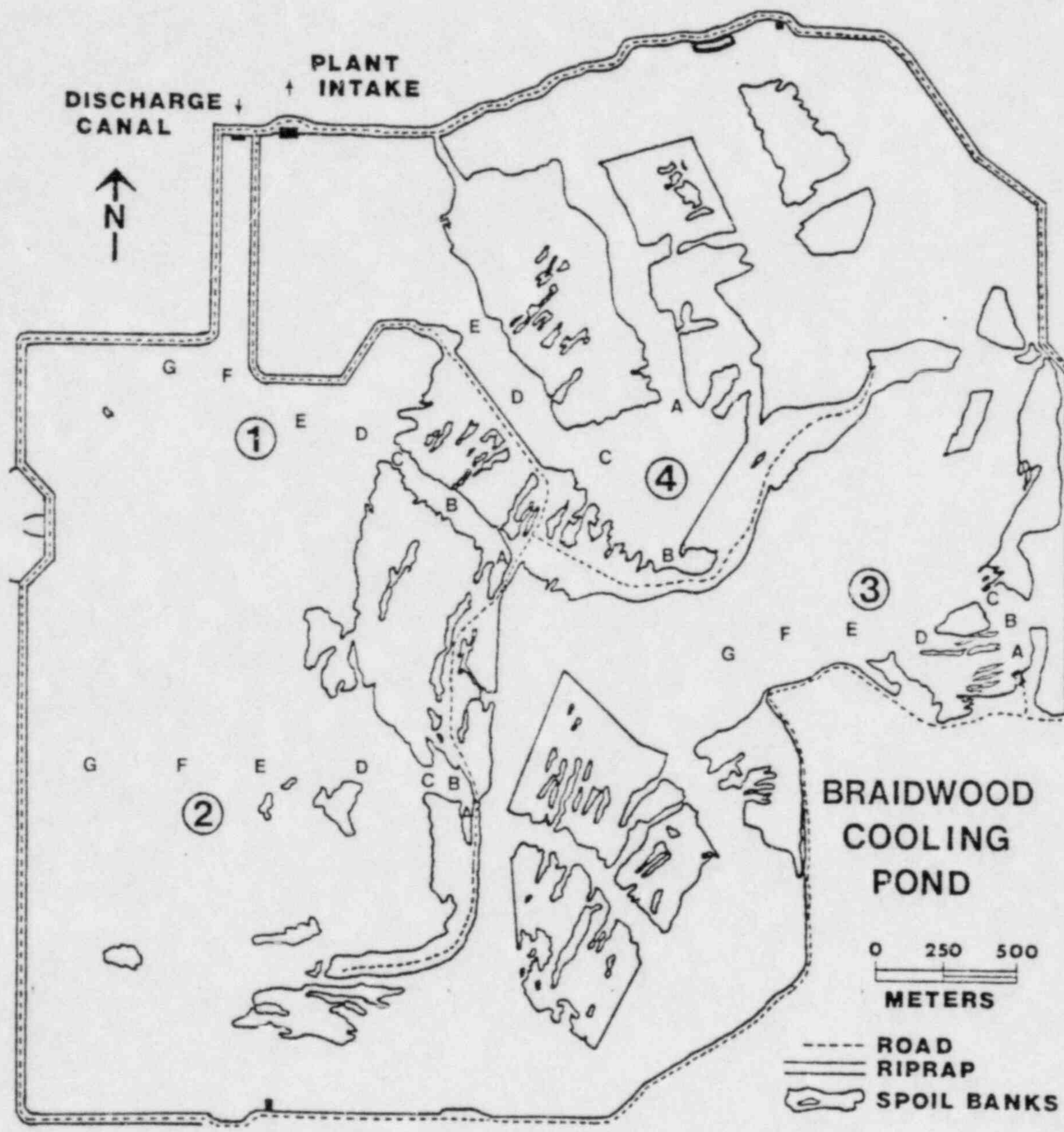

Figure 4-1. Benthic sampling locations on Braidwood cooling pond.

Table 4-1. Mean density (no./m^2) and percent composition of major taxonomic groups collected from Braidwood cooling pond during 1981 and 1982.

Entire lake

	1981		1982	
	Mean no./m^2	%	Mean no./m^2	%
Major groups				
Tubificidae	20	2.1	78	3.2
Naididae	52	5.6	633	25.7
Enchytraeidae	14	1.5	5	0.2
Pelecypoda	1	0.1	0	0
Gastropoda	18	1.9	2	0.1
Caenidae	13	1.4	59	2.4
Ephemeridae	11	1.2	17	0.7
Chaoboridae	197	21.1	257	10.4
Ceratopogonidae	72	7.7	44	1.8
Chironomidae	524	56.1	1,180	47.8
Others	12	1.3	192	7.8
Total invertebrates	934	100	2,467	100

Stripmine basin

	1981		1982	
	Mean no./m^2	%	Mean no./m^2	%
Tubificidae	42	4.5	34	1.3
Naididae	38	4.1	1,001	37.4
Enchytraeidae	0	0	6	0.2
Pelecypoda	2	0.2	0	0
Gastropoda	5	0.5	0	0
Caenidae	9	1.0	70	2.6
Ephemeridae	21	2.3	27	1.0
Chaoboridae	358	38.5	516	19.2
Ceratopogonidae	94	10.1	53	2.0
Chironomidae	312	33.5	958	35.7
Others	50	5.3	17	0.6
Total invertebrates	931	100	2,682	100

Newly flooded basin

	1981		1982	
	Mean no./m^2	%	Mean no./m^2	%
Tubificidae	1	0.1	112	4.9
Naididae	64	6.8	645	28.2
Enchytraeidae	26	2.8	5	0.2
Pelecypoda	0	0	0	0
Gastropoda	0	0	3	0.1
Caenidae	12	1.3	51	2.2
Ephemeridae	3	0.3	10	0.4
Chaoboridae	59	6.3	46	2.0
Ceratopogonidae	54	5.8	35	1.5
Chironomidae	704	75.1	1,362	59.5
Others	15	1.5	22	1.0
Total invertebrates	938	100	2,291	100

Table 4-2. Benthic macroinvertebrates collected from Braidwood cooling pond during 1982, with mean density (no./m^2), percent composition, areas of occurrence, and density means significantly different (T-test; $\alpha < 0.05$) from 1981 denoted.

Taxa	Mean density	% composition	Old basins	New basin	Station 1	Station 2	Station 3	Station 4	Means significantly different
Annelida									
Oligochaeta (total)	902	36.6	x	x	x	x	x	x	+
Tubificidae									
Aulodrilus pigueti	59	2.4	x	x	x	x	x	x	
Limnodrilus cervix	1	*		x		x			
L. claparedeianus	10	0.4	x	x		x	x	x	
L. hoffmeisteri	6	0.2	x	x		x	x	x	
Tubifex tubifex	2	0.1	x				x		
Naididae	57	2.3	x	x	x	x	x	x	+
Chaetogaster diaphanus	1	*		x				x	
Dero sp.	1	*	x			x			
D. digitata	7	0.3	x	x	x	x	x	x	
Nais sp.	5	0.2	x	x		x		x	
N. communis	80	3.2	x	x	x	x	x	x	+
N. pardalis	33	1.3	x	x	x		x	x	
N. variabilis	1	*	x			x	x		
Paranais frici	445	18.0	x	x	x	x	x	x	+
Stylaria lacustris	3	0.1		x			x		
Enchytraeidae	5	0.2		x	x	x	x	x	
Mollusca									
Gastropoda									
Planorbidae	2	0.1		x			x		
Arthropoda									
Insecta									
Ephemeroptera									
Caenidae									
Caenis sp.	59	2.4	x	x	x	x	x	x	+

Table 4-2 (continued).

Taxa	Mean density	% composition	Old basins	New basin	Station 1	Station 2	Station 3	Station 4	Means significantly different
Ephemeridae									
Hexagenia sp.	17	0.7	x	x	x	x	x	x	
Odonata									
Zygoptera									
Coenagrionidae									
Argia sp.	1	*	x			x			
Trichoptera									
Hydroptilidae	1	*	x		x				
Hydroptila	1	*		x			x		
Orthotrichia	1	*		x			x		
Leptoceridae									
Oecetis	1	*		x	x		x		
Polycentropodidae									
Polycentropus cinereus	3	0.1	x	x	x	x			
Megaloptera									
Sialidae									
Sialis	1	*	x			x			
Diptera									
Chaoboridae									
Chaoborus punctipennis	257	10.4	x	x	x	x	x	x	
Ceratopogonidae									
Culicoides	1	*		x			x		
Dasyhelia	2	0.1	x	x		x	x	x	
Palpomyia complex	41	1.7	x	x	x	x	x	x	-
Chironomidae (total)	1,180	47.8	x	x	x	x	x	x	+
Tanypodinae									
Ablabesmyia sp.	4	0.2	x	x	x	x	x		
Coelotanypus sp.	7	0.3		x		x		x	
Procladius sp.	135	5.5	x	x	x	x	x	x	+

Table 4-2 (continued).

Taxa	Mean density	% composition	Old basins	New basin	Station 1	Station 2	Station 3	Station 4	Means significantly different
Orthocladiinae	3	0.1	x		x		x		
Corynoneura sp.	1	*		x			x		
Cricotopus sylvestris group	1	*		x				x	
Epoicocladius sp.	1	*	x				x		
Parakiefferiella sp.	35	1.4	x	x	x	x	x	x	+
Chironominae	1	*	x			x			
Chironomini									
Chironomus sp.	96	3.9	x	x	x	x	x	x	+
Cladopelma sp.	20	0.8	x	x	x	x	x		+
Cryptochironomus sp.	32	1.3	x	x	x	x	x		+
Cryptotendipes sp.	6	0.2	x	x	x		x	x	+
Dicrotendipes sp.	25	1.0	x	x	x	x	x	x	
Endochironomus sp.	1	*	x				x		
E. nigricans	1	*	x			x	x		
Glyptotendipes sp.	5	0.2	x	x	x	x	x		+
Harnischia sp.	8	0.3	x	x	x	x	x	x	+
Microchironomus sp.	69	2.8	x	x	x	x	x	x	+
Parachironomus sp.	3	0.1	x	x		x		x	−
Paratendipes sp.	133	5.4	x	x	x	x	x	x	+
Polypedilum sp.	143	5.8	x	x	x	x	x	x	+
Pseudochironomus sp.	3	0.1	x	x	x	x	x	x	
Stictochironomus sp.	3	0.1	x	x		x	x	x	
Tanytarsini	2	0.1	x	x	x	x	x		
Cladotanytarsus sp.	332	13.5	x	x	x	x	x	x	+
Paratanytarsus sp.	7	0.3	x	x		x	x	x	
Tanytarsus sp.	30	1.2	x	x	x	x	x	x	+

* denotes less than 0.1% composition
x denotes taxon present
+ denotes 1982 mean density significantly greater than 1981 mean
− denotes 1982 mean density significantly less than 1981 mean

Table 4-3. Mean density (no./m²) and percent composition of the ten most abundant genera and species collected from Braidwood cooling pond during 1981 and 1982.

Entire lake	Mean no./m²	%	Stripmine basin	Mean no./m²	%	Newly flooded basin	Mean no./m²	%
Top ten taxa								
			1981					
1. Chaoborus punctipennis	197	21.1	1. Chaoborus punctipennis	358	38.5	1. Cladotanytarsus	155	16.5
2. Cladotanytarsus	105	11.2	2. Palpomyia complex	94	10.1	2. Pseudochironomus	125	13.3
3. Palpomyia complex	72	7.7	3. Polypedilum	50	5.4	3. Dicrotendipes	85	9.1
4. Pseudochironomus	71	7.6	4. Cladotanytarsus	46	4.9	4. Chaoborus punctipennis	59	6.3
5. Dicrotendipes	50	5.4	5. Paratendipes	29	3.1	5. Palpomyia complex	53	5.7
6. Polypedilum	42	4.5	6. Tubifex tubifex	28	3.0	6. Polypedilum	35	3.7
7. Paratendipes	20	2.1	7. Hexagenia	21	2.3	7. Dero digitata	33	3.5
8. Dero digitata	20	2.1	8. Procladius	16	1.7	8. Chironomus	25	2.7
9. Chironomus	19	2.0	9. Paranais frici	14	1.5	9. Paratanytarsus	22	2.3
10. Paratanytarsus	14	1.5	10. Chironomus	12	1.3	10. Tanytarsus	10	1.1
			10. Cryptochironomus	12	1.3			
			1982					
1.*Paranais frici	445	18.0	1. Paranais frici	609	22.7	1.*Cladotanytarsus	524	22.9
2.*Cladotanytarsus	332	13.5	2. Chaoborus punctipennis	516	19.2	2.*Paranais frici	311	13.6
3. Chaoborus punctipennis	257	10.4	3.*Procladius	192	7.2	3.*Polypedilum	191	8.3
4.*Polypedilum	143	5.8	4.*Chironomus	150	5.6	4.*Paratendipes	136	5.9
5.*Procladius	135	5.5	5. Paratendipes	130	4.8	5. Nais communis	106	4.6
6.*Paratendipes	133	5.4	6. Cladotanytarsus	97	3.6	6. Aulodrilus pigueti	101	4.4
7.*Chironomus	96	3.9	7. Polypedilum	84	3.1	7.*Procladius	88	3.8
8.*Microchironomus	69	2.8	8.*Caenis	70	2.6	8.*Microchironomus	73	3.2
9.*Palpomyia complex	41	1.7	9.*Microchironomus	64	2.4	9. Nais pardalis	60	2.6
10. Nais pardalis	33	1.3	10. Palpomyia complex	51	1.9	10. Chironomus	52	2.3

*Denotes significant increase over 1981 mean (T-test; α<0.05).

Table 4-4. Yearly overall, basin, and station means of selected elements of community structure.

	Total macroinvertebrates	Number of taxa/site	Diversity	Evenness
1981				
Overall	*943(± 98)	*4.58	1.83	*2.51
Old basin	*936(±141)	*4.56	1.68	*2.26
New basin	*950(±136)	*4.60	1.96	*2.73
Station 1	*1,270(±205)	*5.00	1.45	2.44
Station 2	*674(±117)	*4.44	*2.18	2.80
Station 3	*815(±166)	*4.35	1.80	2.70
Station 4	987(±244)	*4.50	1.92	2.14
1982				
Overall	*2,467(±267)	*8.21	1.73	*1.24
Old basin	*2,682(±451)	*8.42	1.64	*1.14
New basin	*2,291(±317)	*8.04	1.80	*1.33
Station 1	*2,976(±625)	*8.45	1.78	1.07
Station 2	*2,780(±653)	*8.55	*1.56	1.25
Station 3	*2,371(±428)	*7.70	1.62	1.28
Station 4	1,741(±370)	*8.15	1.95	1.38

*Denotes yearly means significantly different (T-test; $\alpha < 0.05$).

Table 4-5. Taxa and indices which, during 1982, had significant differences (T-test; α <0.05) between means of former stripmine basins and newly flooded areas and/or significant Pearson correlations with depth.

	T-tests			Pearson correlations	
Taxon/Index	Old basin mean	New basin mean		Correlation coefficient	α
Dero digitata	10.50	3.82	ns	0.2068	0.033
Nais spp.	7.00	2.86	ns	0.1876	0.048
N. variabilis	2.33	0.00	ns	0.2372	0.017
Hexagenia	26.83	9.55	0.037	-0.0764	ns
Chaoborus punctipennis	515.67	45.82	0.014	0.3582	0.001
Procladius	192.50	87.82	0.049	0.2207	0.025
Chironomus	150.50	51.55	0.040	0.4185	0.001
Cladopelma	37.33	6.68	ns	0.2203	0.025
Cryptochironomus	23.33	38.18	ns	-0.2869	0.005
Dicrotendipes	18.67	30.55	ns	-0.2349	0.018
Polypedilum	84.00	190.91	ns	-0.2836	0.005
Cladotanytarsus	96.83	524.05	0.001	-0.3697	0.001
Tanytarsus	22.17	37.23	ns	-0.2536	0.012
Diversity	1.64	1.80	ns	-0.2152	0.028
Evenness	1.14	1.33	ns	0.0060	ns
Number of taxa	8.42	8.05	ns	-0.1368	ns
Total invertebrates	2,682	2,291	ns	0.0560	ns

ns = not significant

Table 4-6. Mean density (no./m^2) and percent composition of major taxonomic groups and ten most abundant genera and species collected from each of the four sampling transects at Braidwood cooling pond during 1982.

Transect 1			Transect 2			Transect 3			Transect 4		
	Mean no./m^2	%		Mean no./m^2	%		Mean no./m^2	%		Mean no./m^2	%
<u>Major groups</u>											
Tubificidae	149	5.0	Tubificidae	76	2.7	Tubificidae	123	5.2	Tubificidae	48	2.7
Naididae	665	22.3	Naididae	937	33.7	Naididae	537	22.6	Naididae	390	21.6
Enchytraeidae	6	0.2	Enchytraeidae	2	0.1	Enchytraeidae	10	0.4	Enchytraeidae	2	0.1
Caenidae	50	1.7	Caenidae	42	1.5	Caenidae	120	5.1	Caenidae	25	1.4
Ephemeridae	17	0.6	Ephemeridae	13	0.5	Ephemeridae	19	0.8	Ephemeridae	21	1.2
Chaoboridae	347	11.7	Chaoboridae	170	6.1	Chaoboridae	420	17.7	Chaoboridae	90	5.0
Ceratopogonidae	38	1.3	Ceratopogonidae	19	0.7	Ceratopogonidae	61	2.6	Ceratopogonidae	57	3.2
Chironomidae	1,672	56.2	Chironomidae	947	34.1	Chironomidae	981	41.4	Chironomidae	1,121	62.1
Others	32	1.1	Others	574	20.6	Others	100	4.2	Others	50	2.8
Total	2,976	100	Total	2,780	100	Total	2,371	100	Total	1,804	100
<u>Top ten taxa</u>											
1. *Cladotanytarsus*	594	20.0	1. *Paranais frici*	808	29.1	1. *Chaoborus punctipennis*	420	17.7	1. *Paranais frici*	260	14.4
2. *Paranais frici*	452	15.2	2. *Cladotanytarsus*	202	7.3	2. *Cladotanytarsus*	275	11.6	2. *Cladotanytarsus*	256	14.2
3. *Chaoborus punctipennis*	349	11.7	3. *Chaoborus punctipennis*	170	6.1	3. *Paranais frici*	260	11.0	3. *Paratendipes*	244	13.5
4. *Polypedilum*	227	7.6	4. *Chironomus*	153	5.5	4. *Nais communis*	227	9.6	4. *Polypedilum*	149	8.3
5. *Chironomus*	189	6.4	5. *Procladius*	124	4.5	5. *Procladius*	149	6.3	5. *Procladius*	111	6.2
6. *Paratendipes*	157	5.3	6. *Paratendipes*	103	3.7	6. *Polypedilum*	128	5.4	6. *Chaoborus punctipennis*	90	5.0
7. *Procladius*	155	5.2	7. *Microchironomus*	94	3.4	7. *Caenis*	120	5.1	7. *Nais pardalis*	86	4.8
8. *Aulodrilus pigueti*	149	5.0	8. *Polypedilum*	67	2.4	8. *Microchironomus*	86	3.6	8. *Parakiefferiella*	80	4.4
9. *Nais communis*	59	2.0	9. *Caenis*	42	1.5	9. *Palpomyia* complex	57	2.4	9. *Microchironomus*	57	3.2
10. *Caenis*	50	1.7	10. *Limnodrilus claparedianus*	34	1.2	10. *Cryptochironomus*	38	1.6	10. *Palpomyia* complex	55	3.0
			10. *Tanytarsus*	34	1.2						