AQUATIC IMPACT STUDIES IN NEW BRUNSWICK FORESTS TREATED WITH SEMI-OPERATIONAL APPLICATIONS OF MATACIL® FLOWABLE FORMULATIONS IN 1982.

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INTRODUCTION

The Forest Pest Management Institute conducted preliminary laboratory and field trials in 1981 assessing the environmental hazards of point source applications of aminocarb flowable (MATACIL® 180F) formulations to streams (Holmes, 1981). In 1982 the evaluation of the flowable formulation was expanded to include impact assessment of double 70.0 g/ha MATACIL® 180F + ATLOX 3409F + water and MATACIL® 180F + Insecticide Diluent 585 applications under operational conditions to streams within forested areas in New Brunswick. The effects of these applications on stream benthos and indigenous salmonids are presented in this report. Effects on forest song birds in the same areas are presented in a separate report (Millikin 1982).

SITE DESCRIPTION

Two blocks of forest previously designated as part of the New Brunswick 1982 operational forest pesticide application program were selected for the experimental applications of the MATACIL® 180F formulations (Figure 1). Block 86 was located approximately 35 km southwest of Fredericton and 12 km west of the village of Tracy. The 3200 ha treated area consisted of mixed boreal forest, including spruce, *Picea* spp., balsam fir, *Abies balsamea*, trembling aspen, *Populus tremuloides*, white birch, *Betula papyrifera*, and soft maple, *Acer rubrum*. Yoho Stream, originating from Yoho Lake outside of the block, flowed in a southerly direction through the block, then eastward along the southern edge of the treated area and continued east out of the block and into the Oromocto River. Two sampling stations were established within the block on Yoho Stream, one near the upstream end of the treated portion and the other approximately 1 km from the downstream edge of the block (Figure 2). The stream contained an abundance of various benthic invertebrates and viable populations of juvenile Atlantic salmon, *Salmo salar*, numerous cyprinids, and several other fish species.

Block 82 was located about 25 km northeast of Fredericton, and 10 km east of the hamlet of Lower Durham. Most of the 4300 ha block was comprised of lowland spruce and balsam fir with sections of soft maple, trembling aspen and white birch. A biological sampling station was established near the centre of the treated portion of Bear Brook, which entered the northwest corner of the block and flowed out midway along the western perimeter (Figure 3). Benthic invertebrates were numerous, and brook trout, *Salvelinus fontinalis*, was the predominant resident fish species, although lesser numbers of cyprinids, white suckers, *Catostomus commersoni*, and juvenile Atlantic salmon did occur.

Meransy Brook, located 1 km southeast of the village of Tracy and 15 km east of Block 86, was selected as an untreated control station for sampling benthic invertebrates and juvenile Atlantic salmon. Because of the difficulty in obtaining brook trout from an untreated area, two control streams were used for sampling this fish species. McKenzie Brook and

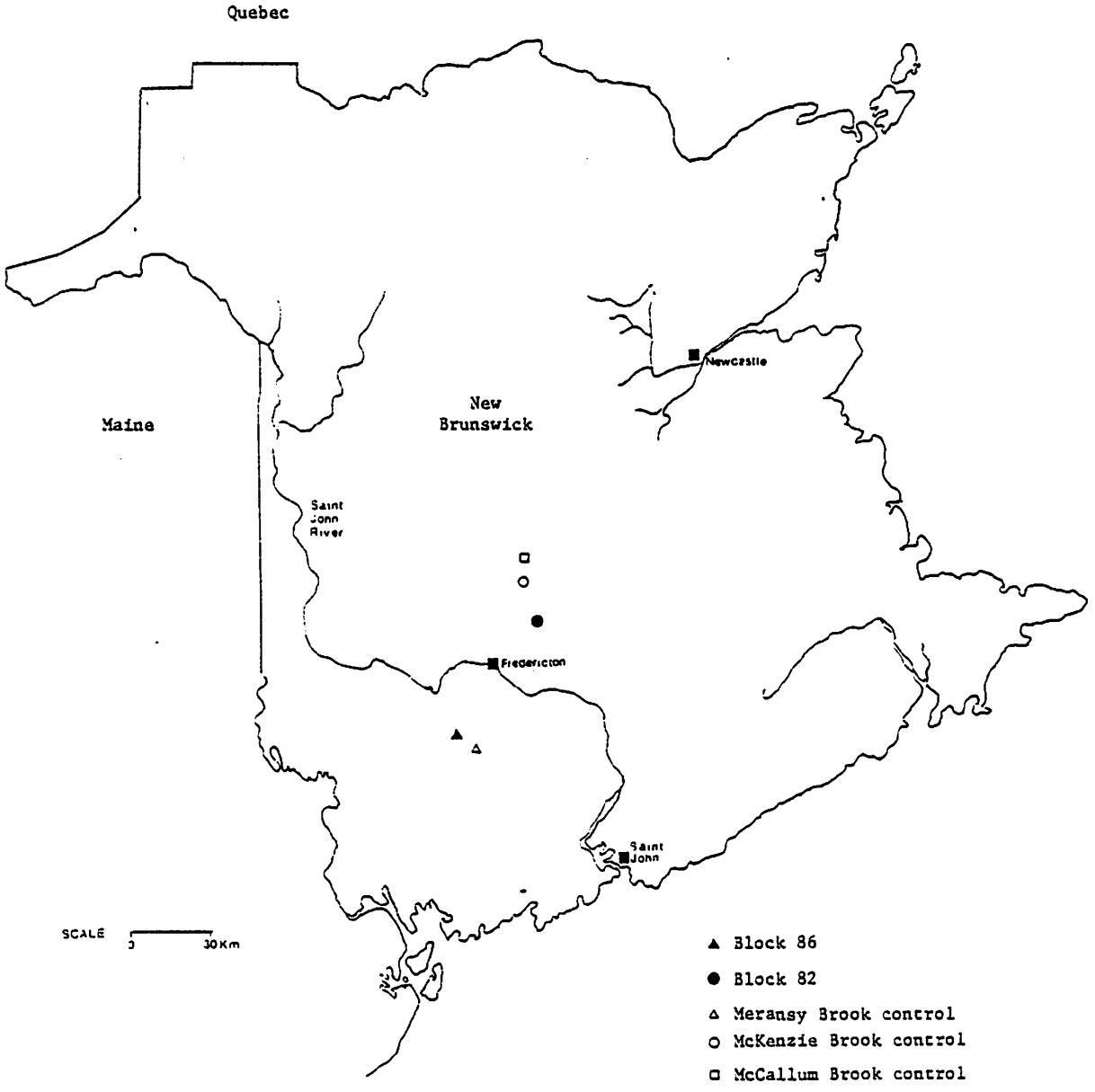


Figure 1. Experimental MATACIL® application areas and untreated control sites, New Brunswick, 1982

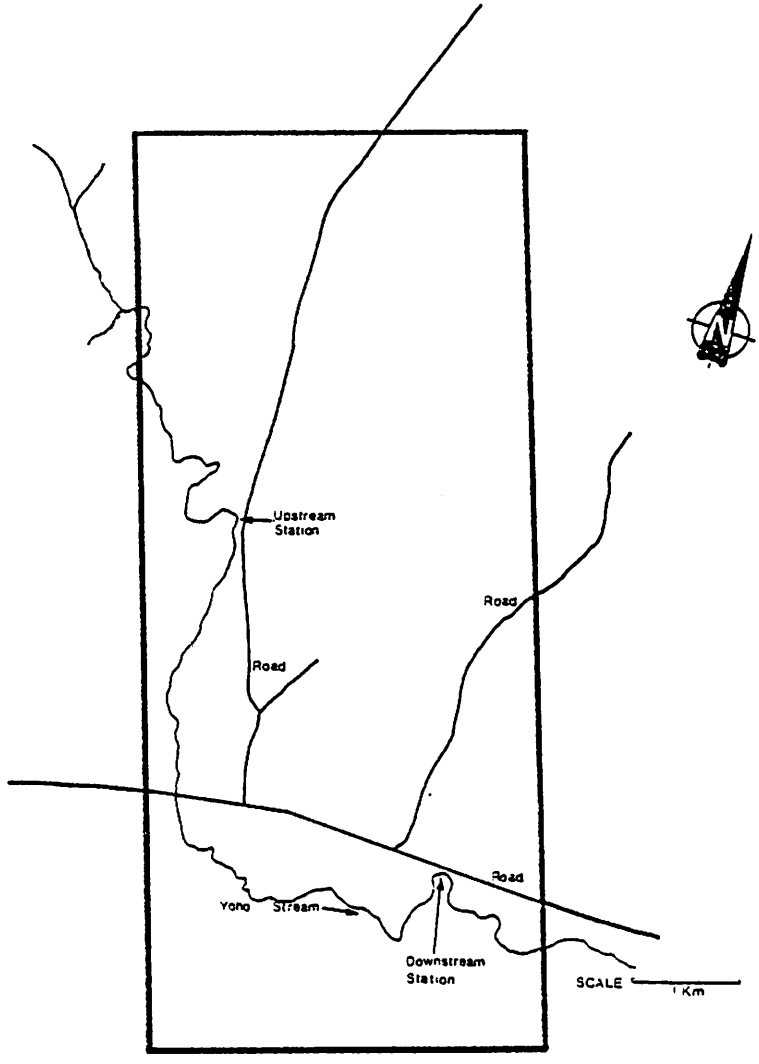


Figure 2. Block 86 treated with two applications of 70.0g/ha MATACIL® 180F + ATLOX 3409F + water

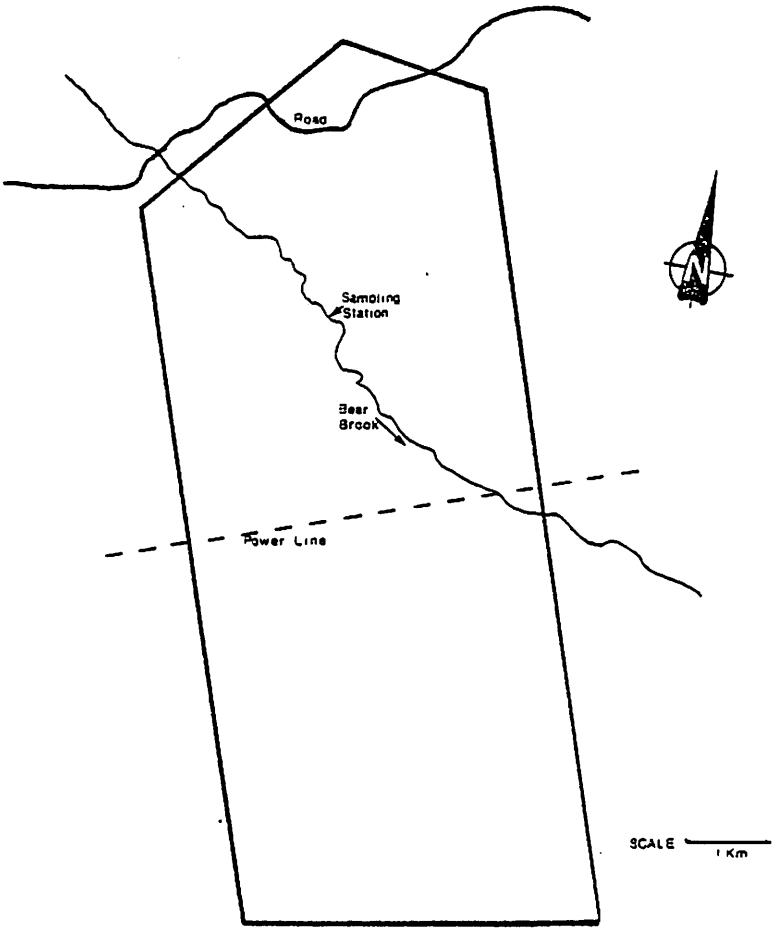


Figure 3. Block 82 treated with two applications of 70.0g/ha MATACIL® 180F + Insecticide Diluent 585

McCallum Brook are located approximately 35 km north of Fredericton and are tributaries of the Nashwaak River watershed. Both streams contained brook trout and juvenile salmon as well as several other fish species.

A summary of the descriptive characteristics of each stream is contained in Table 1.

METHODS

Pesticide Application

Both experimental blocks received double applications of MATACIL® flowable formulations. The timing and mode of application are described on Table 2.

Biological Sampling

Drifting invertebrates. Drifting invertebrates were monitored before and after the MATACIL® applications using drift nets set in the Block 86 upstream station, Block 86 downstream station, Block 82, and in the untreated control stream. Drift samples were collected from each station on two separate days prior to the pesticide applications to establish baseline drift levels for that station. On the days of application, drift samples were collected at hourly intervals corresponding to the pre-spray sampling regime, commencing immediately prior to the application and continuing up to 12 hours post-spray. Drifting invertebrates in the control stream were sampled concomitant with those in the treated areas when possible.

The drift nets measured 0.47 x 0.32 m with a No. 54 (363μ) mesh collection bag and were positioned in the streams to collect drifting organisms from a column of water for a pre-determined length of time. The nets were placed such that a water column was sampled from the surface to the stream bottom. Current velocity (measured with a Teledyne Gurley No. 625 Pygmy Current Meter) and depth of the water at the net opening were recorded with each sample taken. All aquatic invertebrates collected were sorted from the net contents, preserved in 70% methanol, and subsequently counted, identified and quantified as organisms per cubic meter of water using the following formula:

$$\frac{\text{number of organisms collected}}{\text{depth of water column (m) x width of net opening (0.47 m) x current velocity (m/sec) x sample duration (sec)}}$$

Terrestrial organisms were separated from the drift samples, counted, identified and recorded as numbers of organisms per 10 m^2 of surface water flowing through the net, calculated as follows:

Table 1. Site description of sampling stations.

Station	Treatment	Approx. width	Approx. depth	Flow Description	Instream cover	Shoreline cover	Bottom type
Block 86 Upstream Yoho Stream	70.0 g AI/ha MATACIL® 180F + ATLOX 3409F + water on 31 May and 8 June 1982	6-8 m	25-60 cm	variable - frequent interspersion of riffles and pools	3-5% cover - boulders, logs, undercut banks	20-35% canopy alder, chokecherry, soft maple, white birch	rubble, boulders, some areas of gravel and sand - some moss on rocks
Block 86 Downstream Yoho Stream	70.0 g AI/ha MATACIL® 180F + ATLOX 3409 F + water on 31 May and 8 June 1982	8-12 m	25-100 cm	mainly slow to moderate with few riffles	1-2% cover boulders, logs, undercut banks	5% canopy alder	rubble, boulders, areas of gravel, sand, and silt - moss abundant on rocks
Block 82 Bear Brook	70.0 g AI/ha MATACIL® 180F + insecticide Diluent 585 on 4 June and 9 June 1982	4-7 m	20-50 cm	moderate to fast with few pools	1-10% fallen logs, undercut banks, rocks	20-45% canopy alder	rubble and gravel with areas of sand and detritus - moss very abundant on rocks
Meransy Brook Control	untreated stream sampled for invertebrates and Atlantic salmon	7-10 m	20-70 cm	mainly slow to moderate with some riffles	5% cover boulders	5-25% canopy alder, soft maple, white birch, aspen, balsam fir	rubble, boulders, areas of gravel - abundant moss on rocks
McCallum Brook Control	untreated stream sampled for brook trout population densities	5-8 m	20-60 cm	moderate to fast with frequent riffles and few pools	2-5% cover - boulders, logs, undercut banks	20-50% canopy alder	rubble, boulders, few sections of gravel - moss very abundant on rocks
McKenzie Brook Control	untreated stream sampled for brook trout stomach content analyses	6-10 m	25-80 cm	moderate to fast with few pools	5-10% cover boulders	10-15% canopy alder	boulders, rubble, areas of gravel

Table 2. Experimental MATACIL® applications.

Block	Application	Insecticide	Aircraft
Block 86 3200 ha	31 May 1982 at 1908 hrs ADT 8 June 1982 at 0554 hrs ADT	70.0 g AI/ha MATACIL® 180F and ATLOX 3409F in water	TBM Avenger aircraft with 1010 flat fan TeeJet® nozzles
Block 82* 4300 ha	4 June 1982 at 0630 hrs ADT 9 June 1982 at 0550 hrs ADT	70.0 g AI/ha MATACIL® 180F in Insecticide Diluent 585	same as above

* a small section of the northeast corner of Block 82 was not sprayed during the second application and a subsequent small aircraft application was made to the section on 17 June. The stream was not affected by either the oversight or the subsequent application as it was completely within the portion of the block treated on 9 June and well buffered from the 17 June application.

$$\frac{\text{number of organisms} \times 10}{\text{width of net opening (0.47 m) x current velocity (m/sec) x sample duration (sec)}}$$

Benthic invertebrates. Prior to and at intervals following the MATACIL® applications, and in the control stream, the density of benthic invertebrates was estimated with 0.093 m^2 Surber nets at each station. The pre- and post-spray samples were sorted, preserved in 70% methanol and later counted, identified, and presented as mean number and standard deviation of four samples.

Benthic invertebrates were also sampled in each stream with multiple plate artificial substrates similar to those described by Hester and Dendy (1962). The samplers were constructed of eight 8 cm x 8 cm plates of 0.3 cm tempered hardboard separated by 2 cm x 2 cm spacers of the same material and mounted on a 20 cm length of 0.6 cm (1/4") threaded rod. The rod was fastened to a standard building brick and placed on the stream bottom such that the plates were suspended approximately 10 to 15 cm off the bottom. The samplers were removed from the stream at specific intervals to ensure that colonization periods in the treated and control streams were similar (Table 3). The invertebrates collected from the plates were preserved in 70% methanol and counted, identified, and presented as mean number and standard deviation per substrate.

Fish diet analysis. In order to determine possible changes in feeding behavior in response to a pesticide impact, resident fish were collected from the treated and control streams with a Type VII Smith-Root Electrofisher and dip net. Juvenile Atlantic salmon were sampled from Block 86 approximately 0.5 km below the downstream station, and from the Meransy Brook control stream, and brook trout were collected from the Block 82 station and the McKenzie Brook control. Total length, fork length, weight, and sex were determined for each of a sample of 10 to 20 fish using a measuring board, an Ohaus 1600 g capacity balance, and dissecting tools. The stomach from each fish was extracted and preserved in 10% formalin, and later analyzed for food content. The food organisms were identified to Order and the volume of stomach contents was measured by water displacement in a 5 ml graduated cylinder.

Fish population estimates. Fish population densities were measured in Block 86 near the downstream station, in Block 82 approximately 1 km below the drift sampling station, and in the Meransy Brook control stream. Because McKenzie Brook did not contain sufficient numbers of brook trout for estimating population densities, McCallum Brook was sampled for determining brook trout densities in an untreated stream. A representative section of stream (35-50 m) was closed off with nylon barrier seines at either end, and 5 or 6 successive electrofishing sweeps were made through the entire section to remove and temporarily retain the fish. All salmonids were anaesthetized with tertiary-amyl alcohol, weighed, and measured. All other fish were identified and counted. At the end of the final sweep and

Table 3. Sampling regime of artificial substrates set in treated and control streams, New Brunswick, 1982.

	Control		Block 86 upstream		Block 86 downstream		Block 82	
Date	IN	OUT	IN	OUT	IN	OUT	IN	OUT
13 May	17		13		17			
14 May							13	
29 May		5		5		5		
30 May								5
1 June		4		4		4		
6 June		4				4		4
10 June	5	4	5	4	5	4		
11 June							5	4
26 June		5		5		5		
27 June								5

when all anaesthetized salmonids had recovered, the fish were removed from the holding cage and returned to the fishing section.

On each occasion, stream width was measured at 5 m intervals through the fishing section and 10 depth measurements were taken at each width interval to determine the mean width and depth for that section of stream. The total area for the fishing section was calculated (length x mean width) and the lowest value obtained for each station throughout the sampling season was used in determining fish density. This was presented as the number of individuals per 100 m^2 of stream obtained in five successive passes with the electroshocker through the sampling site.

All salmonids collected during the initial sampling at each site were adipose fin clipped. Because of heavy copepod parasitism of adipose fins on brook trout from McCallum Brook control, a portion of the right pelvic fin was clipped. The number of fin clipped fish recaptured during the two post-spray samples was recorded and later presented as per cent recapture of the pre-spray sample.

RESULTS

Drifting Invertebrates

Neither pesticide application to Block 86 (MATACIL® 180F + ATLOX 3409F + water) resulted in an increase in drifting aquatic invertebrates. The drift patterns of post-spray samples from both stations within the block did not deviate from either the temporal or spatial control samples (Figure 4 and 5). The drift increases observed before dawn and just prior to nightfall conform to the normal diel periodicity of drifting aquatic invertebrates (Waters 1972, Muller 1974, Elliott 1970). Although Figure 4 indicates a slightly higher drift peak at the Block 86 upstream station than at the control on the evening of the initial application, the small differences in the numbers involved (approximately 6 invertebrates per m^3 in Block 86 and 4 per m^3 in control) and temporal control drift patterns preclude an indication of a disturbance of benthos. The increase occurred at 2200 h ADT and corresponded to similar increases at the same time period during pre-spray drift sampling in both the treatment block and control streams. The nightfall drift increases in the Block 86 upstream station, including the evening of the first application, were comprised mainly of simulid larvae. A similar drift composition occurred at the control station with increases in simulid larvae occurring in greater magnitude in pre-spray drift samples and in slightly lesser numbers on the evening of the application to Block 86 (Appendix Tables 1 and 3).

Sampling in Block 82 demonstrated a similar pattern with no indication of a pesticide-induced drift increase following the MATACIL® 180F + Insecticide Diluent 585 applications (Figure 6). Slightly elevated drift levels during daylight hours of the day of the first spray (4 June) reflected spate conditions resulting from rain and high water levels on 2-4 June and did not indicate a disturbance of aquatic invertebrates attributable to the MATACIL® applications. The classification and numbers of aquatic invertebrates collected in drift samples from all treated stations and the untreated control stream are contained in Appendix Tables 1 to 4.

Numbers of terrestrial arthropods collected in drift nets set in Block 86 increased after both applications (MATACIL® 180F + ATLOX 3409F + water) indicating a pesticide-induced knockdown of terrestrial invertebrates. The increases in drifting terrestrial arthropods were moderate (less than 13 per 10 m^2 of surface water) (Table 4) and were mainly comprised of adult dipterans and Collembola (Appendix Tables 5 and 6). A comparable knockdown did not occur as a result of the MATACIL® 180F + Insecticide Diluent 585 applications to block 82 where drifting terrestrial invertebrates did not exceed 1.35 per 10 m^2 of surface water sampled (Table 4). The differences in knockdown may infer a difference in toxicity of the two formulations to terrestrial arthropods. In previous experimental applications of MATACIL®, Millikin (1981) reported no apparent differences in knockdown produced by the two formulations. However, she suggested that ATLOX 3409F may have contributed to the impact of the MATACIL® 180F + ATLOX 3409F + water applications, since an experimental application of ATLOX

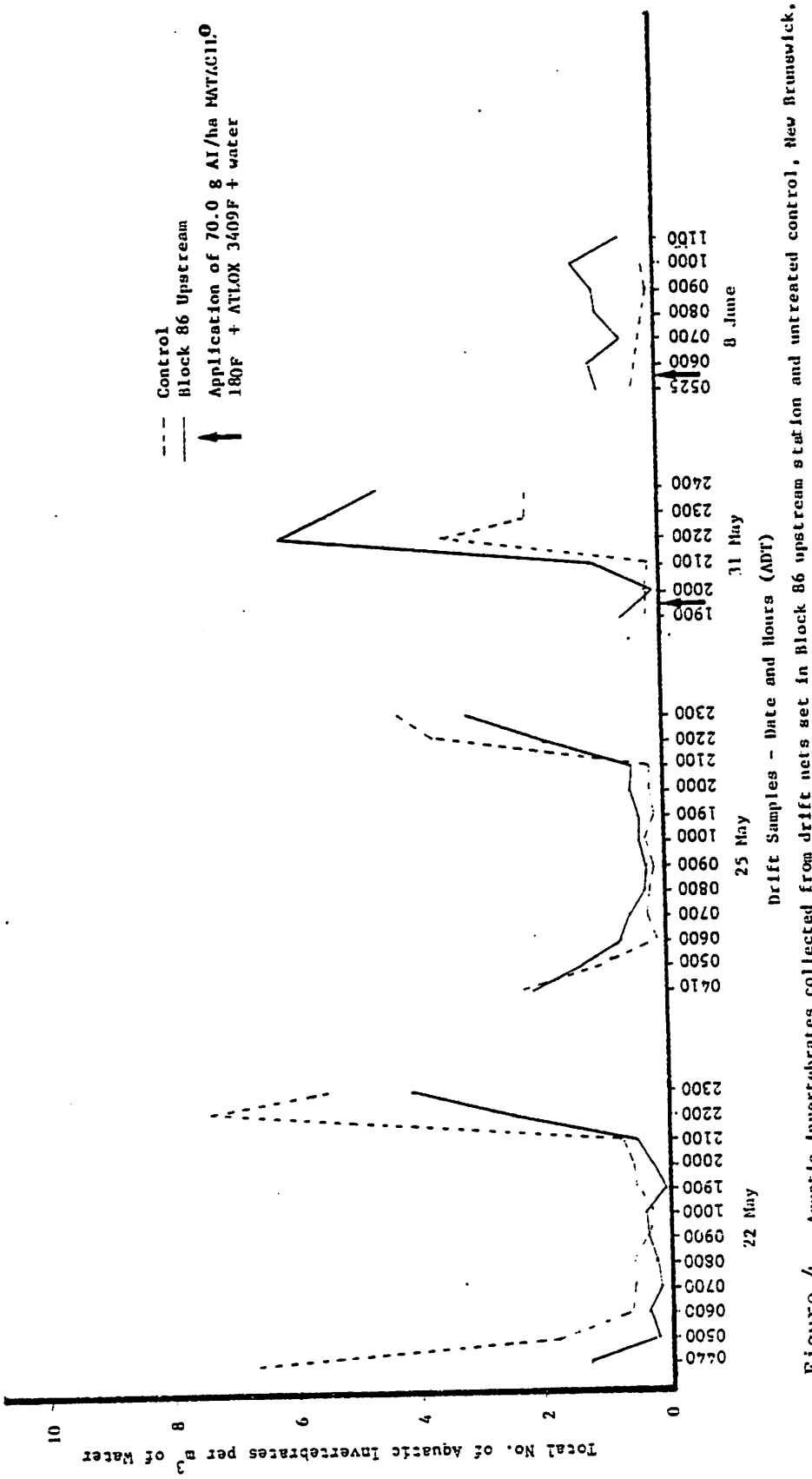


Figure 4. Aquatic invertebrates collected from drift nets set in Block 86 upstream station and untreated control, New Brunswick, 1982

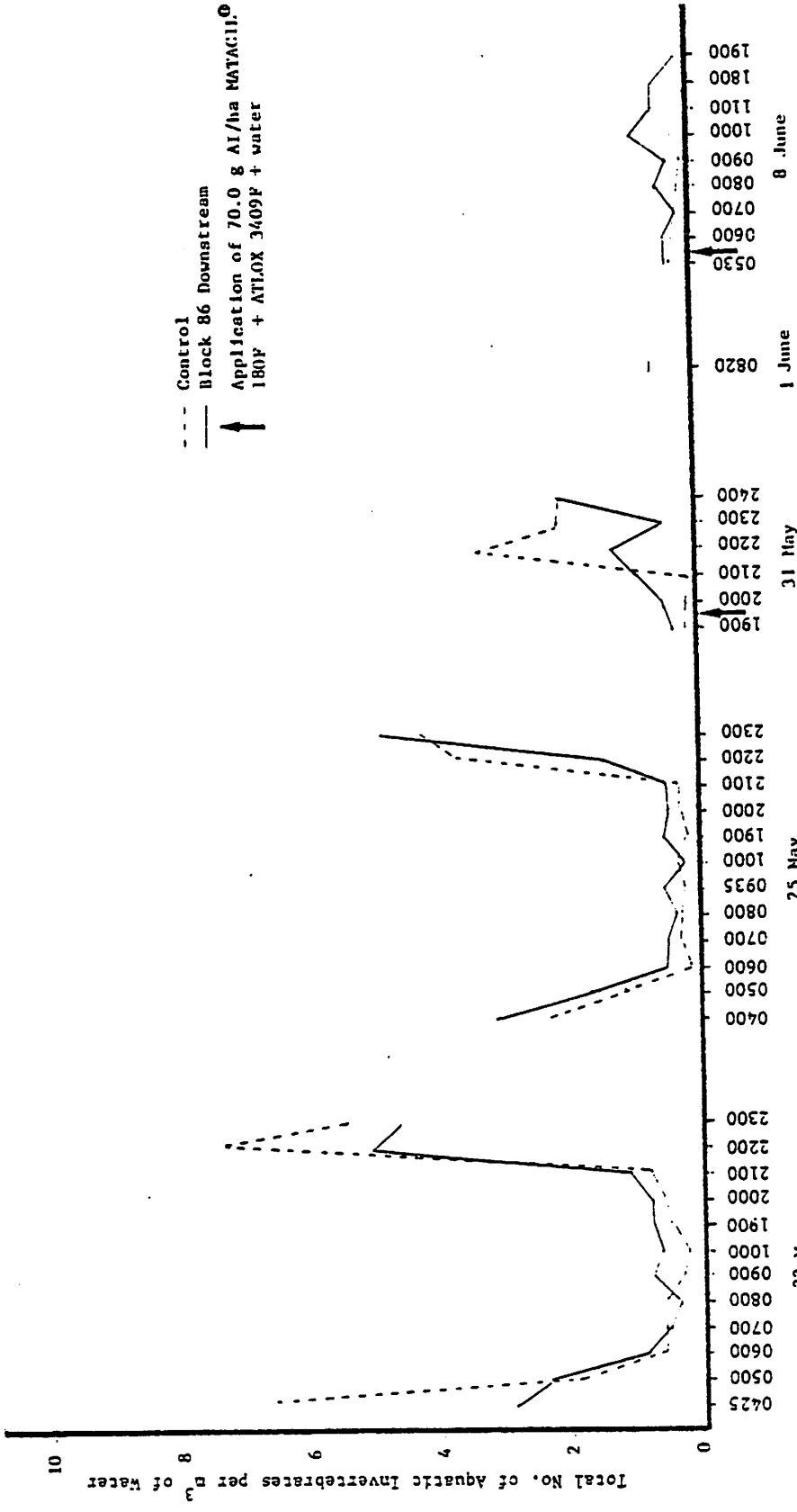


Figure 5. Aquatic invertebrates collected from drift nets set in Block 86 downstream station and untreated control, New Brunswick, 1982

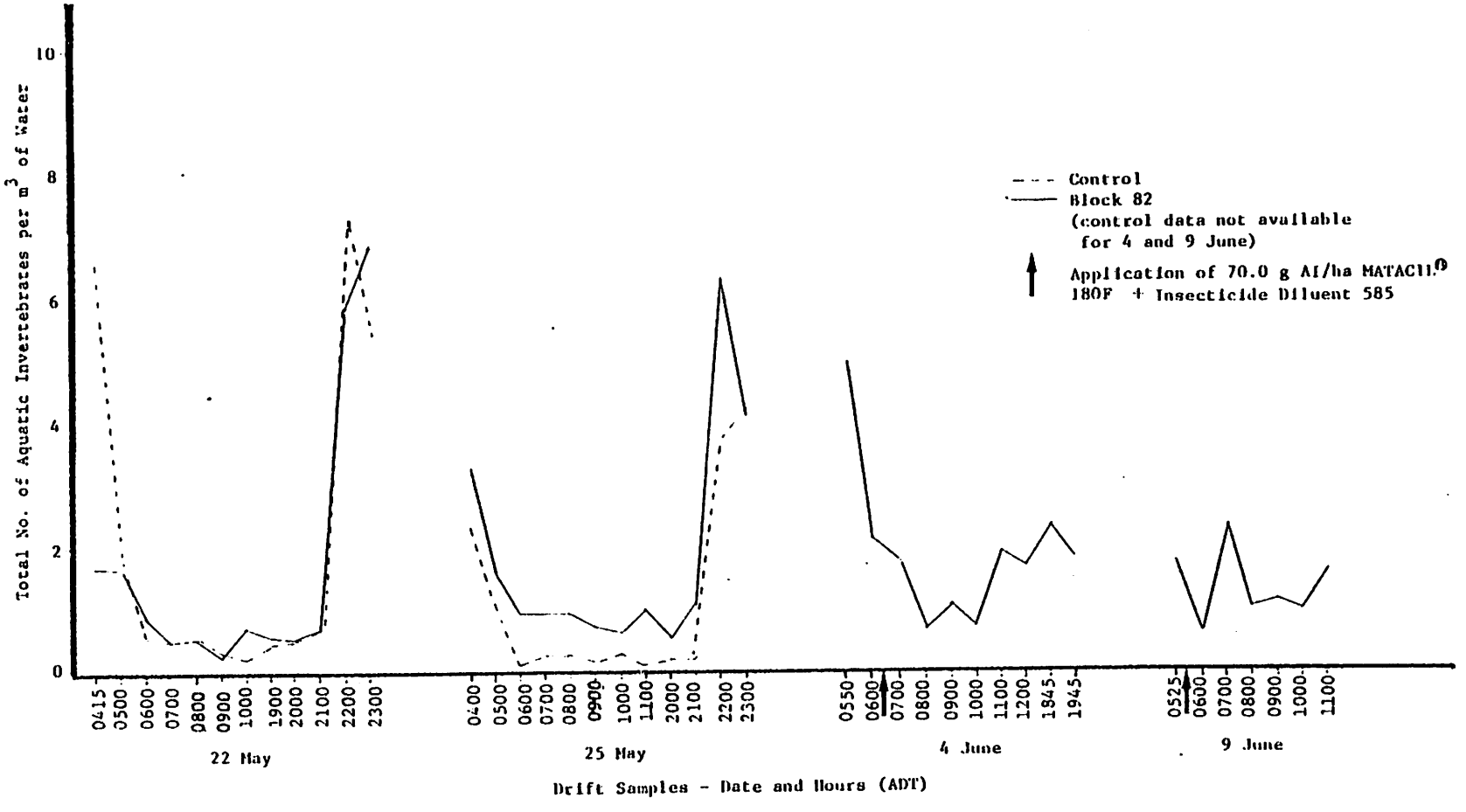


Figure 6. Aquatic invertebrates collected from drift nets set in Block 82 and untreated control, New Brunswick, 1982

Table 4. Numbers of terrestrial invertebrates (per 10 m^2 of surface water sampled) collected in drift nets set in treatment blocks.

Station	Pre-spray average	Pre-spray peak	First application post-spray peak	Second application post-spray peak
Block 86 upstream station	0.88	2.56	10.40	11.96
Block 86 downstream station	1.83	8.18	12.25	4.00
Block 82	0.14	0.89	1.35	0.36

3409F + water produced a noticeable knockdown of terrestrial invertebrates. Although the presence of ATLOX 3409F in the Block 86 applications in the present study could have contributed to the effects on terrestrial arthropods, the higher knockdown level may have been largely attributable to the physical characteristics of the two blocks. The stream bank vegetation (previously described in Site Description) in Block 86 consisted of a heterogenous composition of tree species while the stream canopy in Block 82 was almost entirely comprised of speckled alder. This may have produced conditions more conducive to a greater density of terrestrial arthropods on streamside vegetation in Block 86 than in Block 82. This is supported by the much higher level of pre-spray terrestrial invertebrate drift in Block 86 than in Block 82 (Appendix Tables 5, 6 and 8).

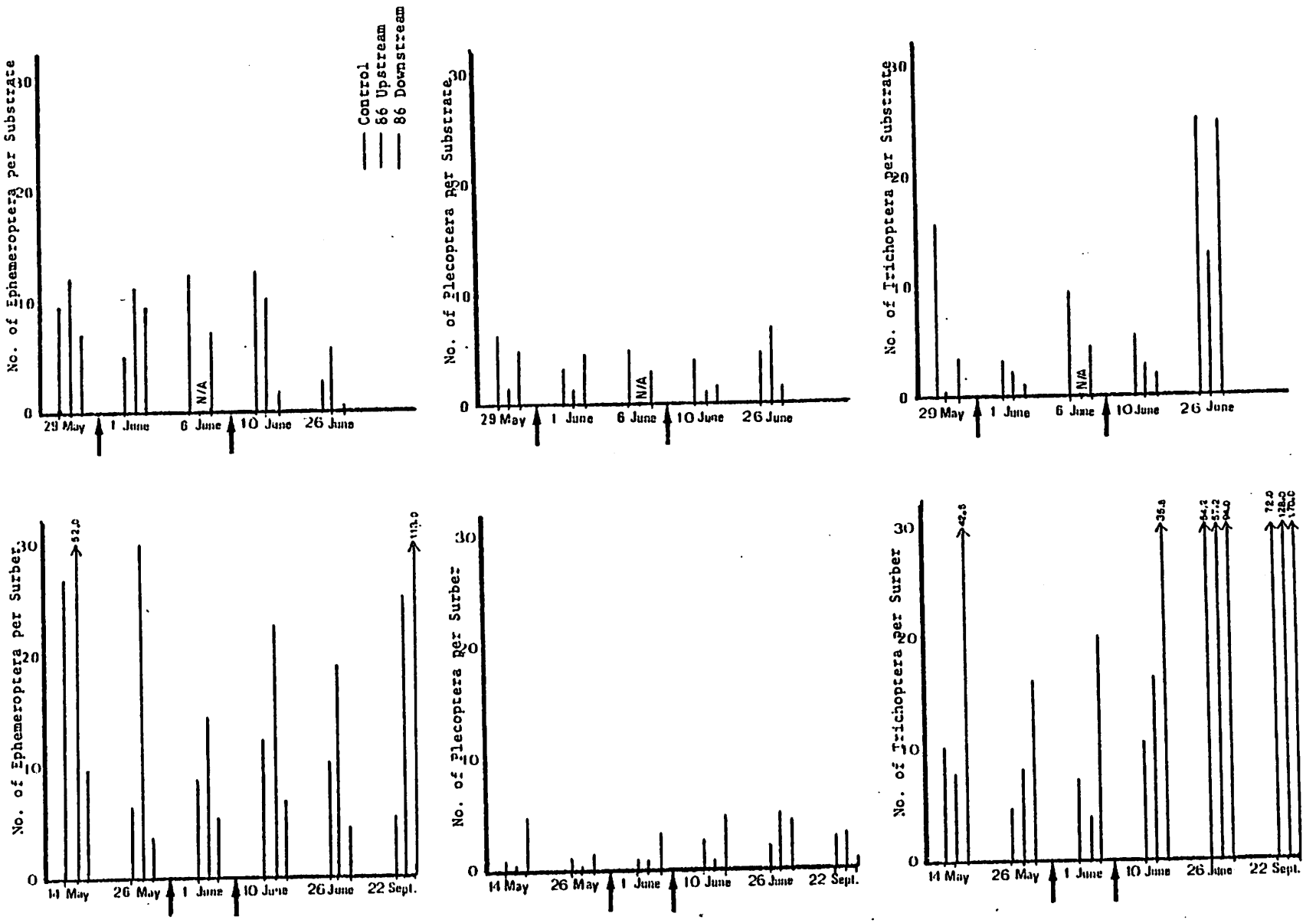
Drifting terrestrial insects at the untreated control stream dramatically increased on 31 May (up to 56 per 10 m^2 of surface water), but the increases were almost entirely comprised of tent caterpillars *Malacosoma disstria,* which had heavily infested the area several days prior to the drift samples. Disregarding the large influx of tent caterpillars, terrestrial invertebrate drift levels in the control stream were generally consistent and did not exceed 2.3 per 10 m^2 of surface water sampled (Appendix Table 7).

Benthic Invertebrates

Numbers of benthic invertebrates collected from Surber samples and artificial substrates at each stream station varied considerably throughout the sampling period. The taxonomic composition of these samples, listed in Appendix Tables 9 to 16, demonstrates that most of the variation occurred because of drastic fluctuations in numbers of Diptera, especially Chironomidae. Changes in the density of Diptera larvae occurred in both the control and treated streams and did not appear to be related to the pesticide applications. Since these changes greatly influence total standing crop estimates and tend to obscure more subtle variations in other taxa, three important components of the stream benthos, Ephemeroptera and Plecoptera nymphs and Trichoptera larvae, have been selected as indicators of pesticide impact.

Figure 7 illustrates that the numbers of these benthic organisms collected in Block 86 (2 x 70.0 g AI/ha MATACIL® 180F + ATLOX 3409F + water) closely followed the pattern of changes observed in the control stream. Benthic invertebrate densities estimated by Surber sampling in both the treated and control streams demonstrated a decline toward early summer, and a subsequent increase in numbers, especially Trichoptera larvae, on the 22 September sampling date. These trends are consistent with the generalized pattern of seasonal changes in the density of temperate lotic species described by Hynes (1970) and Williams (1981).

Similar results were obtained from artificial substrate sampling in Block 86. Colonization rates of multiple plate samplers in the treatment and control streams were comparable throughout most of the sampling periods



↑ - Application of 70.0 g AI/ha MATACIL 180F +ATLOX 3409F + water

Figure 7. Benthic invertebrates collected in artificial substrates and surber samples from Block 86 and untreated control, New Brunswick 1982

(Appendix Tables 13, 14, and 16). Two days after the second application to Block 86, the numbers of ephemeropterans and plecopterans on artificial substrates in the downstream station declined by factors of 5 and 2, respectively, while the density of these organisms at the upstream station and control remained constant (Figure 7). However, field notes recorded on each sampling date indicate that the water level and velocity at the downstream station in Block 86 fluctuated drastically between the first post-spray and second post-spray collections, such that at the artificial substrate site an extremely low flow rate was followed by several days of flooding and abnormally high water levels. Most of the samplers were moved or tipped over during the spate conditions, and this may have resulted in a loss of colonized invertebrates. The absence of other evidence of reduced bottom fauna in the treatment block, and the lack of drift increases demonstrating a disturbance, indicate that the 2 x 70 g AI/ha MATACIL® 180F + ATLOX 3409F + water applications to Block 86 did not measurably affect the stream benthos.

Similarly, the oil based flowable formulation of MATACIL® applied to Block 82 (2 x 70 g AI/ha MATACIL® 180F + Insecticide Diluent 585) did not demonstrate a measurable impact on benthic invertebrates within the block. There was no evidence of pesticide induced reductions in benthos from either Surber samples or artificial substrates (Appendix Tables 11 and 15), and the density patterns of Ephemeroptera, Plecoptera, and Trichoptera in the treated block followed, or in some cases exceeded, those in the control stream (Figure 8). Plecoptera nymphs disappeared from artificial substrates in Block 82 on the 27 June sample date, but previous samples had contained low numbers (not exceeding 3.5 per sampler) and high variance, and since plecopterans remained in post-spray Surber samples, it is felt the slight reduction in Plecoptera on artificial substrates was not pesticide related.

Fish Diet Analysis

The results of stomach content analyses have been graphically presented in Figures 9 to 12 with the abbreviations used listed on Table 5. Patterns of feeding activity of juvenile Atlantic salmon in Block 86 (Figure 9) were, for the most part, consistent and comparable to the food organism selection of the control salmon (Figure 10). On the day of the initial pesticide application (within 12 hours post-spray) two apparent deviations from a normal feeding pattern of salmon in the treated block were observed. Trichoptera larvae became considerably more abundant in the stomach contents (an increase from 5.1 to 27.7% contribution to volume) but corresponded to a similar-sized reduction (19.3 to 2.8%) in the selection of Trichoptera pupae, and a heavy reliance on Trichoptera larvae in the control stream. Immediately following the first application to Block 86, terrestrial arthropods increased in the diets of juvenile salmon, contributing up to 50% of the organisms consumed. This change in food organism selection corresponds to the increase in the number of drifting terrestrial arthropods observed following the first spray and probably reflects a feeding response induced by increased availability of that food item. Although

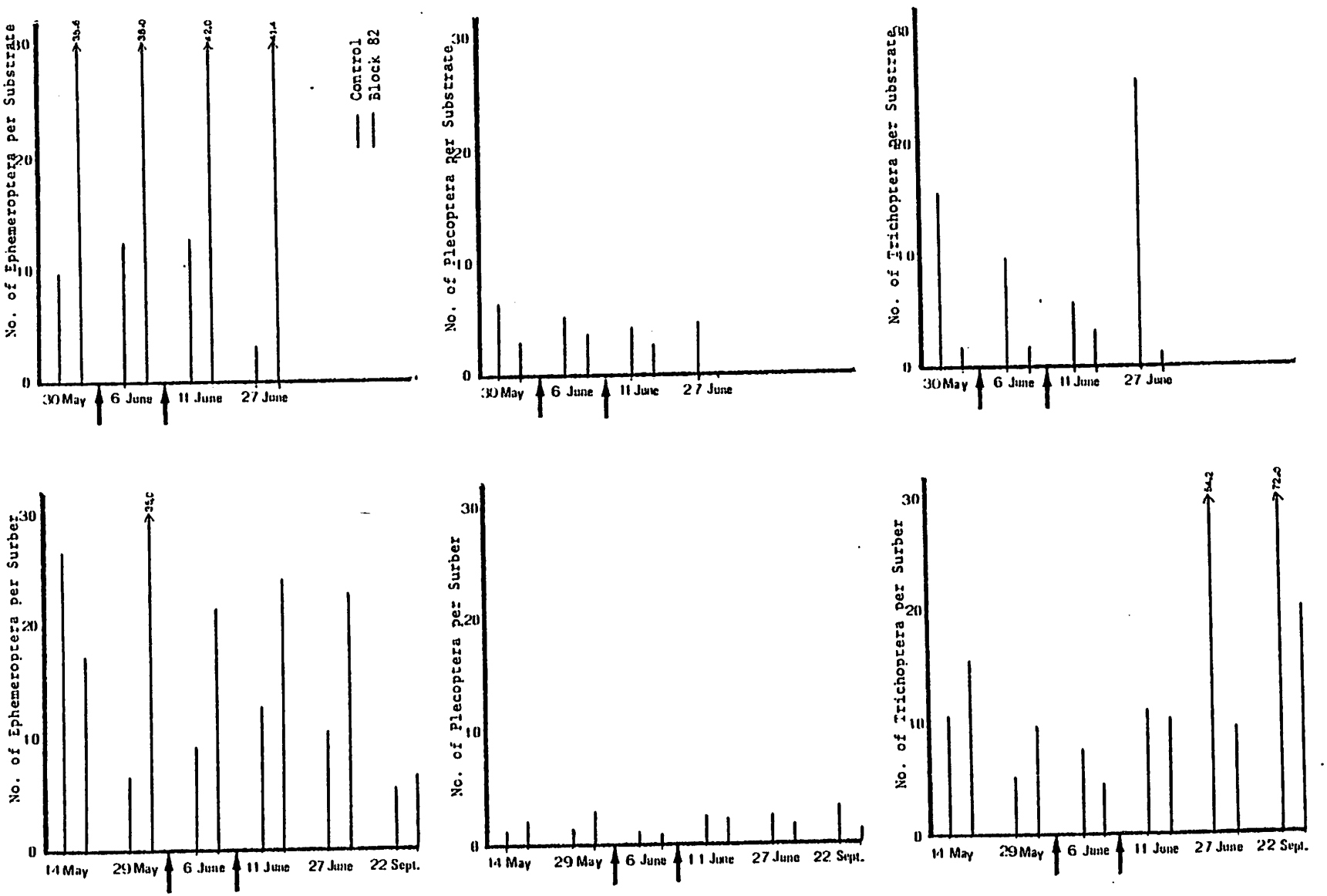


Figure 8. Benthic invertebrates collected in artificial substrates and surber samples from Block 82 and untreated control, New Brunswick 1982

Table 5. Abbreviations used in fish stomach content graphs.

Misc	- Miscellaneous aquatic organisms
Eph	- Ephemeroptera nymphs
Odon	- Odonata nymphs
Ple	- Plecoptera nymphs
Meg	- Megaloptera larvae
Neur	- Neuroptera larvae
Tri L	- Trichoptera larvae
Tri P	- Trichoptera pupae
Col A	- aquatic Coleoptera adults
Col L	- aquatic Coleoptera larvae
Ath	- Athericidae larvae
Chir L	- Chironomidae larvae
Chir P	- Chironomidae pupae
Hel	- Heleidae larvae
Emp	- Empididae
Sim L	- Simuliidae larvae
Sim P	- Simuliidae pupae
Tip	- Tipulidae larvae
Ol	- Oligochaeta
Hy	- Hydracarina
Fish	- unidentifiable fish parts
Hir	- Hirudinea

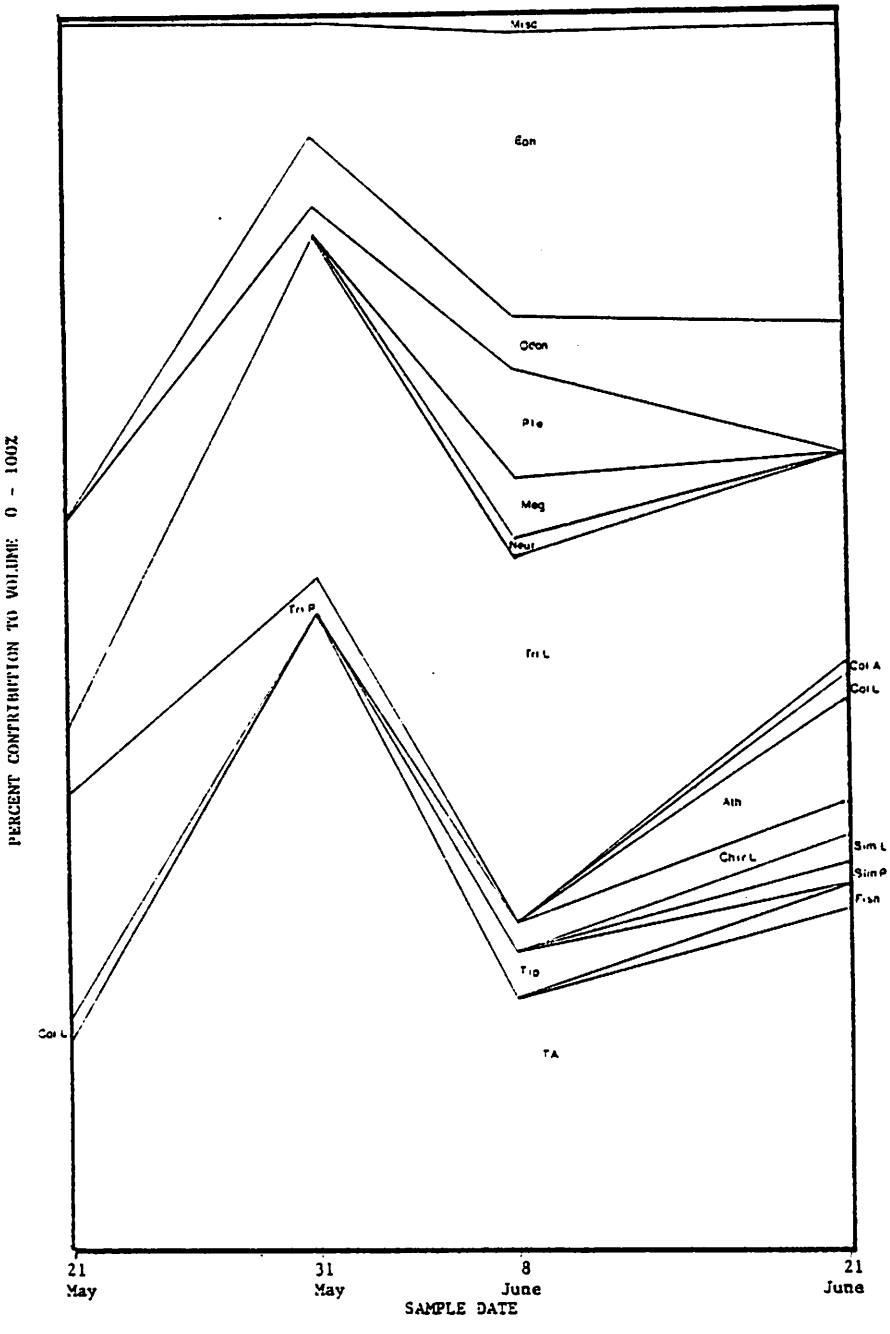


Figure 9. Contribution of various food organisms to stomach contents of juvenile Atlantic salmon in Block 86 treated with application formulation - 70g/ha MATACIL® 180F + ATLOX 3409F + water on 31 May and 8 June 1982

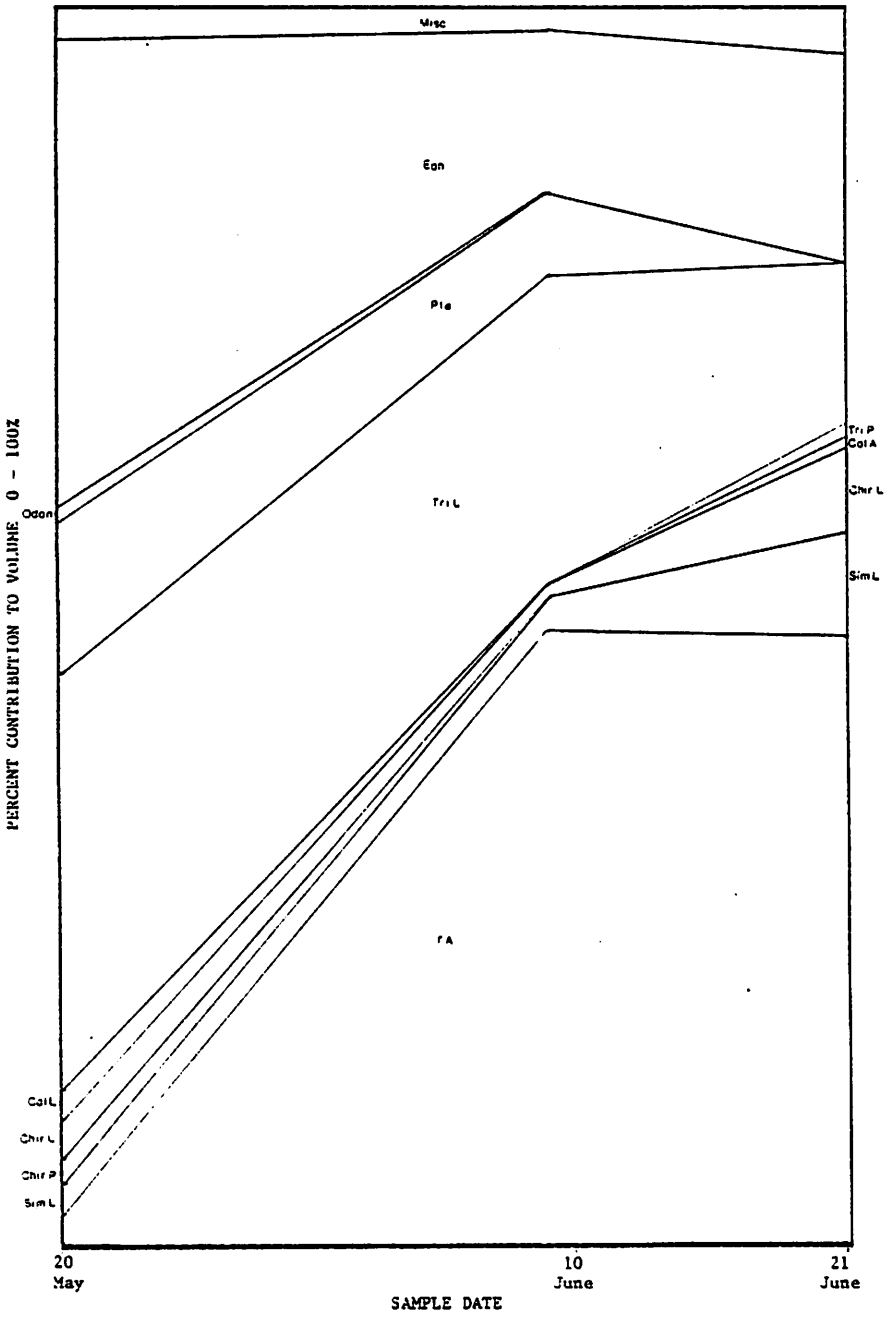


Figure 10. Contribution of various food organisms to stomach contents of juvenile Atlantic salmon in untreated Meransy Control

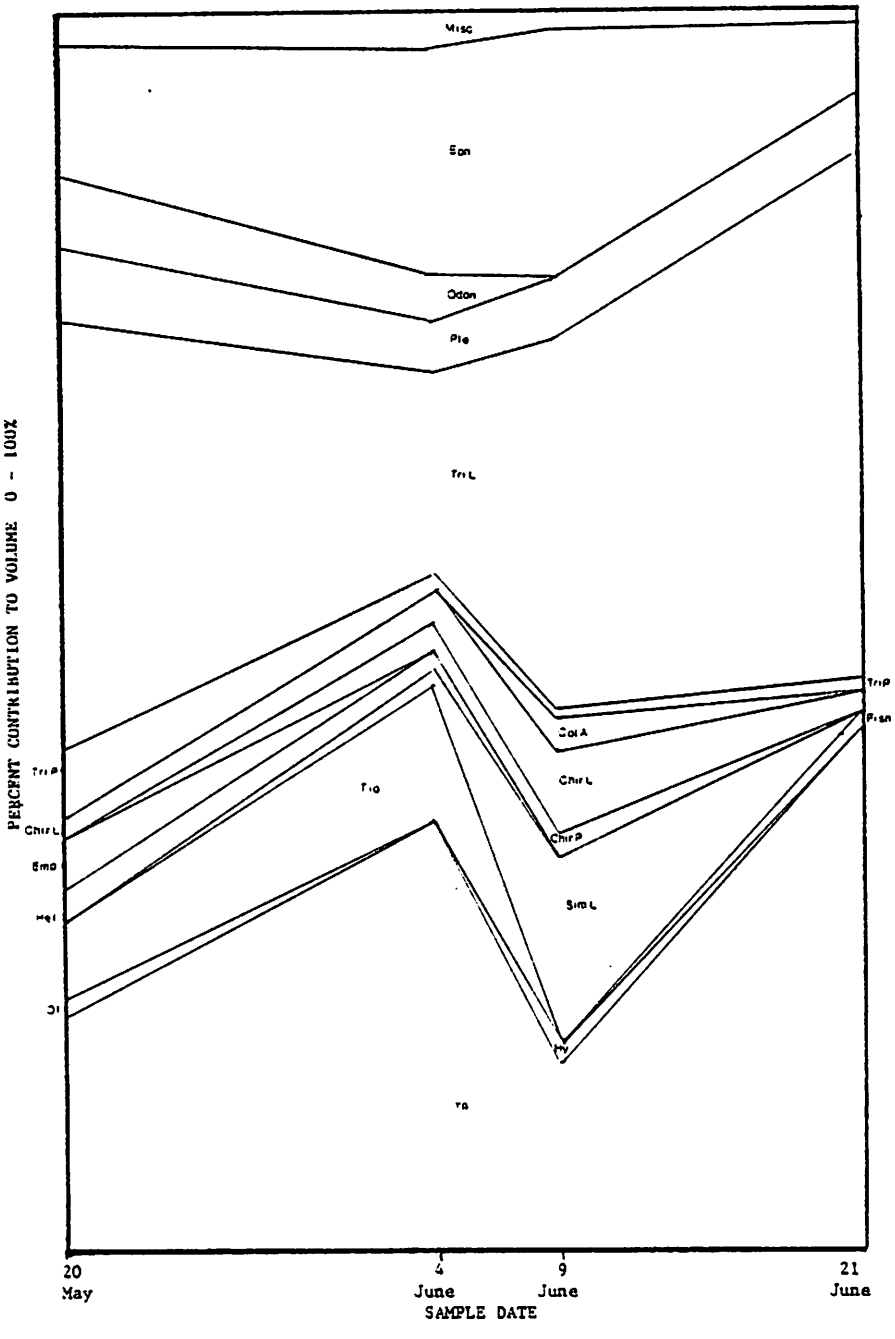


Figure 11. Contribution of various food organisms to stomach contents of Brook trout in Block 82 treated with application formulation - 70g/ha MATACIL® 180F + Insecticide Diluent 585 on 4 June and 9 June 1982

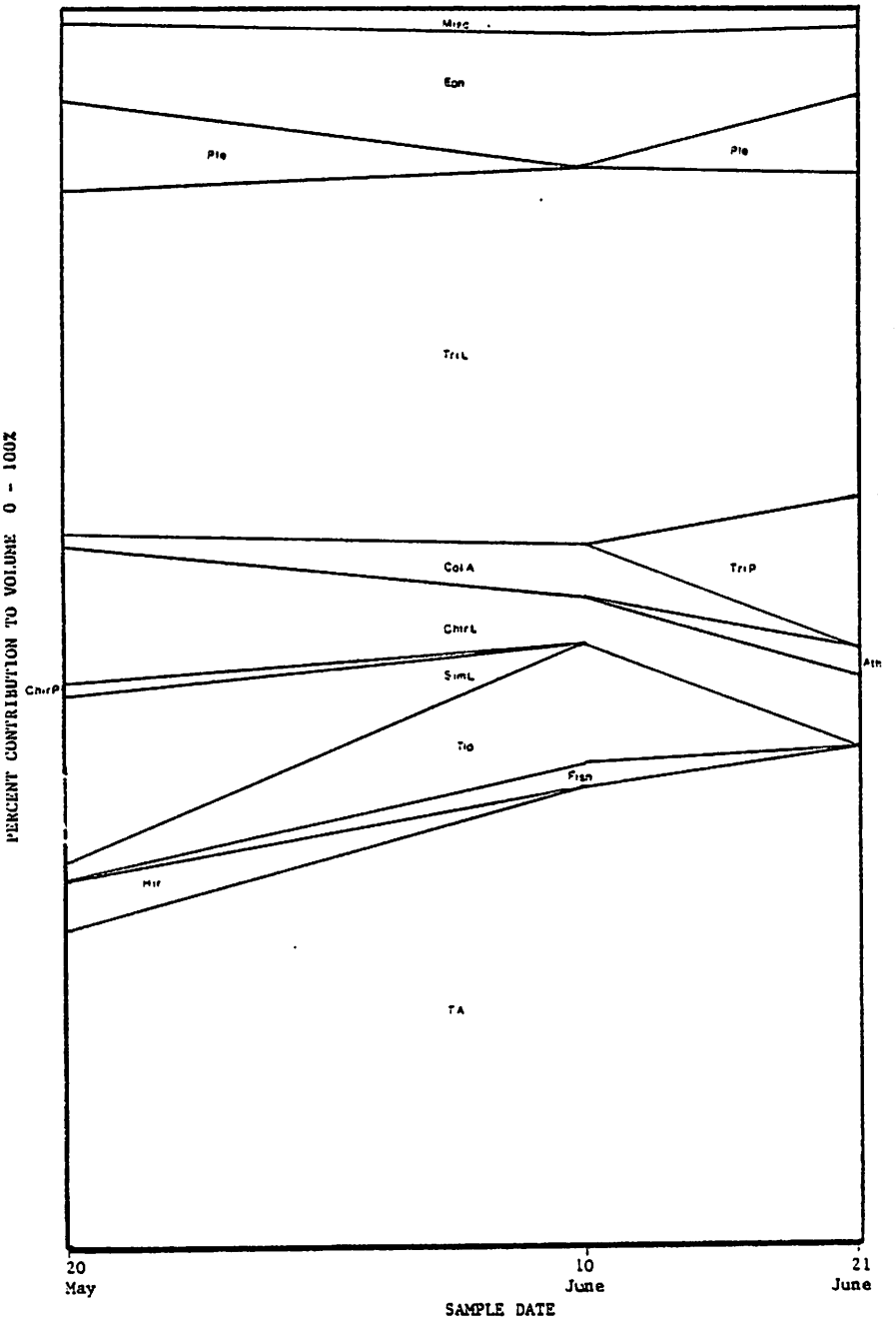


Figure 12. Contribution of various food organisms to stomach contents of Brook trout in untreated McKenzie Control

the percent contribution of terrestrial arthropods increased, the volume of food ingested by the salmon did not (Table 6), indicating a limited opportunistic feeding on the drifting terrestrial invertebrates. Stomach contents of salmon sampled within 12 hours of the second application to Block 86, and two-and-a-half weeks post-spray, did not demonstrate pesticide-induced changes in feeding activity and indicated a continued utilization of a variety of aquatic organisms by salmon throughout that period.

The food organism selection by brook trout in Block 82 did not appear to be affected by the 70.0 g/ha MATACIL® 180F + Insecticide Diluent 585 applications, but followed a pattern of feeding activity similar to the control trout (Figures 11 and 12). Although the composition of brook trout stomach contents did not alter significantly after the first application, a large increase did occur in the volume of food intake (Table 6). The results of drift sampling discussed previously, suggest that the increased food intake reflected the increased drift resulting from spate conditions just prior to the first application. This increase in stomach content volumes did not occur after the second spray, but the composition changed to a certain extent with noticeable increases in the percent contribution of Simuliidae and Chironomidae larvae. These taxa did not demonstrate pesticide-induced drift increases, but benthos sampling showed an increase in density of these organisms during this period. Consequently, the brook trout may have utilized these organisms to a greater extent as they became more abundant in the benthos. Two-and-a-half week post-spray sampling indicated feeding patterns of brook trout in Block 82 similar to those in the control. A complete description of stomach content analyses from both treated blocks and the controls are contained in Appendix Tables 17-20.

Fish Population Estimates

Numbers of juvenile Atlantic salmon in the fish population sampling area of Block 86 declined by about 50% two-and-a-half weeks after the 70.0 g/ha MATACIL® 180F + ATLOX 3409F + water applications (Table 7). The density of salmon in the control stream was reduced during the same period, but to a lesser extent (27% reduction). The results listed on Table 7 also show that the percent recapture of marked juvenile salmon in Block 86 was substantially lower than that in the control, indicating a greater rate of dispersal in and out of the population area of Block 86 during the two week post-spray period. The decline in density and increase in dispersion of salmon in Block 86 after the MATACIL® applications suggest a non-lethal effect of the pesticide inducing a migration out of the population area. If such an effect occurred, it does not appear to be related to feeding activity since benthos and fish stomach content sampling indicated no pesticide-related changes in the availability or utilization of fish food organisms. Dispersal may have been induced by influences other than those assessed in this study, such as normal seasonal migrations, social interactions or environmental parameters. Drastically fluctuating water levels observed during the period between the pre- and post-spray density estimates (recorded in field notes) may have contributed to the movement of

Table 6. Relative values expressing volumes of food organisms* consumed by fish in treatment and control areas, New Brunswick, 1982.

	Pre-spray	Immediate post first application	Immediate post second application	Post-spray
	20-21 May	31 May and 4 June	8 June and 9 June	21 June
Block 86 Atlantic salmon	2.32	2.01	1.92	2.36
Meransy Control Atlantic salmon	1.68	-	6.62	4.67
Block 82 brook trout	3.35	13.05	3.16	3.95
McKenzie Control brook trout	3.47	-	7.84	5.42

* calculated as:

$$\frac{\text{mean volume stomach contents} \times 10^3}{\text{mean fork length}}$$

Table 7. Estimates of density and occurrence of recapture in fish population sample areas, New Brunswick, 1982.

	Pre-spray 24 May to 2 June			15 to 17 days post-spray 22 to 26 June				108 to 109 days post-spray 26 September			
	Actual catch	Number of fish per 100 m^2	Number of marked fish	Actual catch	Number of fish per 100 m^2	Number of recaptures	Per cent recapture	Actual catch	Number of fish per 100 m^2	Number of recaptures	Per cent recapture
Block 86 Atlantic salmon	65	17.7	65	54	9.2	18	28%	68	21.2	15	23%
Moransy Control Atlantic salmon	56	32.2	56	41	23.5	34	61%	59	33.9	13	23%
Block 82 Brook trout	31	14.1	31	31	14.1	15	48%	23	10.4	5	16%
McCallum Control Brook trout	55	20.8	55	70	26.5	35	64%	71	26.9	N/A	N/A

juvenile salmon. Population sampling in late September (108 days post-spray) indicated densities of salmon in both Block 86 and the control had increased to a level comparable to the initial estimates in late May, and the per-cent recapture was similar in both streams.

The MATACIL® 180F + Insecticide Diluent 585 applications to Block 82 did not appear to influence the density of brook trout in the population sampling area up to 17 days post-spray (Table 7). While brook trout densities remained at a high level in the control stream in September (109 days post-spray), those in Block 82 demonstrated a minor decline. The absence of further evidence of effects on resident fish or fish food organisms suggests that the late season decline was the result of factors other than those attributable to the pesticide applications.

CONCLUSIONS

Data generated from the experimental applications of the MATACIL® flowable formulations gave no evidence of pesticide-induced disturbances of stream benthos or a disruption of normal aquatic invertebrate drift patterns. A knockdown of terrestrial arthropods following the MATACIL® 180F + ATLOX 3409F + water applications did occur and was reflected in small increases in the numbers of drifting terrestrial invertebrates in the streams.

The applications of MATACIL® 180F + Insecticide Diluent 585 did not produce measurable changes in the feeding activity or population densities of resident brook trout. The food organism selection by indigenous juvenile salmon was not affected by the MATACIL® 180F + ATLOX 3409F + water applications, other than slight opportunistic feeding on knocked down terrestrial arthropods drifting in the stream. Some evidence of a post-spray reduction in juvenile salmon density occurred in the treated block, but the extent to which that was attributable to the MATACIL® applications is not conclusive.

These results concur with most previous environmental monitoring of the conventional MATACIL® formulation (MATACIL® 1.8D) by other investigators and agencies. Results from these impact studies, reviewed by Holmes and Kingsbury (1980), indicated little or no effects of the pesticide on macroinvertebrates or fish in treated streams and lakes. The assessment of the flowable formulations in the present study did not demonstrate evidence of introduced or compounded hazards of MATACIL® resulting from the new formulations.

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APPENDIX TABLES

Table 1. Aquatic invertebrates* collected in drift nets set in Block 86** upstream station, Yoho Stream, York County, New Brunswick, 22 May to 8 June, 1982.

Sample Date	22 May	22 May	22 May	22 May	22 May	22 May	22 May	22 May	22 May	22 May	22 May	22 May	25 May	25 May	25 May	25 May	25 May	25 May	25 May	25 May
Sample Time (ADT)	0440 h	0500 h	0600 h	0700 h	0800 h	0900 h	1000 h	1900 h	2000 h	2100 h	2200 h	2300 h	0410 h	0500 h	0600 h	0700 h	0800 h	0900 h	1000 h	1900 h
Volume of Drift Column (m^3)	54.82	54.82	51.39	49.49	49.49	51.39	49.49	30.79	32.99	32.99	34.26	32.99	21.40	20.47	22.33	22.33	20.30	19.46	18.61	24.36
Current Velocity (m/sec)	0.48	0.48	0.45	0.45	0.45	0.45	0.45	0.42	0.45	0.45	0.45	0.45	0.33	0.33	0.33	0.33	0.30	0.30	0.30	0.36
Ephemeroptera Total Nymphs	0.24		0.10	0.06			0.04		0.03	0.06	0.82	1.15	0.33	0.15	0.18	0.09			0.05	0.04
- Baetidae	0.13		0.02	0.02							0.47	0.27	0.23	0.10	0.13	0.09				0.04
- Ephemerellidae	0.05		0.06	0.04			0.02		0.03		0.18	0.24	0.05						0.05	
- Heptageniidae	0.04		0.02				0.02			0.06	0.03	0.33	0.05	0.05	0.04					
- Leptophlebiidae	0.02										0.15	0.30								
Plecoptera Total Nymphs	0.02	0.04	0.04	0.04			0.02		0.03		0.23	1.00	0.47	0.05						0.04
- Leuctridae							0.02					0.18	0.05							
- Nemouridae											0.03									
- Perlodidae	0.02	0.04	0.04	0.04					0.03		0.20	0.82	0.42	0.05						0.04
Megaloptera - Corydalidae																				
Trichoptera Total Larvae	0.04		0.04	0.04	0.04	0.10	0.06	0.03	0.03	0.09	0.06	0.12		0.12			0.10	0.10	0.11	0.08
- Brachycentridae			0.04	0.02	0.02	0.08	0.04		0.03			0.09		0.05			0.05	0.05	0.11	0.08
- Glossosomatidae																				
- Hydropsychidae				0.02		0.02				0.03		0.03					0.05			
- Hydroptilidae																				
- Leptoceridae																				
- Philopotamidae								0.03			0.06			0.05						
- Polycentropodidae	0.04				0.02															
- Rhyacophilidae							0.02			0.06				0.05				0.05		
- unidentified																				
Coleoptera																				
- Elmidae Larvae	0.04		0.02									0.18	0.14	0.05		0.04			0.05	0.04
Adult	0.02						0.02			0.03		0.24	0.09							
- Dytiscidae Adult													0.05							
- Psephenidae Larvae		0.02																		
Diptera Total	0.88	0.09	0.10	0.04	0.16	0.23	0.24		0.09	0.30	1.26	1.24	0.98	0.93	0.45	0.45	0.15	0.10	0.16	0.16
- Athericidae Larvae		0.02										0.03								
- Chironomidae Larvae	0.07	0.04	0.02		0.02	0.02	0.02		0.06		0.20	0.21	0.09	0.10	0.04	0.18	0.05		0.05	
Pupae					0.02		0.02		0.08		0.03			0.05						
- Empididae Pupae																				
- Ibleidae Pupae																				
- Muscidae Larvae																		0.05		
- Simuliidae Larvae	0.80	0.04	0.08	0.04	0.12	0.19	0.20			0.30	1.02	0.94	0.84	0.78	0.40	0.27	0.10	0.05	0.05	0.12
- Tipulidae Larvae												0.06							0.05	0.04
Pupae													0.05							
Turbellaria		0.02																		
Gastropoda																				
Arachnida - Hydracarina	0.02								0.03		0.18	0.12	0.05	0.05						
Crustacea - Amphipoda	0.02										0.03									
- Ostracoda																				
Total	1.26	0.16	0.29	0.18	0.20	0.33	0.38	0.06	0.21	0.48	2.57	4.06	2.10	1.37	0.63	0.53	0.25	0.21	0.38	0.37

*expressed as organisms per m^3 of flow through drift net

**treated with 70.0 g AI/ha MATACIL® 180F + ATLOX 3409F + water at 1908 ADT 31 May and again at 0554 ADT 8 June, 1982.

Table 1. (continued)

Sample Date	25 May	25 May	25 May	25 May	31 May	31 May	31 May	31 May	31 May	31 May	8 June	8 June	8 June	8 June	8 June	8 June	8 June
Sample Time (ADT)	2000 h	2100 h	2200 h	2300 h	1900 h	2000 h	2100 h	2200 h	2300 h	2400 h	0525 h	0600 h	0700 h	0800 h	0900 h	1000 h	1100 h
Volume of Drift Column (m^3)	23.27	21.87	22.80	22.33	15.23	16.07	17.77	16.92	16.07	16.07	34.52	35.96	35.96	34.52	35.96	35.96	34.52
Current Velocity (m/sec)	0.33	0.33	0.33	0.33	0.27	0.30	0.30	0.30	0.30	0.30	0.51	0.51	0.51	0.51	0.51	0.51	0.51
Ephemeroptera Total Nymphs	0.09	0.05	0.44	0.99	0.13	0.06	0.11	1.00	0.93	0.81	0.09		0.06	0.06	0.22	0.19	
- Baetidae	0.09	0.05	0.18	0.27	0.07	0.06		0.77	0.50	0.68	0.06			0.03	0.08	0.14	
- Ephemerellidae			0.18	0.31	0.07		0.06	0.24	0.19	9.06	0.03		0.03	0.03	0.06	0.06	
- Heptageniidae				0.18			0.06		0.06				0.03		0.03		
- Leptophlebiidae			0.09	0.22					0.19	0.06					0.06		
Plecoptera Total Nymphs			0.09	0.94					0.37	0.31		0.03			0.14	0.03	
- Leuctridae				0.13					0.31	0.31		0.03			0.14	0.03	
- Nemouridae																	
- Perlodidae			0.09	0.81					0.06						0.06		
Megaloptera - Corydalidae																	
Trichoptera Total Larvae	0.13	0.05	0.13				0.06	0.41	0.19	0.37	0.12		0.03	0.26		0.64	0.20
- Brachycentridae	0.09	0.05	0.04					0.06			0.09		0.03	0.14		0.58	0.17
- Glossosomatidae	0.04																0.03
- Hydropsychidae			0.04							0.06							
- Hydroptilidae											0.03						
- Leptoceridae							0.06	0.12	0.06					0.03		0.06	
- Philopotamidae								0.24	0.12	0.31				0.06			
- Polycentropodidae																	
- Rhyacophilidae														0.03			
- unidentified			0.04														
Coleoptera																	
- Elmidae Larvae	0.09		0.04	0.36	0.13	0.12		0.12				0.08		0.03	0.03	0.06	
Adult				0.18			0.06								0.03	0.03	
- Dytiscidae Adult																	
- Psephenidae Larvae			0.04														
Diptera Total	0.13	0.23	1.10	0.58	0.33	0.81	0.90	4.26	3.67	2.92	0.67	0.97	0.47	0.52	0.44	0.42	0.29
- Athericidae Larvae							0.06										
- Chironomidae Larvae	0.04	0.09	0.18	0.13	0.13	0.37	0.39	0.53	0.68	0.44	0.09	0.11	0.19	0.32	0.31	0.14	0.14
Pupae			0.09		0.07	0.12		0.53	0.19		0.09	0.08		0.03	0.06		
- Empididae Pupae																0.03	
- Ibisidae Pupae											0.06			0.06		0.08	
- Muscidae Larvae																	
- Simuliidae Larvae	0.09	0.14	0.83	0.45	0.13	0.31	0.45	3.19	2.74	2.43	0.43	0.78	0.28	0.12	0.11	0.17	0.14
- Tipulidae Larvae									0.06	0.06							
Pupae																	
Turbellaria																	
Gastropoda								0.06									
Arachnida - Hydracarina	0.04	0.09		0.04			0.06	0.18			0.03	0.03					
Crustacea - Amphipoda																	
- Ostracoda											0.03					0.03	0.03
Total	0.47	0.41	1.84	3.09	0.59	0.10	1.13	6.03	5.23	4.42	0.93	1.11	0.56	0.87	0.92	1.39	0.52

Table 2. Aquatic invertebrates* collected in drift nets set in Block 86** downstream station, Yoho Stream, York County, New Brunswick, 22 May to 8 June, 1982.

Sample Date	22 May	22 May	22 May	22 May	22 May	22 May	22 May	22 May	22 May	22 May	22 May	22 May	25 May	25 May	25 May	25 May	25 May	25 May	25 May
Sample Time (ADT)	0425 h	0500 h	0600 h	0700 h	0800 h	0900 h	1000 h	1900 h	2000 h	2100 h	2200 h	2300 h	0400 h	0500 h	0600 h	0700 h	0800 h	0935 h	1000 h	1900 h
Volume of Drift Column (m^3)	39.59	39.59	32.99	43.78	45.68	45.68	47.59	24.36	25.38	26.40	26.40	26.40	21.32	22.33	24.20	24.20	24.20	24.20	24.20	27.92
Current Velocity (m/sec)	0.39	0.39	0.39	0.45	0.45	0.45	0.45	0.36	0.36	0.39	0.39	0.39	0.36	0.36	0.39	0.39	0.39	0.39	0.39	0.45
Ephemeroptera Total Nymphs	.33	.15	.09	.05	.02	.02	.08		.12	.04	.83	.98	.75	.18		.08	.04	.08	.04	.14
- Baetidae	.20	.10	.03		.02	.02	.04		.04		.27	.11	.28				.04	.08	.04	.14
- Ephemerellidae	.03	.03	.06	.05			.02		.04	.04	.30	.42	.23			.08				
- Heptageniidae		.03					.02				.23	.27	.19	.13						
- Leptophlebiidae	.76								.04		.04	.19	.05	.04						
- Siphlonuridae	.03																			
Plecoptera Total Nymphs	.25	.05			.02						.53	1.70	.61	.04				.04		
- Chloroperlidae	.03																			
- Leuctridae	.05	.03									.04	.23	.09							
- Perlidae	.03											.04								
- Perlodidae	.15	.03			.02						.49	1.44	.52	.04				.04		
Hemiptera - Gerridae							.02													
- Notonectidae											.04									
Megaloptera - Corydalidae																				
Trichoptera Total Larvae	.43	1.29	.24	.23	.18	.31	.21	.12	.28	.19	.15	.19	.23	.72	.17	.12	.08	.04	.04	.18
- Brachycentridae	.05	.03		.14	.15	.18	.13	.04	.20	.15	.11	.11	.14	.09	.12	.04	.04	.04	.04	.11
- Glossosomatidae	.28	1.24	.24	.07	.02	.13	.06	.08	.08		.04	.08	.05	.31	.04	.04	.04			.07
- Hydropsychidae	.05																			
- Hydroptilidae	.03						.02						.05	.04						
- Leptoceridae	.03															.04				
- Limnephilidae										.04										
- Philopotamidae														.13						
- Polycentropodidae		.03																		
- Rhyacophilidae				.02										.13						
- pupae																				
Coleoptera																				
- Dytiscidae Adults																				
- Elmidae Larvae	1.36	.48	.09	.05	.02	.09	.06			.04	.08	.72	.56	.18	.08	.04	.04	.12		
Adults	.03	.03									.08	.45	.28							
- Haliplidae Adults																				
- Psephenidae Larvae																				
- Gyrinidae Adults											.04									
Diptera Total	.73	.43	.45	.27	.15	.37	.17	.16	.24	.64	3.30	.53	.75	.40	.25	.21	.12	.25	.08	.18
- Athericidae Larvae			.03									.08				.08				
- Chironomidae Larvae	.13	.03	.12		.02	.15				.04	.04	.34	.14	.04			.04	.17		
Pupae	.03					.04						.04					.04			
- Empididae Pupae						.02	.02						.05					.04		.04
- Muscidae Pupae							.02													
- Simuliidae Larvae	.58	.40	.30	.25	.13	.15	.13	.16	.24	.61	3.26	.08	.56	.36	.25	.12	.04	.04	.08	.14
Pupae				.02																
Turbellaria																				
Hirudinea	.03		.03														.04	.08	.04	.14
Arachnida - Hydracarina	.03		.03				.06	.29	.16	.23	.08	.04	.05	.09						
Crustacea - Amphipoda	.03										.04									
- Ostracoda							.02	.04												
Oligochaeta			.03																	
Total	2.96	2.37	.97	.59	.39	.79	.63	.78	.79	1.14	5.15	4.62	3.24	1.61	.50	.45	.33	.62	.21	.64

*expressed as organisms per m^3 of flow through drift net

**treated with 70.0 g AI/ha MATACIL® 180F + ATLOX 3409F + water at 1908 ADT 31 May and again at 0554 ADT 8 June 1982.

Table 2. (continued)

Sample Date	25 May	25 May	25 May	25 May	31 May	31 May	31 May	31 May	31 May	31 May	1 June	8 June	8 June	8 June	8 June	8 June	8 June	8 June	8 June	8 June
Sample Time (ADT)	2000 h	2100 h	2200 h	2300 h	1900 h	2000 h	2100 h	2200 h	2300 h	2400 h	0820 h	0530 h	0600 h	0700 h	0800 h	0900 h	1000 h	1100 h	1800 h	1900 h
Volume of Drift Column (m^3)	29.19	25.30	25.30	25.30	33.76	33.76	33.76	33.76	27.07	27.07	26.40	30.79	30.79	30.79	30.79	30.79	30.79	30.79	29.69	29.69
Current Velocity (m/sec)	0.45	0.39	0.39	0.39	0.57	0.57	0.57	0.57	0.48	0.48	0.48	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39
Ephemeroptera Total Nymphs			.47	1.03			.15	.86	.48	.96			.06		.03		.03			
- Baetidae				.12			.09	.80	.18	.63			.03		.03		.03			
- Ephemerellidae			.28	.59			.06		.04	.07										
- Heptageniidae			.16	.24				.03	.07											
- Leptophlebiidae			.04	.08				.03	.18	.18			.03							
- Siphlonuridae																				
Plecoptera Total Nymph		.08	.20	.71	.03			.06	.07				.03				.03			
- Chloroperlidae																				
- Leuctridae		.04	.04	.12				.06	.07								.03			
- Perlidae			.04																	
- Perlodidae		.04	.12	.59	.03								.03							
Hemiptera - Gerridae																				
- Notonectidae																				
Megaloptera - Corydalidae			.04	.04																
Trichoptera Total Larvae	.10	.20	.12	.16	.06		.12	.03	.59	.18	.11	.10	.06			.06	.13	.10	.03	.10
- Brachycentridae	.07	.16	.12	.08	.03		.09					.06	.03				.13	.10		.03
- Glossosomatidae	.03			.04			.03	.03		.04		.03				.03				.03
- Hydropsychidae				.04					.04	.04			.03			.03				
- Hydroptilidae																			.03	.03
- Leptoceridae		.04			.03				.18		.11									
- Limnephilidae																				
- Philopotamidae									.33	.11										
- Polycentropodidae																				
- Rhyacophilidae									.04											
- pupae								.03									.03	.03		
Coleoptera																				
- Dytiscidae Adults				.04																
- Elmidae Larvae	.07	.04		2.33	.03	.03	.09	.06		.18	.11	.06	.03		.16	.06	.29	.10	.03	
Adults	.03			.40		.06			.07	.11										
- Haliplidae Adults																				
- Psephenidae Larvae																				
- Gyrinidae Adults											.04									
Diptera Total	.73	.43	.45	.27	.15	.37	.17	.16	.24	.64	3.30	.53	.75	.40	.25	.21	.12	.25	.08	.18
- Athericidae Larvae			.03									.08				.08				
- Chironomidae Larvae	.13	.03	.12		.02	.15				.04	.04	.34	.14	.04			.04	.17		
Pupae	.03					.04						.04					.04			
- Empididae Pupae						.02	.02													
- Heleidae Pupae							.02						.05					.04		.04
- Simuliidae Larvae	.58	.40	.30	.25	.13	.15	.13	.16	.24	.61	3.26	.08	.56	.36	.25	.12	.04	.04	.08	.14
Pupae				.02																
Turbellaria																				
Hirudinea	.03		.03																	
Arachnida - Hydracarina	.03		.03				.06	.29	.16	.23	.08	.04	.05	.09			.04	.08	.04	.14
Crustacea - Amphipoda	.03										.04									
- Ostracoda							.02	.04												
Oligochaeta			.03																	
Total	2.96	2.37	.97	.59	.39	.79	.63	.78	.79	1.14	5.15	4.62	3.24	1.61	.50	.45	.33	.62	.21	.64

*expressed as organisms per m^3 of flow through drift net
**treated with 70.0 g AI/ha MATACIL® 180F + ATLOX 3409F + water at 1908 ADT 31 May and again at 0554 ADT 8 June 1982.

Table 3. Aquatic invertebrates* collected in drift nets set in untreated control station, Morancy Brook, Sunbury County, New Brunswick, 22 May to 8 June, 1982.

Sample Date	22 May	22 May	22 May	22 May	22 May	22 May	22 May	22 May	22 May	22 May	22 May	22 May	25 May	25 May	25 May	25 May	25 May	25 May	25 May	25 May
Sample Time (ADT)	0400 h	0500 h	0600 h	0700 h	0800 h	0900 h	1000 h	1900 h	2000 h	2100 h	2200 h	2300 h	0400 h	0500 h	0600 h	0700 h	0800 h	0900 h	1000 h	1900 h
Volume of Drift Column (m^3)	76.14	76.14	76.14	76.14	72.97	72.97	72.97	50.59	48.65	40.86	42.81	40.86	44.67	43.74	43.74	43.74	43.74	43.74	43.74	54.99
Current Velocity (m/sec)	0.72	0.72	0.72	0.72	0.69	0.69	0.69	0.69	0.69	0.69	0.69	0.69	0.66	0.66	0.66	0.66	0.66	0.66	0.66	0.75
Ephemeroptera Total Nymphs	.39	.12		.04		.01	.03	.02			.58	.91	.34	.02	.02		.05	.02	.05	
- Baetidae	.24	.07					.01				.16	.12	.22	.02				.02		
- Ephemerellidae	.04	.01		.03		.01	.01	.02			.09	.39			.02				.05	
- Heptageniidae	.11	.01		.01							.21	.34	.07				.05			
- Leptophlebiidae	.01	.03									.12	.05	.04							
Plecoptera Total Nymphs	.12	.03									.16	.37	.16							
- Chloroperlidae	.03										.05									
- Leuctridae											.05									
- Nemouridae	.04	.03									.07	.17	.04							
- Perlidae																				
- Perlodidae	.05										.05	.15	.11							
- Unidentified																				
Megaloptera - Corydalidae												.02								
Trichoptera Total Larvae	.07	.13	.09	.04	.04	.03	.01	.02	.06	.05	.09	.10	.04	.02		.05	.05			
- Brachycentridae	.01	.01		.01		.01			.02		.02									
- Glossosomatidae	.01	.07	.05	.01	.03	.01		.02		.05			.02							
- Hydropsychidae	.01				.01						.02			.02			.05			
- Hydroptilidae																				
- Lepidostomatidae			.03						.02			.02								
- Leptoceridae		.01										.05								
- Limnephilidae				.01												.05				
- Philopotamidae	.01	.03	.01						.02		.05		.02							
- Polycentropodidae		.01										.02								
- Rhyacophilidae	.01																			
Coleoptera																				
- Chrysomelidae Adults																				
- Elmidae Larvae	.16	.01	.01	.01	.01					.02			.02	.05		.02		.02		
Adult	.05	.01						.02	.02		.02	.15	.04	.05			.02	.02	.02	
- Dytiscidae Adult												.02								
- Gyrinidae Adult	.01																			
- Haliplidae Adult																				
Diptera Total	5.83	1.56	.54	.46	.55	.29	.21	.34	.37	.64	6.61	3.92	1.77	.98	.16	.21	.18	.16	.25	.15
- Chironomidae Larvae	.04	.01	.01	.09	.01	.01			.02	.07		.05	.07	.07	.07	.11		.02	.02	
Pupae	.03							.06						.05		.05				
- Empididae Larvae																				
- Simuliidae Larvae	5.75	1.55	.53	.37	.53	.27	.21	.26	.35	.56	6.61	3.84	1.70	.87	.09	.05	.18	.14	.23	.15
Pupae								.02												
- Tipulidae Larvae	.01											.02								
Pupae																				
Turbellaria														.02						
Nematomorpha																				
Arachnida - Hydracarina	.01		.03	.01				.04	.08	.05		.02				.02	.02		.02	.02
Crustacea - Ostracoda					.01					.02										
Total	6.65	1.86	0.67	0.56	0.60	0.33	0.25	0.43	0.53	0.78	7.47	5.51	2.37	1.14	0.18	0.30	0.32	0.23	0.34	.16

*expressed as organisms per m^3 of flow through drift nets

Table 3. (continued)

Sample Date	25 May	25 May	25 May	25 May	31 May	31 May	31 May	31 May	31 May	31 May	8 June	8 June	8 June
Sample Time (ADT)	2000 h	2100 h	2200 h	2300 h	1900 h	2000 h	2100 h	2200 h	2300 h	2400 h	0520 h	0900 h	1000 h
Volume of Drift Column (m^3)	54.99	54.99	54.99	54.99	32.15	32.15	32.15	32.15	32.15	32.15	48.15	48.65	46.70
Current Velocity (m/sec)	0.75	0.75	0.75	0.75	0.60	0.60	0.60	0.60	0.60	0.60	0.69	0.69	0.69
Ephemeroptera Total Nymphs	.02		.15	.76			.03	.25	.09	.31	.08		.06
- Baetidae			.04	.25				.09	.03		.02		.04
- Ephemerellidae	.02		.05	.13				.06	.03	.09			.02
- Heptagenitidae			.04	.27				.03		.06	.02		
- Leptophlebiidae			.02	.11			.03	.06	.03	.16	.04		
Plecoptera Total Nymphs			.04	.18		.03		.09	.06	.06			.02
- Chloroperlidae									.03	.03			
- Leuctridae									.03				
- Nemouridae				.05		.03				.03			
- Perlidae				.02									
- Perlodidae			.04	.11				.03					.02
- Unidentified								.06					
Megaloptera - Corydalidae													
Trichoptera Total Larvae		.02		.04		.03	.03	.16	.09	.06		.02	.02
- Brachycentridae						.03	.03		.03	.03			
- Glossosomatidae								.03					
- Hydropsychidae		.02							.03			.02	.02
- Hydroptilidae													
- Lepidostomatidae													
- Leptoceridae								.09					
- Limnephilidae													
- Philopotamidae				.02				.03	.03	.03			
- Polycentropodidae													
- Rhyacophilidae				.02									
Coleoptera													
- Chrysomelidae Adults		.02											
- Elmidae Larvae			.13	.44						.09		.02	.02
Adult			.04	.04				.12	.06	.03			
- Dytiscidae Adult													
- Gyrinidae Adult				.02									
- Haliplidae Adult								.03					
Diptera Total	.27	.29	3.31	2.75	.19	.12	.06	2.67	1.74	1.46	.21	.08	.13
- Chironomidae Larvae	.04		.07	.07	.06	.06		.53	.16	.19	.04	.08	.04
Pupae			.02		.03			.03	.03	.06	.02		
- Empididae Larvae											.02		
- Simuliidae Larvae	.24	.27	3.22	2.67	.06	.06	.06	2.12	1.56	1.21	.12		.09
Pupae					.03								
- Tipulidae Larvae													
Pupae		.02											
Turbellaria													
Hemiptera								.09			.02		
Arachnida - Hydracarina	.02	.02	.04					.03			.04		.02
Crustacea - Ostracoda													
Total	.31	.35	3.69	4.22	.19	.19	.12	3.45	2.05	2.02	.35	.12	.28

Table 4. Aquatic invertebrates* collected in drift nets set in Block 82**, Bear Brook, York County, New Brunswick, 22 May to 9 June, 1982.

Sample Date	22 May	22 May	22 May	22 May	22 May	22 May	22 May	22 May	22 May	22 May	22 May	22 May	25 May	25 May	25 May	25 May	25 May	25 May	25 May	25 May	25 May
Sample Time (ADT)	0415 h	0500 h	0600 h	0700 h	0800 h	0900 h	1000 h	1900 h	2000 h	2100 h	2200 h	2300 h	0400 h	0500 h	0600 h	0700 h	0800 h	0900 h	1000 h	1900 h	2000 h
Volume of Drift Column (m^3)	67.00	70.05	67.00	67.00	67.00	67.00	67.00	46.53	46.70	46.70	46.70	44.67	21.40	21.40	23.35	23.35	23.35	23.35	23.35	29.70	29.70
Current Velocity (m/sec)	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.75	0.72	0.72	0.72	0.72	0.69	0.69	0.72	0.72	0.72	0.72	0.72	0.81	0.81
Ephemeroptera Total Nymphs	0.93	0.63	0.21	0.10	0.09	0.03	0.09	0.09	0.06	0.13	4.48	4.52	1.82	0.56	0.17	0.26	0.30	0.04	0.04	0.10	
- Baetidae	0.64	0.50	0.19	0.10	0.07	0.03	0.09	0.06	0.06	0.13	4.22	3.54	1.26	0.56	0.17	0.26	0.30	0.04	0.04	0.10	
- Ephemerellidae	0.21	0.03	0.01		0.01			0.02			0.19	0.74	0.51								
- Heptageniidae	0.01										0.04	0.13									
- Leptophlebiidae	0.06	0.10									0.02	0.11	0.05								
Plecoptera Total Nymphs	0.12	0.07				0.01			0.02		0.06	0.22	0.09	0.09							
- Leuctridae	0.07	0.01									0.04	0.09		0.05							
- Nemouridae	0.04	0.06										0.09	0.09								
- Perlodidae						0.01			0.02		0.02	0.04		0.05							
Trichoptera Total Larvae	0.16	0.13	0.16	0.18	0.21	0.12	0.27	0.11	0.30	0.21	0.39	0.49	0.28	0.19	0.21	0.30	0.34	0.51	0.39	0.44	0.13
- Brachycentridae	0.06	0.06	0.06	0.09	0.01	0.09	0.18	0.06	0.11	0.13	0.19	0.18	0.23	0.09		0.04	0.04	0.09		0.10	0.03
- Glossosomatidae										0.02											
- Hydropsychidae	0.06										0.04	0.04									
- Hydroptilidae			0.01													0.04					
- Lepidostomatidae	0.04	0.03	0.04	0.04	0.04		0.07	0.04	0.13	0.06	0.02	0.18	0.05	0.09	0.17		0.30	0.21	0.26	0.27	0.03
- Leptoceridae						0.01															
- Limnephilidae		0.01	0.03	0.04	0.15	0.01	0.01		0.06		0.04	0.04			0.04	0.21		0.21	0.13	0.07	0.07
- Phryganeidae											0.02										
- Polycentropodidae											0.06	0.04									
- Psychomyiidae		0.01																			
- Rhyacophilidae		0.01	0.01																		
Coleoptera																					
- Dytiscidae Adults																					
- Elmidae Larvae	0.03		0.03				0.03	0.06		0.02	0.06	0.16	0.09							0.03	
Adults	0.06			0.01			0.01				0.19	0.69	0.09								
- Gyrinidae Adults											0.02	0.02									
Diptera Total	0.37	0.84	0.37	0.16	0.19	0.04	0.24	0.13	0.11	0.19	0.64	0.65	0.89	0.70	0.43	0.21	0.21	0.13	0.17		0.07
- Athericidae Larvae											0.02										
- Chironomidae Larvae	0.01	0.04	0.01	0.01		0.03	0.01			0.11	0.02	0.04		0.09	0.09			0.04	0.04		
Pupae						0.01															
- Empididae Pupae		0.01																			
- Tipulidae Pupae	0.01																				
- Simuliidae Larvae	0.31	0.77	0.33	0.15	0.19		0.22	0.13	0.11	0.09	0.54	0.54	0.89	0.61	0.34	0.21	0.21	0.09	0.13		0.07
- Tipulidae Larvae	0.03	0.01									0.06	0.07									
Nematoda																					
Oligochaeta									0.02												0.03
Arachnida - Hydracarina	0.04		0.03		0.03	0.04	0.06	0.24	0.11	0.15	0.02	0.09		0.05	0.04	0.04		0.04	0.04	0.40	0.34
Crustacea - Amphipoda																					
- Ostracoda		0.03			0.01			0.02	0.02							0.04					
Total	1.72	1.70	0.81	0.46	0.54	0.25	0.70	0.64	0.64	0.71	5.87	6.85	3.27	1.59	0.86	0.86	0.86	0.73	0.64	0.98	0.57

*expressed as organisms per m^3 of flow through drift net

**treated with 70.0 g AI/ha MATACIL® 180F + Insecticide Diluent 585 at 0630 ADT 4 June and again at 0550 ADT 9 June, 1982

Table 4. (continued)

Sample Date	25 May	25 May	25 May	4 June	4 June	4 June	4 June	4 June	4 June	4 June	4 June	4 June	4 June	9 June	9 June	9 June	9 June	9 June	9 June	9 June
Sample Time (ADT)	2100 h	2200 h	2300 h	0550 h	0600 h	0700 h	0800 h	0900 h	1000 h	1100 h	1200 h	1845 h	1945 h	0525 h	0600 h	0700 h	0800 h	0900 h	1000 h	1100 h
Volume of Drift Column (m^3)	29.70	29.70	29.70	17.17	24.87	24.87	25.76	24.87	24.87	24.87	24.87	35.96	35.96	32.15	33.76	31.98	33.76	36.97	35.02	36.97
Current Velocity (m/sec)	0.81	0.81	0.81	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.02	1.02	0.60	0.63	0.63	0.63	0.69	0.69	0.69
Ephemeroptera Total Nymphs	0.34	7.21	2.22	0.64	0.24	0.16	0.16	0.12	0.04	0.24	0.48	0.08	0.22	0.06	0.03	0.16	0.09	0.08	0.06	0.03
- Baetidae	0.20	6.60	0.67	0.41	0.12	0.16	0.12	0.04	0.04	0.20	0.32	0.03	0.14	0.03	0.03	0.16	0.09	0.08	0.06	0.03
- Ephemerellidae	0.10	0.30	1.21	0.12	0.04						0.04	0.03	0.03							
- Heptageniidae			0.07																	
- Leptophlebiidae	0.03	0.30	0.27	0.12	0.08		0.04	0.08		0.04	0.12	0.03	0.06	0.03						
Plecoptera Total Nymphs		0.17	0.10			0.04	0.04			0.04			0.03							
- Leuctridae		0.07	0.03			0.04				0.04										
- Nemouridae		0.03											0.03							
- Perlodidae		0.07	0.07																	
Trichoptera Total Larvae	0.40	0.20	0.67	0.12	0.12	0.16	0.04	0.16	0.20	0.16	0.28	0.14	0.11	0.06	0.06	0.03	0.15	0.05	0.03	0.05
- Brachycentridae	0.10	0.03	0.27								0.16	0.06			0.03					
- Glossosomatidae														0.03						
- Hydropsychidae		0.03																		0.03
- Hydroptilidae						0.04			0.04	0.04	0.04	0.06	0.06							
- Leptodostomatidae	0.27	0.03	0.13	0.06	0.04	0.04	0.04	0.08	0.12		0.04					0.03	0.06	0.03	0.03	
- Leptoceridae																				
- Limnephilidae	0.03		0.03	0.06		0.08		0.08	0.04	0.08	0.04	0.03	0.06	0.03	0.03		0.09	0.03		0.03
- Phryganeidae			0.24																	
- Polycentropodidae		0.10																		
- Psychomyiidae					0.04					0.04										
- Rhyacophilidae					0.04															
Coleoptera																				
- Dytiscidae Adults		0.03																		
- Elmidae Larvae		0.10	0.17	0.41	0.28	0.32	0.16	0.24	0.16	0.16	0.12									
Adults		0.03	0.40			0.04			0.04											
- Gyrinidae Adult			0.03																	
Diptera Total	0.07	0.54	0.47	3.61	1.21	0.84	0.35	0.44	0.20	0.64	0.56	1.33	0.83	1.62	0.59	2.13	0.68	0.95	0.86	1.30
- Athericidae Larvae																				0.05
- Chironomidae Larvae	0.03	0.20	0.13	0.52	0.24	0.24	0.16	0.16	0.04	0.20	0.04	0.03	0.06			0.03	0.06		0.06	0.03
Pupae										0.04		0.06								
- Empididae Larvae						0.04	0.04													
- Ibisidae Larvae				0.06				0.04			0.04									
- Simuliidae Larvae	0.03	0.30	0.34	2.91	0.97	0.56	0.12	0.24	0.16	0.40	0.48	1.25	0.78	1.62	0.59	2.10	0.62	0.95	0.80	1.22
- Tipulidae Larvae		0.03		0.12			0.04													
Nematoda												0.08								
Oligochaeta	0.03				0.04			0.04					0.06							
Arachnida - Hydracarina	0.27	0.10	0.03	0.12	0.04	0.04			0.12	0.08	0.20	0.50	0.58				0.06	0.05		0.14
Crustacea - Amphipoda													0.03							
- Ostracoda				0.06	0.20	0.16		0.04		0.60		0.22								0.08
Total	1.11	8.38	4.11	4.95	2.13	1.77	0.70	1.05	0.76	1.93	1.65	2.36	1.86	1.74	0.68	2.31	0.98	1.14	0.94	1.60

Table 5. Terrestrial invertebrates* collected in drift nets set in Block 86**, upstream station, Yoho Stream, York County, New Brunswick, 22 May to 8 June, 1982.

Sample Date	22 May	22 May	22 May	22 May	22 May	22 May	22 May	22 May	22 May	22 May	22 May	22 May	25 May	25 May	25 May	25 May	25 May	25 May	25 May	25 May
Sample Time (ADT)	0440 h	0500 h	0600 h	0700 h	0800 h	0900 h	1000 h	1900 h	2000 h	2100 h	2200 h	2300 h	0410 h	0500 h	0600 h	0700 h	0800 h	0900 h	1000 h	1900 h
Surface Area of Drift Column (m^2)	203	203	190	190	190	190	190	127	127	127	127	127	93	93	93	93	85	85	85	102
Arachnida - Acari										0.08										
- Araneida						0.05		0.08					0.11							0.10
- Phalangida																				
Collembola	0.05	0.15	0.21	0.05	0.10		0.05	0.24	0.16	0.24		0.08	0.54	0.64			0.12		0.21	0.87
Ephemeroptera Adults																				0.30
Plecoptera Adults																				
Thysanoptera Adults									0.08											
Hemiptera																				
Homoptera																				
Megaloptera Adults						0.10	0.10													
Trichoptera Adults	0.10				0.05			0.08	0.16		0.08		0.43	0.21						0.10
Lepidoptera																				
- *Malacosoma* Larvae																				
- Others - Larvae								0.32											0.12	
- Adult																				
Hymenoptera																				
- Formicidae					0.05															
- Others																				
Coleoptera Adults				0.05									0.11							
Diptera Adults	0.30	0.10		0.05		0.42	0.42	1.34	0.79	0.79	0.39	0.79	0.75	1.61	0.21	0.21	0.12	0.35	0.21	1.18
Anoplura																		0.12		
Total	0.44	0.25	0.21	0.15	0.21	0.58	0.58	2.05	1.18	1.10	0.47	0.87	1.93	2.47	0.21	0.21	0.24	0.47	0.59	2.56

*expressed as organisms per 10 m^2 of surface water flowing through drift net

**treated with 70.0 g AI/ha MATACIL® 180F + ATLOX 3409F + water at 1908 ADT 31 May and again at 0554 ADT 8 June, 1982.

Table 5. (continued)

Sample Date	25 May	25 May	25 May	25 May	31 May	31 May	31 May	31 May	31 May	31 May	8 June	8 June	8 June	8 June	8 June	8 June	8 June
Sample Time (ADT)	2000 h	2100 h	2200 h	2300 h	1900 h	2000 h	2100 h	2200 h	2300 h	2400 h	0525 h	0600 h	0700 h	0800 h	0900 h	1000 h	1100 h
Surface Area of Drift Column (m^2)	93	93	93	93	76	85	85	85	85	85	144	144	144	144	144	144	144
Arachnida - Acari																0.14	
- Araneida			0.21	0.11		0.12	0.24	0.12	0.47	0.71						0.07	
- Phalangida					0.13		0.12	0.12									
Collembola	0.32	0.32		0.11		2.01	4.49	3.90	3.90	3.66	0.49	0.76	1.25	9.04	8.83	0.56	0.70
Ephemeroptera Adults				0.11						0.12					0.07		0.07
Plecoptera Adults						0.12		0.24								0.35	
Thysanoptera Adults																	
Hemiptera									0.12							0.14	0.07
Homoptera											0.07			0.07	0.07	0.28	0.07
Megaloptera Adults																0.07	
Trichoptera Adults		0.21		0.11	0.13			0.47	0.95	0.35						0.07	
Lepidoptera																	0.07
- *Malacosoma* Larvae									0.12								
- Others - Larvae					0.13			0.95	0.47	0.35						0.14	
- Adult									0.24								
Hymenoptera																0.07	
- Formicidae						0.12								0.35	0.14	0.14	0.07
- Others						0.24				0.24							
Coleoptera Adults						0.24		0.12	0.12			0.07	0.14	0.14	0.07		
Diptera Adults	0.86	1.07	0.43	0.64	0.39	1.06	1.54	2.48	4.01	3.07	0.21	0.28	0.28	1.32	2.78	0.83	0.63
Anoplura																	
Total	1.18	1.61	0.64	1.07	0.79	3.90	6.38	8.39	10.40	8.51	0.76	1.11	1.67	10.92	11.96	2.85	1.67

Table 6. Terrestrial Invertebrates* collected in drift nets set in Block 86**, downstream station, Yoho Stream, York County, New Brunswick, 22 May to 9 June, 1982.

Sample Date	22 May	22 May	22 May	22 May	22 May	22 May	22 May	22 May	22 May	22 May	22 May	22 May	25 May	25 May	25 May	25 May	25 May	25 May	25 May	25 May
Sample Time (ADT)	0425 h	0500 h	0600 h	0700 h	0800 h	0900 h	1000 h	1900 h	2000 h	2100 h	2200 h	2300 h	0400 h	0500 h	0600 h	0700 h	0800 h	0935 h	1000 h	1900 h
Surface Area of Drift Column (m^2)	165	165	165	190	190	190	190	102	102	110	110	110	102	102	110	110	110	110	110	127
Arachnida - Araneida						.05	.05					.09	.10						.09	
- Acari									.10											.24
Collembola	.06	.61	1.21	.84	.32	.58	.26	.39	.39	1.00		.73	1.08	1.58	.09	.09				.32
Ephemeroptera Adults									.30											
Plecoptera Adults					.05		.05	.10					.10							
Hemiptera							.05						.10							
Homoptera																	.09		.09	.16
Trichoptera Adults	.06						.05	.39	.20											
Lepidoptera																				
- *Malacosoma* larvae																				
- Other																				
Hymenoptera					.05		.11													
Coleoptera Adults					.05		.05						.30							
Diptera Adults	.73	1.21	.24			2.31	2.36	1.58	7.19	.82	.36	.18	4.33	2.86		.18	.27	.36	.09	1.18
Total	.85	1.82	1.45	.84	.47	2.94	2.99	2.46	8.18	1.82	.36	1.00	6.01	4.43	.09	.27	.36	.36	.27	1.89

*expressed as organisms per 10 m^2 of surface water flowing through drift net

**Treated with 70.0 g AI/ha MATACIL® 180F + AILOX 3409F + water at 1908 ADT 31 May and again at 0554 ADT 8 June, 1982.

Table 6. (continued)

Sample Date	25 May	25 May	25 May	25 May	31 May	31 May	31 May	31 May	31 May	31 May	1 June	8 June	8 June	8 June	8 June	8 June	8 June	8 June	8 June	8 June
Sample Time (ADT)	2000 h	2100 h	2200 h	2300 h	1900 h	2000 h	2100 h	2200 h	2300 h	2400 h	0820 h	0530 h	0600 h	0700 h	0800 h	0900 h	1000 h	1100 h	1800 h	1900 h
Surface Area of Drift Column (m^2)	127	110	110	110	161	161	161	161	135	135	135	110	110	110	110	110	110	110	110	110
Arachnida - Araneida			.09					.06	.52	.30	.15									
- Acari					.06						.07	.09								
Collembola	.32	.18			.37	.44	.93	.10	1.63	1.93	.22	1.55	.18	.09	.27	.55	.27	.09	1.18	.45
Ephemeroptera Adults							.06		.15		.07						.36	.09		
Plecoptera Adults								.06	.07								.09			
Hemiptera								.06	.07			.18			.27		.09	.18		
Homoptera																				
Trichoptera Adults	.08	.27	.36	.18			.19	1.43	.07	.37				.09	.09					
Lepidoptera																				
- *Malacosoma* larvae											.07									
- Other											.15									.27
Hymenoptera	.08					.12	.12												.09	
Coleoptera Adults				.09		.12		.25		.22										
Diptera Adults	3.15	1.18	.27		.25	1.56	3.98	4.29	9.53	6.28	3.40	.18	.27	.27	1.09	1.00	.64	2.36		.18
Total	3.62	1.64	.72	.27	.68	2.24	5.29	6.25	12.25	9.09	4.14	2.18	.64	.64	3.46	2.00	1.45	3.00	3.27	4.00

Table 7. Terrestrial invertebrates* collected in drift nets set in untreated control station, Meransy Brook, Sunbury County, New Brunswick, 22 May to 8 June, 1982.

Sample Date	22 May	22 May	22 May	22 May	22 May	22 May	22 May	22 May	22 May	22 May	22 May	22 May	25 May	25 May	25 May	25 May	25 May	25 May	25 May	25 May	25 May
Sample Time (ADT)	0400 h	0500 h	0600 h	0700 h	0800 h	0900 h	1000 h	1900 h	2000 h	2100 h	2200 h	2300 h	0400 h	0500 h	0600 h	0700 h	0800 h	0900 h	1000 h	1900 h	2000 h
Surface Area of Drift Column (m^2)	305	305	305	305	292	292	292	195	195	195	195	195	186	186	186	186	186	186	186	212	212
Arachnida - Acari				.03	.07					.05		.05		.11			.05		.05		
- Araneida									.10			.05		.11	.05						
Collembola			.07	.03	.07	.21	.03	.05	.05	.15	.05	.10	.05	.21		.05	.05			1.04	.76
Ephemeroptera Adults			.03																		.05
Plecoptera Adults			.03					.05													.09
Hemiptera Homoptera	.03							.05							.05						
Trichoptera Adults					.03			.05			.10		.05						.05	.05	
Lepidoptera - *Malacosoma* larvae																			.91		
- Others							.27	1.03	.05		.05	.05			.16	.11	.05			.76	.09
Hymenoptera - Formicidae																					
- Others		.03		.03	.03	.03	.03	.05			.05			.11							
Coleoptera Adults						.07							.05		.05						
Diptera Adults		.16	.23	.07	.14	.17	.07	.82	.41	.15	.31	.10	.32	.32	.05	.16	.21	.05	.05	.14	.38
Diplopoda										.05											
Total	.03	.20	.36	.16	.34	.48	.41	2.11	.62	.41	.57	.36	.48	.86	.38	.32	.38	.05	1.07	1.99	1.37

* expressed as organisms per 10 m^2 of surface water flowing through drift net

Table 7. (continued)

Sample Date	25 May	25 May	25 May	31 May	31 May	31 May	31 May	31 May	31 May	8 June	8 June	8 June
Sample Time (MDT)	2100 h	2200 h	2300 h	1900 h	2000 h	2100 h	2200 h	2300 h	2400 h	0520 h	0900 h	1000 h
Surface Area of Drift Column (m^2)	212	212	212	169	169	169	169	169	169	195	195	195
Arachnida - Acari												
- Araneida		.05		.06	.06			.12				.05
Collembola	1.70		.52	.12	.06	.06			.06		.05	
Ephemeroptera Adults	.05			.12								.05
Plecoptera Adults				.06								
Hemiptera			.05									
Homoptera		.05				.06	.18					
Trichoptera Adults							.12	.06				
Lepidoptera												
- *Malacosoma* larvae				55.38	35.40	22.58	8.16	3.61	3.78	.72		3.03
- Others	.05		.05							.05	.10	.10
Hymenoptera												
- Formicidae				.12	.06		.06				.05	.05
- Others												
Coleoptera Adults							.06			.05		
Diptera Adults	.47	.19	.38	.18	.53	.59	.47	.18	.18	.05	.36	.41
Diplopoda												
Total	2.27	.28	.99	56.04	36.11	23.29	9.04	3.96	4.02	.87	.57	3.70

Table 8. Terrestrial invertebrates* collected in drift nets set in Block 82**, Bear Brook, York County, New Brunswick, 22 May to 9 June, 1982.

Sample Date	22 May	22 May	22 May	22 May	22 May	22 May	22 May	22 May	22 May	22 May	22 May	22 May	25 May	25 May	25 May	25 May	25 May	25 May	25 May	25 May	25 May
Sample Time (ADT)	0415 h	0500 h	0600 h	0700 h	0800 h	0900 h	1000 h	1900 h	2000 h	2100 h	2200 h	2300 h	0400 h	0500 h	0600 h	0700 h	0800 h	0900 h	1000 h	1900 h	2000 h
Surface Area of Drift Column (m^2)	304	304	304	304	304	304	304	211	203	203	203	203	97	97	102	102	102	102	102	114	114
Arachnida - Acari								0.05		0.34		0.05									0.18
- Araneida										0.05											
Collembola								0.09				0.05									
Ephemeroptera Adults							0.03	0.28	0.20												
Plecoptera Adults																					
Hemiptera	0.03																				
Homoptera																					
Lepidoptera																					
- *Malacosoma* larvae																					
- Other larvae																					
Hymnoptera																					
- Formicidae																					
- Other						0.03														0.09	
Coleoptera Adults																					
Diptera Adults	0.03	0.07	0.03		0.03			0.33	0.69	0.05				0.10							0.18
Total	0.07	0.07	0.03	0.0	0.03	0.03	0.03	0.76	0.89	0.44	0.0	0.10	0.0	0.10	0.0	0.0	0.0	0.0	0.0	0.09	0.35

* expressed as organisms per 10 m^2 of surface water flowing through drift net

** treated with 70.0 g AI/ha MATACIL® 180F + Insecticide Diluent 585 at 0630 ADT 4 June and again at 0550 ADT 9 June, 1982.

Table 8. (continued)

Sample Date	25 May	25 May	25 May	4 June	4 June	4 June	4 June	4 June	4 June	4 June	4 June	4 June	4 June	9 June	9 June	9 June	9 June	9 June	9 June	9 June
Sample Time (ADT)	2100 h	2200 h	2300 h	0550 h	0600 h	0700 h	0800 h	0900 h	1000 h	1100 h	1200 h	1845 h	1945 h	0525 h	0600 h	0700 h	0800 h	0900 h	1000 h	1100 h
Surface Area of Drift Column (m^2)	114	114	114	59	89	89	89	89	89	89	89	144	144	169	178	178	178	195	195	195
Arachnida - Acari												0.07	0.07							0.05
- Araneida	0.09						0.11	0.11	0.23		0.11									0.05
Collembola	0.18	0.09					0.23	0.11			0.11	0.14	0.07			0.06	0.06			0.05
Ephemeroptera Adults												0.42	0.42						0.05	0.21
Plecoptera Adults							0.11						0.07							
Hemiptera										0.11	0.11									
Homoptera																				
Lepidoptera													0.07					0.31		
- *Malacosoma* larvae								0.11	0.23										0.05	
- Other larvae																				
Hymenoptera																			0.05	
- Formicidae							0.11	0.23												
- Other																				
Coleoptera Adults																			0.15	
Diptera Adults	0.09	0.09					0.34	0.11	0.56	0.56	1.01	0.35								
Total	0.35	0.18	0.0	0.0	0.0	0.0	0.90	0.68	1.01	0.68	1.35	0.97	0.70	0.0	0.0	0.06	0.06	0.31	0.31	0.36

Table 9. Aquatic invertebrates* collected in Surber samples from Block 86**, upstream station, Yoho Stream, York County, New Brunswick, 14 May to 22 September, 1982.

Sample Date	14 May	26 May	1 June	10 June	26 June	22 Sept.
Ephemeroptera - Total nymphs	52.0 ± 16.4	30.0 ± 12.3	14.2 ± 8.0	22.5 ± 18.5	19.0 ± 9.0	25.0 ± 3.5
Baetidae	0.5 ± 0.6		0.2 ± 0.5	0.5 ± 1.0	1.2 ± 2.5	
Ephemerellidae	15.5 ± 10.7	7.0 ± 4.1	4.5 ± 3.1	7.5 ± 7.3	5.5 ± 3.9	3.0 ± 4.2
Heptageniidae	34.2 ± 12.4	20.8 ± 9.2	8.2 ± 6.0	12.2 ± 9.6	12.0 ± 6.0	19.0 ± 5.2
Leptophlebiidae	1.8 ± 2.1	2.0 ± 1.4	1.2 ± 0.5	2.2 ± 2.1	0.2 ± 0.5	3.0 ± 2.2
unidentified		0.2 ± 0.5				
Odonata - Aeshnidae				0.5 ± 1.0		
Plecoptera - Total nymphs	0.5 ± 1.0	0.2 ± 0.5	1.2 + 1.2	1.2 ± 1.0	5.2 ± 2.2	3.5 ± 2.5
Leuctridae	0.2 ± 0.5		0.5 ± 0.6	1.2 ± 1.0	5.2 ± 2.2	0.7 ± 1.0
Perlidae						0.2 ± 0.5
Perlodidae	0.2 ± 0.5	0.2 ± 0.5	0.5 ± 1.0			2.5 ± 2.1
unidentified			0.2 ± 0.5			
Megaloptera - Corydalidae	0.8 ± 0.5	0.8 ± 1.0	1.0 ± 0.8	1.0 ± 1.4	1.0 ± 0.8	3.3 ± 1.7
- Sialidae			0.2 ± 1.0		0.2 ± 0.5	0.2 ± 0.5
Trichoptera - Total larvae	8.0 ± 4.8	8.5 ± 1.9	4.0 ± 2.4	16.5 ± 7.5	57.2 ± 41.2	128.0 ± 86.4
Brachycentridae	3.0 ± 2.0	0.5 ± 0.6	1.0 ± 0.0	6.5 ± 7.5	23.2 ± 20.6	40.8 ± 15.5
Glossosomatidae	2.5 ± 2.4	2.0 ± 2.4	1.2 ± 1.2	4.0 ± 2.8	18.2 ± 9.1	2.5 ± 1.9
Hydropsychidae	0.5 ± 0.6	2.5 ± 1.3	0.8 ± 1.5	0.5 ± 0.6	8.8 ± 9.4	65.5 ± 55.5
Hydroptilidae						0.5 ± 1.0
Leptoceridae				1.0 ± 0.8	1.0 ± 1.2	
Limnephilidae	0.8 ± 0.5	1.2 ± 1.5	0.2 ± 0.5	1.2 ± 1.2	0.5 ± 0.6	0.7 ± 0.5
Odontoceridae	0.2 ± 0.5					0.2 ± 0.5
Philopotamidae	0.2 ± 0.5	2.2 ± 2.9	0.2 ± 0.5	3.0 ± 3.5	3.2 ± 5.2	13.5 ± 12.7
Polycentropodidae			0.5 ± 0.6		2.0 ± 2.2	1.0 ± 1.4
Rhyacophilidae	0.2 ± 0.5			0.2 ± 0.5	0.2 ± 0.5	3.3 ± 5.9
unidentified larvae	0.5 ± 1.0					
pupae	5.2 ± 4.2	2.0 ± 2.7	3.2 ± 2.2	5.5 ± 5.9	1.8 ± 1.0	1.0 ± 0.8
Coleoptera - Elmidae - adults	2.5 ± 1.7	1.0 ± 0.8	1.8 ± 1.7	1.5 ± 0.6	2.2 ± 2.9	1.0 ± 0.8
- larvae	7.2 ± 6.8	6.5 ± 6.4	4.2 ± 3.3	5.8 ± 5.1	5.2 ± 3.6	1.3 ± 1.3
Psephenidae larvae	3.8 ± 2.6	2.5 ± 2.4	2.5 ± 0.6	3.8 ± 1.7	3.5 ± 0.6	2.3 ± 1.7
Dytiscidae - adults		0.2 ± 0.5				
Diptera - Total	28.8 ± 22.1	34.0 ± 44.7	16.2 ± 12.4	25.2 ± 28.0	16.8 ± 15.0	117.8 ± 42.1
Tipulidae - larvae	1.0 ± 0.8	0.2 ± 0.5	1.0 ± 0.8	1.0 ± 0.8	0.2 ± 0.5	1.0 ± 1.2
Simuliidae - larvae	0.2 ± 0.5		1.0 ± 1.4		0.2 ± 0.5	
- pupae	1.0 ± 1.4					0.2 ± 0.5
Chironomidae - larvae	23.8 ± 20.5	20.0 ± 17.4	8.0 ± 6.7	21.0 ± 27.4	13.8 ± 13.9	93.8 ± 44.7
- pupae		32.8 ± 28.4	4.0 ± 3.9	0.2 ± 0.5	0.8 ± 1.0	0.8 ± 1.5
Heleidae - pupae					0.5 ± 0.6	
Athericidae - larvae	2.8 ± 1.7	1.0 ± 0.8	2.0 ± 1.4	2.0 ± 1.4	0.8 ± 1.0	21.5 ± 13.7
Empididae - larvae			0.2 ± 0.5	0.8 ± 1.0	0.2 ± 0.5	0.5 ± 0.6
- pupae			0.2 ± 0.5	0.8 ± 1.0	0.2 ± 0.5	0.5 ± 0.6
Hirudinea		1.0 ± 2.0	0.2 ± 0.5			
Nematoda				0.2 ± 0.5		
Oligochaeta	1.0 ± 0.8		0.2 ± 0.5	0.2 ± 0.5		
Pelecypoda	0.2 ± 0.5					0.2 ± 0.5
Hydracarina	1.2 ± 1.0	0.5 ± 0.6	0.5 ± 1.0			0.2 ± 0.5
Turbellaria						0.5 ± 1.0
Total	111.2 ± 47.5	107.2 ± 60.7	39.8 ± 18.2	84.0 ± 57.2	112.2 ± 69.7	284.3 ± 102.1

* expressed as mean number and one standard deviation of organisms collected in four 0.093 m^2 Surber samples.

** treated with 70.0 g AI/ha MATACIL® 180F + ATLOX 3409F + water at 1908 ADT 31 May and again at 0554 ADT 9 June, 1982.

Table 10. Aquatic invertebrates* collected in Surber samples from Block 86**, downstream station, Yoho Stream, York County, New Brunswick, 14 May to 22 September, 1982.

Sample Date	14 May	26 May	1 June	10 June	26 June	22 Sept.
Ephemeroptera - Total nymphs	9.8 ± 4.6	3.8 ± 1.7	5.5 ± 1.7	6.8 ± 4.0	4.5 ± 2.6	11.3 ± 8.3
Baetidae		0.8 ± 1.0		2.2 ± 1.7	1.0 ± 1.4	
Ephemerellidae	5.0 ± 3.2	1.5 ± 2.4	3.8 ± 1.0	2.2 ± 1.5	1.8 ± 2.1	3.3 ± 2.2
Heptagenlidae	3.5 ± 2.5	1.2 ± 1.0	1.2 ± 1.0	1.8 ± 1.5	1.8 ± 1.0	6.0 ± 4.8
Leptophlebiidae	1.2 ± 1.5	0.2 ± 0.5	0.5 ± 1.0	0.5 ± 0.6		2.0 ± 1.6
Odonata - Aeshnidae					0.8 ± 1.0	0.5 ± 0.6
- Gomphidae					0.2 ± 0.5	0.2 ± 0.5
Plecoptera - Total nymphs	5.0 ± 2.7	1.8 ± 2.2	3.5 + 2.1	4.8 ± 2.8	4.5 ± 3.1	1.3 ± 1.0
Chloroperlidae			0.2 ± 0.5	0.2 ± 0.5		
Leuctridae	0.5 ± 1.0		0.2 ± 0.5	2.5 ± 3.1	1.5 ± 0.6	0.2 ± 0.5
Perlidae	2.5 ± 1.3	1.8 ± 2.2	1.0 ± 0.8	1.2 ± 1.5	2.8 ± 2.5	0.5 ± 0.6
Perlodidae	2.0 ± 2.2		2.0 ± 1.2	0.5 ± 1.0		0.5 ± 1.0
Pteronarcidae				0.2 ± 0.5	0.2 ± 0.5	
Megaloptera - Corydalidae	1.0 ± 1.2	1.0 ± 1.4	0.8 ± 1.0	0.8 ± 0.5	1.8 ± 1.7	1.3 ± 1.0
Sialidae				0.8 ± 1.5		
Trichoptera - Total larvae	42.5 ± 38.5	16.2 ± 13.6	20.2 ± 2.6	35.5 ± 43.0	94.0 ± 46.8	170.0 ± 128.8
Brachycentridae	34.2 ± 30.5	9.2 ± 12.6	7.0 ± 6.4	28.5 ± 42.3	62.5 ± 30.7	78.0 ± 35.8
Glossosomatidae	6.5 ± 9.1	5.5 ± 2.9	7.0 ± 4.8	2.5 ± 1.7	5.2 ± 6.4	
Hydropsychidae	1.0 ± 1.4	0.8 ± 1.5	3.8 ± 4.3	2.5 ± 3.3	23.5 ± 16.0	84.5 ± 107.2
Hydroptilidae				0.5 ± 0.6	0.2 ± 0.5	1.3 ± 1.5
Lepidostomatidae					0.2 ± 0.5	1.3 ± 1.9
Leptoceridae			0.5 ± 0.6	0.5 ± 0.6	0.5 ± 0.6	0.2 ± 0.5
Limnephilidae	0.5 ± 0.6	0.8 ± 1.0	1.0 ± 1.2			0.2 ± 0.5
Odontoceridae	0.2 ± 0.5			0.2 ± 0.5		
Philopotamidae			0.2 ± 0.5	0.2 ± 0.5	1.0 ± 1.2	3.8 ± 4.5
Polycentropodidae			0.2 ± 0.5	0.5 ± 1.0		
Rhyacophilidae			0.5 ± 0.6		0.5 ± 1.0	
unidentified larvae					0.2 ± 0.5	
pupae	4.2 ± 5.3	2.5 ± 2.1	10.8 ± 8.3	15.0 ± 11.3	2.5 ± 3.1	
Coleoptera - Elmidae - adults	7.0 ± 10.0	2.5 ± 2.1	3.5 ± 2.6	7.2 ± 5.7	3.8 ± 3.0	13.3 ± 12.6
- larvae	18.5 ± 7.5	7.0 ± 10.7	19.8 ± 24.8	45.5 ± 27.6	17.0 ± 18.9	26.8 ± 25.5
Psephenidae - larvae	1.8 ± 1.5	2.0 ± 2.7	0.8 ± 1.0	0.5 ± 1.0	0.2 ± 0.5	0.2 ± 0.5
Diptera - Total	15.0 ± 13.8	5.2 ± 2.9	10.8 ± 7.4	49.0 ± 47.1	45.5 ± 37.5	58.5 ± 74.2
Athericidae - larvae	4.0 ± 3.6	2.0 ± 2.8	1.0 ± 1.2	3.2 ± 1.3	2.8 ± 0.5	16.8 ± 10.6
Chironomidae - larvae	8.8 ± 10.5	1.8 ± 1.7	6.5 ± 3.7	37.0 ± 36.5	36.8 ± 31.1	37.3 ± 63.2
- pupae	0.2 ± 0.5	0.2 ± 0.5	0.8 ± 1.0	1.8 ± 1.5	0.5 ± 0.6	0.2 ± 0.5
Empididae - larvae			1.0 ± 1.4	0.8 ± 1.5	1.8 ± 1.2	
- pupae				0.8 ± 1.0	0.5 ± 1.0	
Heleidae - pupae		0.2 ± 0.5			0.2 ± 0.5	
Simuliidae - larvae	0.8 ± 1.0	0.8 ± 1.5	1.0 ± 1.4	5.2 ± 3.1	4.5 ± 4.7	1.0 ± 1.4
- pupae	0.8 ± 1.5				0.2 ± 0.5	0.2 ± 0.5
Tipulidae - larvae	0.5 ± 0.6	0.2 ± 0.5	0.5 ± 0.6	0.2 ± 0.5	1.5 ± 1.3	3.0 ± 2.6
Oligochaeta	11.5 ± 6.4	0.8 ± 1.0	1.2 ± 2.5	24.0 ± 24.9	2.5 ± 1.9	0.5 ± 0.6
Gastropoda	0.5 ± 0.6	0.8 ± 1.5		0.8 ± 1.0		
Pelecypoda	0.2 ± 0.5					
Hydracarina		0.2 ± 0.5			0.2 ± 0.5	1.5 ± 1.9
Turbellaria						0.2 ± 0.5
Total	117.0 ± 81.7	44.8 + 36.1	76.8 + 41.1	190.5 + 103.7	168.2 + 87.6	285.0 + 241.9

* expressed as mean number and one standard deviation of organisms collected in four 0.093 m^2 Surber samples.

** treated with 70.0 g AI/ha MATACIL® 180F + ATLOX 3409F + water at 1908 ADT 31 May and again at 0554 ADT 8 June, 1982.

Table 11. Aquatic invertebrates* collected in Surber samples from Block 82**, Bear Brook, York County, New Brunswick, 14 May to 22 September, 1982.

Sample Date	14 May	29 May	6 June	11 June	27 June	22 Sept.
Ephemeroptera - Total nymphs	17.2 ± 13.0	35.0 ± 9.6	21.5 ± 7.1	24.0 ± 7.8	22.5 ± 14.7	6.5 ± 0.6
Baetidae	0.5 ± 0.6	9.2 ± 6.3	1.5 ± 0.6	1.5 ± 1.3	3.5 ± 2.4	
Ephemerellidae	13.8 ± 10.7	15.2 ± 6.8	10.8 ± 4.3	12.5 ± 5.0	5.8 ± 4.5	2.8 ± 2.8
Heptageniidae	2.8 ± 1.5	10.5 ± 3.7	9.2 ± 5.3	9.5 ± 5.0	13.2 ± 8.8	3.8 ± 2.6
Leptophlebiidae	0.2 ± 0.5			0.5 ± 1.0		
Odonata - Aeshnidae	0.5 ± 0.6					1.3 ± 1.9
- Gomphidae						0.8 ± 1.0
Plecoptera - Total nymphs	2.0 ± 1.8	2.8 ± 1.7	1.0 + 1.2	2.0 ± 1.4	1.8 ± 1.5	1.3 ± 1.3
Leuctridae	0.8 ± 1.0	1.2 ± 1.0	1.0 ± 1.2	1.2 ± 1.2	1.5 ± 1.3	
Nemouridae	0.2 ± 0.5	0.2 ± 0.5		0.5 ± 0.6		0.2 ± 0.5
Perlodidae	1.0 ± 0.8	1.2 ± 1.9		0.2 ± 0.5	0.2 ± 0.5	1.0 ± 1.4
Hemiptera - Veliidae						0.2 ± 0.5
Megaloptera - Corydalidae		0.5 ± 0.6	0.5 ± 0.6	0.2 ± 0.5	0.2 ± 0.5	0.8 ± 1.0
Trichoptera - Total larvae	15.5 ± 11.8	9.5 ± 3.7	4.2 ± 3.6	10.0 ± 7.6	9.5 ± 6.0	20.0 ± 11.7
Brachycentridae	3.2 ± 5.9	2.2 ± 2.5	2.0 ± 3.4	3.8 ± 2.8		2.3 ± 3.2
Glossosomatidae			0.2 ± 0.5			1.0 ± 0.8
Hydropsychidae	1.5 ± 1.0	3.5 ± 3.7	0.2 ± 0.5	1.2 ± 1.2	2.0 ± 2.2	4.3 ± 4.0
Hydroptilidae	9.2 ± 5.8	0.8 ± 1.5		2.0 ± 3.4	4.2 ± 3.8	5.5 ± 4.8
Lepidostomatidae		1.0 ± 1.4	0.2 ± 0.5	1.0 ± 2.0	0.2 ± 0.5	0.8 ± 0.5
Leptoceridae					0.2 ± 0.5	
Limnephilidae			0.5 ± 0.6	0.5 ± 1.0		
Philopotamidae	0.5 ± 1.0				1.2 ± 1.9	4.3 ± 6.7
Rhyacophilidae	1.0 ± 1.2	2.0 ± 2.2	1.0 ± 1.2	1.5 ± 1.7	1.5 ± 0.6	2.5 ± 1.7
pupae		0.2 ± 0.5		1.0 ± 1.2	1.5 ± 1.7	0.8 ± 1.5
Coleoptera - Elmidae - larvae	9.5 ± 7.6	13.2 ± 1.30	1.5 ± 1.3	13.5 ± 24.4	8.2 ± 13.2	18.3 ± 9.5
- adults	3.5 ± 3.0	14.5 ± 11.2	9.8 ± 4.1	8.5 ± 6.4	11.2 ± 3.8	27.3 ± 16.1
Haliplidae - adults		0.5 ± 1.0				
Diptera - Total	21.5 ± 16.3	14.0 ± 3.8	111.5 ± 130.5	104.8 ± 108.9	199.2 ± 175.6	11.5 ± 4.2
Athericidae - larvae	1.0 ± 1.4		0.5 ± 1.0	0.5 ± 1.0	0.5 ± 1.0	8.8 ± 3.3
Chironomidae - larvae	15.8 ± 15.1	10.5 ± 4.6	104.2 ± 132.0	78.5 ± 60.4	165.5 ± 148.7	0.8 ± 1.0
- pupae	1.2 ± 1.5		0.5 ± 1.0		1.0 ± 1.4	
Empididae - larvae	0.5 ± 1.0				0.5 ± 1.0	0.2 ± 0.5
Heleidae - larvae					1.0 ± 1.4	0.5 ± 1.0
- pupae				0.2 ± 0.5	0.5 ± 1.0	
Simuliidae - larvae	1.0 ± 1.4	2.5 ± 1.0	5.0 ± 5.5	22.0 ± 42.0	29.5 ± 25.2	
- pupae	1.8 ± 1.7		0.2 ± 0.5			
Tipulidae - larvae	0.2 ± 0.5	1.0 ± 1.4	1.0 ± 1.4	3.5 ± 5.7	0.8 ± 1.0	1.3 ± 1.0
Hirudinea					0.2 ± 0.5	
Oligochaeta	9.5 ± 7.5	9.5 ± 34.0	6.8 ± 4.2	6.2 ± 9.0	2.0 ± 0.0	14.5 ± 3.7
Pelecypoda	0.2 ± 0.5			0.2 ± 0.5		
Hydracarina	1.2 ± 1.0	0.5 ± 1.0	2.2 ± 4.5	3.0 ± 5.4	3.2 ± 4.0	0.8 ± 1.0
Turbellaria						1.0 ± 1.1
Total	80.8 ± 48.8	100.2 ± 30.6	159.0 ± 130.2	173.5 ± 160.6	259.8 ± 212.3	104.8 ± 28.3

* expressed as mean number and one standard deviation of organisms collected in four 0.093 m^2 Surber samples.

** treated with 70.0 g AI/ha MATACIL® 180 F + insecticide Diluent 585 at 0630 ADT 4 June, and again at 0550 ADT 9 June, 1982.

Table 12. Aquatic invertebrates* collected in Surber samples from untreated control station, Meransy Brook, Sunbury County, New Brunswick, 14 May to 22 September, 1982.

Sample Date	14 May	25 May	1 June	10 June	26 June	22 Sept.
Ephemeroptera - Total nymphs	26.5 ± 29.2	6.5 ± 2.9	9.0 ± 3.4	12.5 ± 17.3	10.2 ± 5.8	5.5 ± 1.3
Baetidae	3.5 ± 5.1		1.0 ± 1.4	0.8 ± 1.5		0.5 ± 0.6
Ephemerellidae	9.2 ± 5.7	5.0 ± 2.2	4.2 ± 2.6	8.0 ± 10.7	8.8 ± 5.0	2.2 1.0
Heptageniidae	12.8 ± 19.0	0.5 ± 0.6	2.2 ± 1.0	1.0 ± 1.2	1.0 ± 1.4	2.7 ± 1.0
Leptophlebiidae	1.0 ± 1.4	1.0 ± 1.2	1.8 ± 0.5	2.8 ± 4.8	0.5 ± 0.6	
Odonata - Aeshnidae					0.2 ± 0.5	0.2 ± 0.5
- Gomphidae		1.5 ± 1.7			0.2 ± 0.5	
Plecoptera - Total nymphs	1.0 ± 0.8	1.4 ± 1.2	1.0 + 0.8	2.3 ± 2.4	2.2 ± 1.5	3.2 ± 2.2
Leuctridae	0.2 ± 0.5	0.2 ± 0.5	0.8 ± 0.5	0.8 ± 1.5		
Nemouridae					0.2 ± 0.5	
Perlidae	0.2 ± 0.5	1.2 ± 1.0	0.2 ± 0.5	1.5 ± 1.0	2.0 ± 1.4	2.0 ± 2.4
Perlodidae	0.5 ± 0.6					1.2 ± 1.9
Hemiptera - Veliidae						0.5 ± 1.0
Megaloptera - Corydalidae	1.5 ± 1.3	1.5 ± 2.4		1.0 ± 0.8	1.0 ± 1.2	4.5 ± 1.2
Sialidae	0.2 ± 0.5	0.5 ± 0.6	0.2 ± 0.5			0.5 ± 1.0
Trichoptera - Total larvae	10.5 ± 8.5	5.0 ± 2.9	7.8 ± 3.6	10.8 ± 8.8	54.2 ± 17.8	72.0 ± 33.6
Brachycentridae	0.5 ± 1.0		0.2 ± 0.5		4.8 ± 4.1	0.5 ± 1.0
Glossosomatidae	4.8 ± 3.0	3.8 ± 4.1	3.0 ± 2.9	6.2 ± 6.1	25.0 ± 1.4	3.0 ± 1.8
Helicopsychidae	0.2 ± 0.5					
Hydropsychidae	2.2 ± 3.9	1.0 ± 1.2	2.8 ± 3.0	2.0 ± 2.4	10.0 ± 8.8	38.2 ± 27.3
Hydroptilidae					0.2 ± 0.5	
Leptoceridae				0.2 ± 0.5	0.2 ± 0.5	
Limnephilidae	0.5 ± 0.6			0.2 ± 0.5	7.0 ± 6.0	1.2 ± 1.9
Odontoceridae			0.2 ± 0.5	0.2 ± 0.5	0.2 ± 0.5	
Philopotamidae	1.2 ± 2.5		0.8 ± 1.0	0.8 ± 1.0	5.8 ± 8.9	8.2 ± 3.1
Polycentropodidae	0.2 ± 0.5	0.2 ± 0.5	0.5 ± 0.6		0.8 ± 1.5	
Rhyacophilidae	1.5 ± 1.7		0.2 ± 0.5	1.0 ± 0.8	0.2 ± 0.5	0.8 ± 1.0
pupae	2.9 0 1.8	2.2 ± 1.7	1.0 ± 1.4	5.0 ± 3.4	9.0 ± 5.0	0.2 ± 0.5
Coleoptera - Elmidae - adults	0.2 ± 0.5	0.5 ± 1.0	0.2 ± 0.5	1.0 ± 2.0		1.0 ± 0.8
- larvae	1.2 ± 1.0	1.2 ± 1.0	0.2 ± 0.5	1.0 ± 1.4	1.2 ± 1.5	1.3 ± 1.3
Psephenidae - larvae	0.8 ± 0.5	1.0 ± 1.4	0.2 ± 0.5	0.8 ± 1.0		0.2 ± 0.5
Chrysomelidae - adults			0.2 ± 0.5			
Diptera - Total	6.8 ± 5.7	4.5 ± 3.5	9.2 ± 7.4	17.0 ± 20.6	18.2 ± 10.5	9.0 ± 5.4
Athericidae - larvae				0.2 ± 0.5		0.2 ± 0.5
Chironomidae - larvae	4.5 ± 2.6	3.0 ± 2.9	8.5 ± 7.7	15.2 ± 19.6	13.0 ± 8.0	6.0 ± 4.3
- pupae					1.2 ± 1.2	
Empididae - larvae		0.2 ± 0.5				0.5 ± 0.6
- pupae					0.2 ± 0.5	
Heleidae - pupae					0.2 ± 0.5	
Simuliidae - larvae	0.5 ± 1.0	0.8 ± 1.0		0.5 ± 1.0	1.2 ± 1.9	
Tipulidae - larvae	1.8 ± 2.4	0.8 ± 1.0	0.8 ± 0.5	1.0 ± 0.8	2.2 ± 1.5	2.3 ± 2.1
Nematomorpha			0.5 ± 0.6	0.2 ± 0.5		
Oligochaeta	7.2 ± 4.2	1.5 ± 0.6	0.2 ± 0.5		0.5 ± 0.6	2.3 ± 3.3
Hydracarina						0.5 ± 1.0
Total	58.0 ± 43.7	25.8 + 7.8	30.0 + 10.5	51.5 + 51.3	96.8 + 35.6	100.8 + 34.0

* expressed as mean number and one standard deviation of organisms collected in four 0.093 m^2 Surber samples.

Table 13. Aquatic invertebrates* collected on artificial substrates from Block 36**, upstream station, Yoho Stream, New Brunswick, 29 May to 26 June, 1982.

Sample Date	29 May	1 June	10 June	26 June
Ephemeroptera - Total nymphs	12.0 ± 3.0	11.2 ± 1.7	10.0 ± 4.7	5.8 ± 3.5
Baetidae	0.4 ± 0.9	1.5 ± 0.6	2.5 ± 3.0	1.8 ± 1.5
Ephemerellidae	4.0 ± 2.4	5.0 ± 1.8	3.2 ± 1.5	0.5 ± 0.5
Heptagenlidae	7.0 ± 2.0	4.2 ± 1.0	3.0 ± 2.9	2.8 ± 1.9
Leptophlebiidae	0.5 ± 0.5	0.5 ± 0.6	1.2 ± 0.5	0.5 ± 0.9
Odonata - Aeshnidae				0.2 ± 0.4
- Gomphidae				0.2 ± 0.4
Plecoptera - Total nymphs	1.5 ± 0.9	1.5 ± 1.0	1.0 ± 1.2	6.8 ± 5.1
Leuctridae		0.5 ± 0.6	0.5 ± 1.0	5.2 ± 5.5
Perlidae				0.2 ± 0.4
Perlodidae	1.4 ± 0.9	1.0 ± 1.4	0.5 ± 1.0	0.4 ± 0.9
unidentified	0.2 ± 0.4			
Trichoptera - Total larvae	0.4 ± 0.9	2.0 ± 2.2	2.8 ± 3.0	13.0 ± 5.1
Brachycentridae		0.8 ± 1.5	1.8 ± 2.9	1.4 ± 1.7
Glossosomatidae		0.2 ± 0.5		
Hydropsychidae	0.4 ± 0.9	0.8 ± 1.5	0.5 ± 0.6	10.3 ± 5.3
Leptoceridae			0.2 ± 0.5	
Philopotamidae			0.2 ± 0.5	1.0 ± 0.8
pupae				0.2 ± 0.4
Coleoptera - Elmidae - larvae	0.4 ± 0.5	1.8 ± 1.2	1.2 ± 1.0	0.6 ± 0.9
- adults	0.2 ± 0.4	0.2 ± 0.5		0.2 ± 0.4
Hydrophilidae - adults	0.2 ± 0.4		0.2 ± 0.5	
Diptera - Total	19.2 ± 8.2	115.2 ± 29.3	317.5 ± 77.1	59.4 ± 29.4
Athericidae - larvae	0.4 ± 0.5	2.0 ± 0.8	2.5 ± 1.9	2.8 ± 1.8
Chironomidae - larvae	17.5 ± 7.8	97.2 ± 24.1	297.0 ± 76.9	46.5 ± 22.0
- pupae	0.4 ± 0.5	5.5 ± 4.5	5.2 ± 3.6	1.4 ± 1.7
Empididae - larvae		0.5 ± 1.0	0.8 ± 0.5	0.5 ± 1.3
Heleidae - larvae	0.4 ± 0.9	7.8 ± 15.5		
- pupae		0.2 ± 0.5	8.0 ± 7.4	3.5 ± 2.9
Simuliidae - larvae	0.4 ± 0.9	1.2 ± 0.5	5.8 ± 8.5	14.2 ± 8.0
Tipulidae - larvae		0.8 ± 10.0	0.2 ± 0.5	0.2 ± 0.4
Hydracarina	0.6 ± 0.5	1.2 ± 1.9	0.8 ± 0.5	1.5 ± 2.1
Oligochaeta				1.5 ± 2.1
Nematoda			0.2 ± 0.5	
Total	34.6 ± 5.4	133.2 ± 31.6	335.8 ± 71.0	99.8 ± 36.0

* expressed as mean number and one standard deviation of organisms collected on four or five Hester-Dendy multiple plate samplers.

** treated with 70.0 g AI/ha MATACIL® 180F + ATLOX 3409 F + water at 1908 ADT 31 May, and again at 0554 ADT 9 June, 1982.

Table 14. Aquatic invertebrates* collected on artificial substrates from Block 86** downstream station, Yoho Stream, York County, New Brunswick, 29 May to 26 June, 1982.

Sample Date	29 May		1 June		6 June		10 June		26 June	
Ephemeroptera - Total nymphs	6.3 ±	2.4	9.5 ±	3.9	7.3 ±	2.1	1.5 ±	1.3	0.4 ±	0.5
Baetidae			0.3 ±	0.5			0.3 ±	0.5	0.2 ±	0.4
Ephemerellidae	4.8 ±	1.1	6.0 ±	2.4	3.0 ±	2.0	0.8 ±	1.5		
Heptageniidae	2.0 ±	1.6	3.3 ±	2.6	3.7 ±	1.5	0.5 ±	0.6	0.2 ±	0.4
Leptophlebiidae					0.7 ±	1.2				
Odonata - Aeshnidae					0.3 ±	0.5				
Plecoptera - Total nymphs	5.0 ±	2.9	4.5 ±	2.4	3.0 ±	3.0	1.8 ±	2.2	1.6 ±	1.1
Leuctridae	0.6 ±	0.9	0.5 ±	1.0	1.7 ±	2.9	0.8 ±	1.5		
Perlidae	0.4 ±	0.5	0.5 ±	0.6	0.7 ±	1.2	0.5 ±	0.6	1.6 ±	1.1
Perlodidae	3.4 ±	2.8	3.5 ±	3.1	0.7 ±	0.6	0.5 ±	0.6		
unidentified	0.6 ±	0.5								
Trichoptera - Total larvae	3.6 ±	2.4	1.0 ±	1.4	4.3 ±	4.2	2.0 ±	0.8	24.6 ±	28.3
Brachycentridae	0.2 ±	0.4			2.3 ±	4.0	1.0 ±	1.2	3.2 ±	2.9
Glossosomatidae					0.7 ±	0.6	0.3 ±	0.5		
Hydropsychidae	1.6 ±	1.1	0.8 ±	1.5	1.3 ±	0.6	0.3 ±	0.5	21.2 ±	26.0
Hydroptilidae							0.3 ±	0.5		
Philopotamidae	1.6 ±	1.9					0.3 ±	0.5	0.2 ±	0.4
Polycentropodidae			0.3 ±	0.5						
Rhyacophilidae	0.2 ±	0.4								
Coleoptera - Elmidae - larvae	8.0 ±	3.4	3.8 ±	2.1	2.3 ±	1.5	0.5 ±	0.6	0.8 ±	0.8
- adults	0.8 ±	1.3	0.3 ±	0.5			0.3 ±	0.5	0.6 ±	0.5
Diptera - Total	43.8 ±	24.2	40.8 ±	24.1	171.7 ±	18.7	352.5 ±	167.2	142.0 ±	45.7
Athericidae - larvae					1.0 ±	0.0	1.5 ±	1.7	4.2 ±	4.9
Chironomidae - larvae	39.2 ±	24.6	35.0 ±	18.1	165.0 ±	20.8	337.5 ±	170.1	116.2 ±	52.7
- pupae			1.5 ±	1.9	1.7 ±	0.6	7.0 ±	7.4	0.6 ±	0.9
Empididae - larvae	0.2 ±	0.4	0.8 ±	1.0			0.3 ±	0.5	0.8 ±	1.1
Heleidae - larvae			0.3 ±	0.5	0.3 ±	0.6	0.3 ±	0.5	0.6 ±	1.3
- pupae	0.2 ±	0.4					1.5 ±	1.9	0.2 ±	0.4
Simuliidae - larvae	3.6 ±	1.7	3.0 ±	3.8	3.3 ±	3.2	4.5 ±	5.8	17.0 ±	17.3
- pupae									2.0 ±	3.1
Tipulidae - larvae	0.6 ±	0.9			0.3 ±	0.6			0.4 ±	0.5
Oligochaeta			0.3 ±	0.5			0.3 ±	0.5		
Hydracarina	0.2 ±	0.4			0.3 ±	0.6	0.5 ±	0.6	0.4 ±	0.5
Total	68.2 ±	25.3	59.8 ±	24.9	189.0 ±	19.3	359.5 ±	165.9	170.4 ±	38.6

* expressed as mean number and one standard deviation of organisms collected on four or five Hester-Dendy multiple plate samplers.

** treated with 70.0 g AI/ha MATACIL® 180F + ATLOX 3409F + water at 1908 ADT 31 May and again at 0554 ADT 8 June, 1982.

Table 15. Aquatic invertebrates* collected on artificial substrates from Block 32**, Bear Brook, York County, New Brunswick, 30 May to 27 June, 1982.

Sample Date	30 May	6 June	11 June	27 June
Ephemeroptera - Total nymphs	35.6 ± 9.4	38.0 ± 18.0	42.2 ± 8.7	41.4 ± 15.8
Baetidae	24.6 ± 9.9	24.5 ± 14.0	27.2 ± 7.6	29.4 ± 15.6
Ephemerellidae	4.0 ± 3.7	6.5 ± 4.0	5.2 ± 2.2	2.2 ± 2.3
Heptageniidae	6.8 ± 3.3	7.0 ± 2.2	9.8 ± 2.6	9.8 ± 4.4
Leptophlebiidae	0.2 ± 0.4			
Plecoptera - Total nymphs	2.8 ± 3.1	3.5 ± 2.4	2.5 ± 3.0	
Leuctridae	0.6 ± 0.9	0.8 ± 1.0	1.2 ± 1.5	
Nemouridae	0.4 ± 0.9	2.0 ± 0.8	1.2 ± 1.9	
Perlodidae	1.8 ± 1.8	0.2 ± 0.5		
unidentified		0.5 ± 1.0		
Trichoptera - Total larvae	1.6 ± 2.1	1.8 ± 1.7	2.8 ± 2.2	1.2 ± 0.8
Brachycentridae	0.2 ± 0.4			
Hydropsychidae	1.2 ± 1.8	0.8 ± 1.0	1.2 ± 1.2	0.2 ± 0.4
Lepidostomatidae		0.2 ± 0.5		0.2 ± 0.4
Limnephilidae	0.2 ± 0.4	0.2 ± 0.5		
Philopotamidae			0.2 ± 0.5	
Psychomyiidae			0.2 ± 0.5	
Rhyacophilidae		0.5 ± 1.0	1.0 ± 0.8	0.8 ± 0.8
Coleoptera - Elmidae - larvae	0.6 ± 0.5	0.5 ± 1.0	0.5 ± 0.6	
- adults	0.2 ± 0.4			
Diptera - Total	27.0 ± 14.9	278.0 ± 127.7	299.3 ± 92.1	432.0 ± 228.7
Athericidae - larvae	0.4 ± 0.9	0.5 ± 1.0	0.5 ± 0.6	
Chironomidae - larvae	11.2 ± 7.9	237.2 ± 121.5	254.3 ± 96.5	251.5 ± 87.0
- pupae			2.2 ± 3.9	0.6 ± 0.5
Empididae - larvae	0.6 ± 0.9		0.2 ± 0.5	
Heleidae - pupae				1.0 ± 1.4
Simuliidae - larvae	14.6 ± 13.1	40.2 ± 30.9	31.2 ± 20.0	178.4 ± 177.3
- pupae			0.8 ± 1.0	0.2 ± 0.4
Tipulidae - larvae	0.2 ± 0.4			0.2 ± 0.4
Oligochaeta	0.2 ± 0.4			
Hydracarina	0.4 ± 0.9	2.0 ± 1.4	1.0 ± 0.0	1.0 ± 0.7
Total	68.4 ± 16.3	323.3 ± 147.5	338.3 ± 98.6	475.5 ± 229.2

* expressed as mean number and one standard deviation of organisms collected on four or five Hester-Dendy multiple plate samplers.

** treated with 70.0 g AI/ha MATACIL® 180F + insecticide diluent 585 at 0630 ADT 4 June, and again at 0530 ADT 9 June, 1982.

Table 16. Aquatic invertebrates* collected on artificial substrates from untreated control station, Meransy Brook, Sunbury County, New Brunswick, 29 May to 26 June, 1982.

Sample Date	29 May	1 June	6 June	10 June	26 June
Ephemeroptera - Total nymphs	9.8 ± 3.6	4.8 ± 2.0	12.2 ± 1.5	12.5 ± 3.9	2.3 ± 2.0
Baetidae	1.6 ± 1.5		2.2 ± 1.5	3.0 ± 2.4	0.4 ± 0.5
Ephemerellidae	5.4 ± 2.1	3.0 ± 2.2	2.8 ± 1.0	3.3 ± 2.5	0.6 ± 0.9
Heptageniidae		0.5 ± 0.6	2.8 ± 2.2	1.8 ± 1.0	1.2 ± 1.3
Leptophlebiidae	2.3 ± 2.2	1.2 ± 1.0	4.5 ± 1.3	4.2 ± 1.2	0.6 ± 0.5
Siphlonuridae				0.3 ± 0.5	
Odonata - Aeshnidae				0.3 ± 0.5	
Plecoptera - Total nymphs	5.2 ± 1.9	3.2 ± 1.0	4.8 ± 1.7	4.0 ± 2.2	4.4 ± 2.3
Leuctridae	0.6 ± 0.8	0.8 ± 1.0	2.5 ± 2.4	1.8 ± 1.3	0.4 ± 0.9
Nemouridae	0.2 ± 0.4		0.5 ± 0.6	0.3 ± 0.5	
Perlidae	2.8 ± 1.3	1.2 ± 1.0	1.0 ± 0.8	1.5 ± 0.6	3.6 ± 2.4
Perlodidae	2.6 ± 2.1	1.2 ± 1.2	0.5 ± 1.0	0.5 ± 1.0	0.2 ± 0.4
Pteronarcidae			0.3 ± 0.5		0.2 ± 0.4
Megaloptera - Corydalidae			0.3 ± 0.6	0.5 ± 0.6	
Trichoptera - Total larvae	15.3 ± 5.4	3.2 ± 1.0	9.5 ± 10.4	5.8 ± 2.9	25.2 ± 29.1
Brachycentridae	1.2 ± 1.1	0.2 ± 0.5		0.3 ± 0.5	0.2 ± 0.4
Glossosomatidae				0.3 ± 0.5	
Hydropsychidae	12.0 ± 5.4	1.2 ± 1.5	3.3 ± 2.6	3.5 ± 2.4	20.2 ± 21.6
Leptoceridae			0.3 ± 0.5		
Philopotamidae	2.0 ± 0.7	1.0 ± 1.4	5.5 ± 7.7	1.3 ± 1.3	4.8 ± 7.5
Polycentropodidae			0.3 ± 0.5	0.3 ± 0.5	
Rhyacophilidae	0.6 ± 0.8	0.6 ± 1.0	0.3 ± 0.5	0.3 ± 0.5	
Pupae			0.3 ± 0.5		
Coleoptera - Elmidae - larvae	2.8 ± 2.4	1.5 ± 1.3	0.5 ± 1.0	0.5 ± 0.6	
- adults	0.4 ± 0.8				0.2 ± 0.4
Diptera - Total	92.0 ± 35.4	72.0 ± 37.5	201.0 ± 94.9	626.5 ± 414.2	302.0 ± 44.7
Athericidae - larvae		0.3 ± 0.5	0.3 ± 0.5		
Chironomidae - larvae	18.6 ± 7.6	47.5 ± 25.4	194.8 ± 90.2	612.3 ± 404.2	255.6 ± 50.2
- pupae			1.2 ± 1.5	1.5 ± 1.3	3.0 ± 2.5
Empididae - larvae	0.4 ± 0.5	0.5 ± 0.6	0.8 ± 0.5	0.5 ± 0.6	0.4 ± 0.9
Helaidae - larvae					1.8 ± 4.0
- pupae			0.5 ± 1.0	0.3 ± 0.5	4.0 ± 5.9
Simuliidae - larvae	71.5 ± 36.7	19.8 ± 16.3	3.0 ± 4.2	12.0 ± 9.0	32.6 ± 34.4
- pupae	1.4 ± 1.5	4.0 ± 2.9			4.4 ± 5.8
Tipulidae - larvae			0.3 ± 0.5		0.2 ± 0.4
Oligochaeta		0.3 ± 0.5		0.3 ± 0.5	
Hydracarina	1.4 ± 2.1		0.3 ± 0.5		
Total	128.4 ± 38.6	94.3 ± 36.6	229.5 ± 106.9	650.3 ± 422.8	334.6 ± 51.7

* expressed as mean number and one standard deviation of organisms collected on four or five Hester-Dendy multiple plate samplers.

Table 17. Stomach contents of juvenile Atlantic salmon collected in Block 86*, Yoho Stream, York County, New Brunswick, 1982.

	Per cent occurrence				Mean per cent contribution to volume				Mean no. per stomach			
	21 May	31 May	8 June	21 June	21 May	31 May	8 June	21 June	21 May	31 May	8 June	21 June
Number of fish in sample	10	20	10	10								
Number of empty stomachs	0	0	1	1								
Aquatic Insects												
Ephemeroptera Nymphs												
Baetidae	40		20	20	5.0		1.7	6.8	2		1	2
Ephemerellidae	80	15	40	30	22.0	7.8	5.0	10.4	4	2	2	4
Heptageniidae	70	10	10	10	13.2	1.5	1.1	2.8	2	1	5	2
Leptophlebiidae			20				3.9				2	
Unidentified		5	10	20		0.3	11.1	4.2		1	2	1
Odonata - Anisoptera		10	10	10		5.8	4.4	10.6		1	1	1
Plecoptera Nymphs	60	5	20		16.9	2.3	8.9		2	2	2	
Megaloptera - Sialidae			20				5.0				2	
Neuroptera - Sisyridae			10				1.1				1	
Trichoptera Larvae	40	65	70	60	5.1	27.7	29.8	16.4	1	4	4	5
Trichoptera Pupae	40	10		30	19.3	2.8		0.9	3	2		1
Coleoptera Adults		15	10	30		0.1	0.6	1.1		1	1	1
Coleoptera Larvae				20				2.3				1
Psephnidae	10		10		1.0		0.1		1		1	
Diptera												
Athericidae Larvae				30				8.3				2
Chironomidae Larvae	10		30	60	0.1		2.2	2.1	1		4	3
Chironomidae Pupae		5				0.3				1		
Empididae			10				0.6				2	
Simuliidae Larvae	10	5		50	0.1	0.3		2.7	1	2		3
Simuliidae Pupae				10				1.4				1
Tipulidae Larvae		5	10			0.1	2.8			1	1	1
Other Aquatic Organisms												
Fish				10				2.2				1
Hydracarina		5		10		0.1		0.1		2		1
Terrestrial Arthropods												
Ephemeroptera Adult			20	20			11.7	1.9			1	1
Plecoptera Adult	10	5			2.0	2.0			1	1		
Homoptera			10				0.6				1	
Trichoptera Adult	70	30	10	10	15.3	18.5	0.6	7.8	2	5	1	1
Lepidoptera Larvae		25	10			17.0	4.4			3	3	
Formicidae		5				0.1			2	2		
Coleoptera		5		20		3.0		1.1		1		1
Diptera		30	30	60		5.4	1.0	16.8		4	1	5
Arachnida		15	30			5.6	2.8			1	1	
Collembola			20				0.3				1	

* treated with 70.0 g AI/ha MATACIL® 180F + ATLOX 3409F + water at 1908 AOT 31 May and again at 0554 AOT 8 June 1982.

Table 18. Stomach contents of juvenile Atlantic salmon collected in untreated Meransy Brook control, Sunbury County, New Brunswick, 1982.

	Per cent occurrence			Mean per cent contribution to volume			Mean no. per stomach		
	20 May	10 June	21 June	20 May	10 June	21 June	20 May	10 June	21 June
Number of fish in sample	20	10	10						
Number of empty stomachs	1	0	0						
Aquatic Insects									
Ephemeroptera Nymphs									
Baetidae	35		30	5.2		5.0	1		4
Ephemerellidae	90	80	70	25.2	11.3	7.4	3	4	2
Heptageniidae	40	10	40	5.9	0.3	3.2	3	1	2
Leptophlebiidae	15		10	1.6		1.0	2		1
Odonata - Anisoptera	5	10		1.3	1.5		1	1	
Plecoptera Nymphs	55	60	10	12.2	6.6	0.2	3	2	2
Megaloptera - Sialidae		10			0.5			1	
Neuroptera - Sisyridae			10			0.1			1
Trichoptera Larvae	80	100	90	33.6	24.9	13.5	7	5	6
Trichoptera Pupae		20	20		0.7	1.1		1	1
Coleoptera Adults	15	10	10	0.6	0.1	1.0	1	1	2
Coleoptera Larvae	25			2.5			2		
Diptera									
Athericidae Larvae			20			0.8			1
Chironomidae Larvae	40	70	80	3.1	1.2	6.6	3	5	17
Chironomidae Pupae	20		40	1.4		0.5	2		1
Empididae Larvae	5		30	0.1		0.4	1		1
Heleidae Larvae	5			0.1			1		
Simuliidae Larvae	30	50	50	3.0	2.5	8.8	5	9	25
Tipulidae Larvae		20	20		0.3	0.7		1	1
Unidentified Diptera Larvae			10			0.2			1
Other Aquatic Organisms									
Hydracarina		20	10		0.2	0.1		1	1
Terrestrial Arthropods									
Ephemeroptera Adult	20	10	50	1.9	3.5	17.9	1	9	7
Plecoptera Adults		30			0.5			1	
Hemiptera									
Homoptera		30			1.2			3	
Trichoptera Adults		70	50		10.7	9.5		2	6
Lepidoptera Larvae		90	30		18.3	14.0		5	3
Hymenoptera		10	20		1.6	0.3		3	1
Coleoptera		50	30		8.4	5.9		3	1
Diptera	5	30	30	0.3	5.5	0.8	1	10	2
Arachnida	15		20	0.5		0.3	1		1
Collembola		20			0.2			1	

Table 19. Stomach contents of brook trout collected in Block 82* Bear Brook, York County, New Brunswick, 1982.

	Per cent occurrence				Mean per cent contribution to volume				Mean no. per stomach			
	20 May	4 June	9 June	21 June	20 May	4 June	9 June	21 June	20 May	4 June	9 June	21 June
Number of fish in sample	10	10	10	10								
Number of empty stomachs	0	0	0	0								
Aquatic Insects												
Ephemeroptera Nymphs												
Baetidae	10	50	20		0.5	2.3	1.6		1	4	3	
Ephemerellidae	70	100	50	60	7.5	6.4	9.1	4.6	1	4	6	3
Heptageniidae	40	30	50	20	2.7	0.9	7.2	0.9	1	1	3	2
Leptophlebiidae		90	30			8.8	2.1			8	2	
Odonata - Anisoptera	20	10			6.0	3.5			1	3		
Plecoptera Nymphs	80	70	50	40	5.9	4.1	4.7	4.8	2	5	2	8
Hemiptera		10				0.1				1		
Megaloptera - Sialidae		10				0.6				2		
Neuroptera - Sisyridae			30				0.7				3	
Trichoptera Larvae	90	90	90	100	34.7	16.6	29.8	42.5	14	9	15	14
Trichoptera Pupae	20	60	20	30	5.6	1.3	1.1	1.1	1	1	12	1
Coleoptera Adults	10	30	40	20	0.5	0.9	2.5	0.4	1	13	2	1
Coleoptera Larvae		50				0.8				2		
Psephnidae		10				0.1				1		
Diptera												
Athericidae	10		10		0.5		0.1		4		2	
Chironomidae Larvae	50	80	100	60	1.5	2.3	6.3	1.5	3	12	10	5
Chironomidae Pupae		50	40			2.5	2.0			9	4	
Empididae	50	20	30	10	4.3	0.2	0.3	0.1	2	1	2	2
Heleidae Larvae	20	40	10		2.5	1.2	0.1		5	4	1	
Heleidae Pupae	10	10			0.1	0.1			1	1		
Simuliidae Larvae	10	50	80	30	0.1	1.2	15.4	0.3	1	3	13	3
Simuliidae Pupae	20	10	10		0.6	0.2	0.5		2	1	1	
Tipulidae	20	40	10	40	6.5	11.5	0.1	0.9	1	2	1	1
Unidentified Diptera Larvae	10				0.1				1			
Other Aquatic Organisms												
Fish				10				1.5				8
Fish Egg		10				0.2				1		
Hydracarina	30	30	50		0.3	0.3	1.3		1	2	3	
Oligochaeta	30				1.1				2			
Terrestrial Arthropods												
Ephemeroptera Adult		40	40			2.8	4.2			4	1	
Plecoptera Adult	50	40	10	40	11.5	1.6	0.1	1.6	4	5	3	1
Hemiptera		10		20		0.1		5.1		5		1
Homoptera		60	10	40		5.3	0.1	5.2		12	2	16
Trichoptera Adult		70	40	70		5.4	3.4	5.0		4	9	7
Lepidoptera Adult		10				0.2				1		
Lepidoptera Larvae	10	60	20	30	0.5	4.1	0.3	2.1	1	9	1	4
Hymenoptera	10	50	10	30	0.2	1.4	0.1	1.0	1	9	2	2
Formicidae				10				0.1				1
Coleoptera		40	20	30		1.3	0.7	3.6		4	1	3
Diptera	60	60	60	50	6.1	7.7	6.1	17.5	4	32	5	12
Arachnida	20	70	10	20	0.2	4.5	0.1	0.6	1	9	1	3
Collembola	10		20	10	0.5		0.2	0.1	1		2	2

* treated with 70.0 g AI/ha MATACIL® 180F + Insecticide Diluent 585 at 0630 ADT 4 June and again at 0550 ADT 9 June 1982.

Table 20. Stomach contents of brook trout collected in untreated McKenzie Brook control, York County, Brunswick, 1982.

	Per cent occurrence			Mean per cent contribution to volume			Mean no. per stomach		
	20 May	10 June	21 June	20 May	10 June	21 June	20 May	10 June	21 June
Number of fish in sample	10	10	10						
Number of empty stomachs	0	0	0						
Aquatic Insects									
Ephemeroptera Nymphs									
Baetidae	10	20	10	1.0	0.6	0.2	1	1	1
Ephemerellidae	50	40	30	4.8	5.3	1.9	2	1	1
Heptageniidae	10	30	10	0.5	4.8	2.0	1	1	4
Unidentified			20			0.2			1
Plecoptera Nymphs	70	20	60	7.0	0.6	6.4	3	1	2
Neuroptera - Sisyridae			10			0.3			5
Trichoptera Larvae	80	80	100	28.0	30.9	26.3	14	5	7
Trichoptera Pupae	10	10	40	0.1	0.1	12.0	1	1	3
Coleoptera Adults	10	30	10	1.0	4.2	0.1	2	2	1
Diptera									
Athericidae	10		30	0.5		2.4	1		2
Chironomidae Larvae	90	30	80	10.7	3.2	6.0	11	4	10
Chironomidae Pupae	40	30	20	1.4	0.8	0.8	1	2	10
Empididae Larvae	30			0.3			1		1
Heleidae Larvae	10		10	0.1		0.1	1		1
Heleidae Pupae	20			0.4			3		
Simuliidae Larvae	80	10	40	13.3	0.4	0.5	36	4	1
Simuliidae Pupae			10			0.2			1
Tipulidae Larvae	10	10	20	1.5	5.5	0.5	2	2	1
Unidentified Pupae			10			0.5			1
Other Aquatic Organisms									
Fish		10			4.5			1	
Hirudinea	10			4.0			2		
Hydracarina	10	20	20	0.2	2.1	0.2	2	1	2
Oligochaeta	10			0.1			1		
Terrestrial Arthropods									
Ephemeroptera Adult	30	10	20	3.3	2.0	1.3	2	1	8
Plecoptera Adult	50	30	20	7.5	2.4	0.6	3	1	1
Hemiptera	20		10	1.0		2.0	2		2
Homoptera	10	20	70	1.0	0.6	4.4	1	1	2
Trichoptera Adult		20	40		0.6	3.9		4	3
Lepidoptera Larvae	20	40	20	1.1	17.3	2.9	1	7	1
Hymenoptera	10	10	20	0.2	0.2	1.2	3	1	1
Formicidae		20			0.6			4	
Coleoptera	30	30	60	5.7	7.5	6.1	2	3	1
Diptera	80	40	90	1.6	3.0	10.0	1	7	7
Arachnida	40	30	50	3.8	2.8	2.7	1	2	2
Collembola	10		10	0.3		1.0	3		1
Gastropoda - Slug			10			3.9			4