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Response of Zoobenthos to  
Additions of Hay, Willow  
Leaves, Alder Leaves and  
Cereal Grain to Stream  
Substrates**

by **J. H. Mundie, D. E. Mounce  
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**TECHNICAL REPORT NO. 387**

**1973**



OCT 18 1973

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TECHNICAL REPORT NO. 387

OBSERVATIONS ON THE RESPONSE OF ZOOBENTHOS  
TO ADDITIONS OF HAY, WILLOW LEAVES,  
ALDER LEAVES AND CEREAL GRAIN TO  
STREAM SUBSTRATES

by

J. H. Mundie, D. E. Mounce and L. E. Smith

FISHERIES RESEARCH BOARD OF CANADA  
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MAY 1973

#### ABSTRACT

Measured quantities of plant material were placed in standardized gravels in a stream riffle to be colonized by benthos over periods ranging from 2-12 weeks. The fauna, down to  $50\mu$  in width, which became established was compared with that of a standardized gravel to which no plant material was added. Seventy-eight species of insects were found in the gravels.

In 12 trials out of 18 the benthos which colonized grain weighed more than that of the control gravel. Absence of an increase in weight was attributed in two trials to insufficient exposure (2 weeks) to the grain, and to low temperatures; and in another two trials to over-utilization of the grain after 3 months. The greatest increases in weight occurred in August with grain which had been 4 weeks in the stream. Numbers of insects (246,000/sq m) were then 1.8 times, and weights (21 g - 31 g dry weight/sq m) 16 to 23 times the values of the control standard gravel. The commonest organisms were Chironomini.

No change in numbers or weights of benthos appeared to take place in the presence of hay. The fauna of 1-month-old willow leaf litter was 1.7 times more abundant, and 1.9 times heavier, than that in the control. In alder litter numbers were 1.9 times and the weight 3.8 times those of the control.

In six comparisons out of eight the standard gravel had lower numbers, but equal or greater weights of animals than the natural gravel of the stream.

The implications of the findings for the management of streamside vegetation in relation to salmonids, and for the aqua-culture of fish-food organisms are discussed.

## INTRODUCTION

Studies extending over a decade (e.g. Nelson and Scott 1962, Hynes 1963, Vannote 1969) attest to the substantial contribution of heterotrophy in the productivity of streams. The materials on which this is based are dissolved organic substances leached from soils and leaves, and slowly decomposing plant fragments such as leaves, stems and twigs. The leachates have apparently received no attention in relation to lotic food webs. An example of their capacity to support bacteria, which in turn sustain invertebrates, is seen in the rapid growth of mosquito larvae in a bucket containing rain water and some leaves. The insoluble plant fragments, however, have been studied in detail. It is known that benthic invertebrates aggregate on plant detritus in streams (Egglishaw 1964) and that they feed selectively on different kinds of leaves (Kaushik and Hynes 1971) although the rate of decay of leaves in water is not necessarily accelerated by their presence (Mathews and Kowiczewski 1969). The decomposition of leaves is brought about, at least initially, by fungi and its rate is affected by temperature and the nitrogen and phosphorous content of the water (Kaushik and Hynes 1971). The invertebrates apparently benefit chiefly by cropping the fungal and bacterial flora, although direct observations are lacking. The evidence points, however, to allochthonous plant material being the basis of much invertebrate production, and, in consequence, of much fish production. There is need, therefore, for studies which relate the kinds and quantities of leaf litter in streams to the composition, biomass and growth of benthos.

The work reported here deals only with non-soluble plant material and starts with the assumption that if this is added to gravel invertebrates which encounter it will remain in it, and in time their density and biomass will exceed those of the fauna of unenriched gravel. The objective was to measure the difference between the properties of benthos in gravel enriched with known quantities of plant material and those of benthos in untreated gravel.

The study was exploratory; the method of sampling the animals, the choice of materials, the quantities used, and the duration of the experiments were trial approaches. Hay was selected because it is widely used in culturing invertebrates, alder leaves because Alnus was the dominant deciduous tree along the streams where the study was carried out on Vancouver Island, B.C. Alder is commonly regarded as a weed by the B.C. forest industry, and is frequently eradicated with herbicides. A possible alternative for stream banks is willow which does not have the spreading potential of alder. Litter of local willow was therefore chosen for comparison with alder. Cereal grain was tried from considerations of aqua-culture of fish-food organisms. If stream invertebrates live largely on decomposing plant material, are there common, readily available, plants, or plant products, which could be collected and used as a basis for their production? Grain offered one possibility.

In the initial experiments, in 1971, with the above materials, the greatest response of benthos was to grain; further trials were therefore made with grain in 1972.

## METHODS

The trials were conducted at Kinkade Creek, a small woodland tributary of the Little Qualicum River on the east coast of Vancouver Island. Sampling followed the procedure described by Mundie (1971). This retrieves materials down to 50 $\mu$  from the substrate of riffles. The area covered by the sampler was 0.18 sq m and the depth reached into the substrate was 15 cm.

Gravels of three kinds were sampled. (1) A standard gravel was prepared from selected stream gravel of size-range roughly 13 mm-19 mm (1/2-3/4 inch). This was placed in baskets made of expanded aluminum with a diamond-shaped mesh measuring 2.3 cm  $\times$  1 cm. The baskets were 15 cm deep and of volume 27,000 cc. The shape of the baskets corresponded to the base of the sampler, and also to a metal frame which was placed on top of each basket to minimize loss of materials when the sample was taken (Mundie 1971, Fig. 3). The frames were laid on the baskets when they were embedded in the substrate, and they also served to make their location visible. Baskets of standard gravel were left in the stream for periods corresponding to those of treated gravels, i.e. 2-12 weeks. Their purpose was to provide controls against which treated gravels could be compared. (2) Treated gravels were the same as standard ones but had measured amounts of plant materials mixed into them. (3) Natural gravels were sampled directly from the stream bed whenever standard and enriched gravels were sampled in 1972. They were not sampled in 1971. It was expected that their fauna would differ in composition and density from that of the standard gravel and that it would be highly variable, even within one riffle, because of the physical heterogeneity of the natural stream bed.

All samples were taken from a single riffle and the enriched gravels were placed downstream of the standard and natural localities to avoid risks of contamination.

The depth of water in the stream varied from 15 cm in spring to 1 cm in July. Flows were measured about 3 cm from the gravel.

When a sample was collected the bed materials were thoroughly, but not violently, stirred with a strong trowel until the benthos, large plant material, detritus, sand and silt were conveyed into the nets. This usually took about 10 minutes. The contents of the nets were transferred to wide-necked polyethylene jars and preserved in 5% formalin. In the laboratory, samples with large plant debris (the remains of leaves or hay) were washed carefully on a coarse sieve (mesh 5.6 mm) so that the invertebrates were separated from the debris. This took 2-4 hours. The filtrate was poured, with a circular motion, into a pail of water, the entire floor of which was occupied by 54 upright polystyrene tubes (8 cm  $\times$  2.8 cm). Samples from natural gravel, standard gravel and treated gravels containing grain had no bulky matter and were sedimented without preliminary washing.

The contents of a few tubes were used to estimate the numbers and weights of the invertebrates. Assuming random distribution of the animals, the accuracy of a count is determined by the number of animals counted, and tubes can be examined until the necessary number of animals is reached for a desired degree of accuracy (see Mundie 1971). The estimation of weights, however, is less simple, because in the total material sedimented there can be a

small number of exceptionally large specimens. If one of these is present among the tubes selected, the mean weight is greatly affected; prohibitively large numbers of tubes would have to be examined to allow for this. As a practical choice five tubes were usually taken for analysis of both numbers and weights. The objective was to see whether major differences occurred between treatments and controls, or whether at least a pattern could be seen in the results from a set of experiments, even if there were no significant differences between pairs of estimates.

Settling of the material took from 20 minutes to over 1 hour. The water was then siphoned off without disturbance of the contents of the tubes and the tubes were lifted out. The contents were sorted and counted in small petri dishes under a stereo-microscope capable of  $\times 50$  magnification. This took 45 minutes to 3 hours per tube. The standard gravel was the easiest to analyse and the grain the most troublesome, as grains had frequently to be dissected. Extraction of first instars was particularly time consuming.

Tubes containing average amounts of material were selected for analysis on the reasoning that the range of values could be narrowed without the derived mean being affected. The relationship between the animal contents and the height of settled material was examined to test this. It was found that a 3-fold difference in the height of settled materials from natural gravel produced no differences in the numbers and weights of fauna (Fig. 1), i.e. the animals settled independently of the silt and sand. With a sample of gravel enriched by grain, however, the numbers and weights increased with greater amounts of settled material (Fig. 2). The increase was less than proportional, however, partly because most of the fauna (perhaps two-thirds) were not in, or attached to, the grain but were free to settle, and partly because the debris was flocculent. Some error was introduced, therefore, by the selection of tubes with grain of mean height. Thus the means obtained from five tubes with contents of average height were 339.8 animals and 38.3 mg, and those obtained from the 15 tubes representing all heights were 365.4 and 40.4 mg. On the basis of only five tubes, however, this approach may give a more accurate result than the selection of five tubes at random, because approximately mean values are selected.

When the animals were sorted they were accorded a major taxonomic category. Those from one tube of every five were then classified to genus, or species where possible. The animals from each tube were weighed after being dried at 110°C. Drying lasted 3 hours after all visible moisture had been driven off. Longer periods of drying gave no difference to the weights.

## RESULTS

Data from the analysis of 440 tubes are given in the appendix; 78 species were found. In the following, only salient features are stated.

Experiment with hay: A dry hay mixture of rye grass, timothy grass and clover, amounting in volume, when compressed, to 920 ml (the volume of a 32 oz jar) was placed in the stream on May 26 (water temperature 10.7°C, flow 54 cm/sec) and sampled on June 30 (temperature 11.5°C, flow 54 cm/sec).

At the same times a standard gravel was introduced and lifted. The results showed little difference between the numbers and weights of animals in the treated gravel and in the standard gravel (Fig. 3). There were, however, differences in composition. The fauna of the standard gravel had 21 species, of which 67% were Ephemeroptera (mainly Baetis sp.), and 28% were Chironomidae (mainly Polypedilum sp. and Orthoclaadiinae). That of the hay had 27 species of which 61% were Chironomidae (mainly Polypedilum sp. and Brillia sp.) and 34% were Ephemeroptera (again mainly Baetis sp.). The treatment of the hay sample gave an example of the rare exceptionally large animal; a tipulid larva occurring in one tube weighed 8 mg. This was not included in the weights in Fig. 3.

Experiment with willow and alder: Local fresh-picked willow leaves (Salix sitchensis, sitka willow), amounting to about 920 ml when compressed, were placed in the stream on June 2 (temperature 11.7°C, flow 54 cm/sec) and sampled on July 7 (temperature 12.0°C, flow 50 cm/sec). At the same times an equal quantity of fresh alder leaves (Alnus rubra, red alder) was introduced and lifted, along with a standard gravel. The results showed a 1.7 fold difference in numbers and a 1.9 fold difference in weights of the benthos in willow over the standard gravel (Fig. 4). The control had 28 species of which 56% were Ephemeroptera (mainly Baetis sp.) and 37% were Chironomidae (mainly Orthoclaadiinae and Polypedilum sp.). Plecoptera (chiefly Nemoura sp.) made up 2% and Trichoptera (Hydropsyche sp. and Glossosoma sp.) 1%. In the willow litter were 31 species of which 62% were Chironomidae (18 spp.), 23% Ephemeroptera (mainly Baetis sp.) and 10% Plecoptera (Alloperla sp., Nemoura sp. and Leuctra sp.). Only two specimens of Trichoptera (Glossosoma sp. and a species of Lepidostomatidae) occurred. The insect association in the willow was therefore substantially different from that in the control.

The numerical result with alder was similar; difference of 1.9 times occurred. The leaves when lifted were found to be frequently folded and many larvae and nymphs could be seen between the folds. The insect biomass was substantial, being 3.8 times the weight in the standard gravel (Fig. 4). Again there was a shift in the proportion of chironomid larvae. These made up 63% (mainly Polypedilum spp., Brillia sp. and Micropsectra sp.); Ephemeroptera made up 15% (mainly Baetis sp.). Plecoptera amounted to 3% and Trichoptera (Hydropsyche sp., Rhyacophila sp. and spp. of Lepidostomatidae and Polycentropinae) almost 1%.

Experiments with grain: The first experiments with wheat grain were made in August 1971 and further trials were made the following year. In this account the sequence is by month, starting in the spring, irrespective of year. The grain was placed in boiling water for a minute or two before being taken into the field; otherwise it germinated in the gravel.

(1) Two lots of grain (230 ml and 460 ml) were introduced to the stream, along with a standard gravel on April 19 when the water temperature was 5.3°C and the flow was 102 cm/sec. They were lifted on May 3 when the temperature was 7.5°C and the flow was 87 cm/sec. At this time the natural gravel fauna, having overwintered, was low in numbers (Fig. 5); 19 species were present. Ephemeroptera made up 25% (chiefly Cinygmula sp.) and Chironomidae 22% (mainly Pentaneura sp., Polypedilum sp. and Corynoneura spp.). Elmid Coleoptera (Zaitzevia sp.) amounted to 14%. Plecoptera were rare (<1%). The assessment of mean weight was influenced by an exceptionally large limnephilid caddis larva (Fig. 5).



The fauna of the standard gravel (assessed from 10 tubes) had perhaps a similar weight, in view of the above. It contained 17 species. Ephemeroptera made up 47% (mainly Baetis parvus Dodds, large Cinygmula sp., large Ephemerella inermis Eaton and small Ephemerella tibialis McDunnough). Chironomids (37%) consisted chiefly of Corynoneura spp. and Thienemanniella sp. Elmids were rare (<1%) and Plecoptera absent.

In the gravels to which grain had been added, the invertebrates were similar in weight to those of the standard gravel, but the numbers were higher in the 230 ml wheat. This gave 19 species of which 52% were chironomid larvae (mainly Corynoneura spp., Pentaneura spp. and Polypedilum sp.), and 39% Ephemeroptera (chiefly Baetis parvus and Cinygmula sp.). Plecoptera made up 4%. Elmids were rare. The gravel with twice as much wheat yielded 14 spp. Chironomids and mayflies made up 53 and 34% respectively. The commonest midges were Corynoneura spp.

By the end of the 2 week period, therefore, the grain, which was still intact and hard, had a fauna which differed mainly qualitatively from that of the standard gravel.

(2) Grain was introduced to the stream for the period April 19 to May 17. When the samples were lifted the water temperature was 10.5°C and the flow 69 cm/sec. The natural gravel gave 29 species. Chironomidae made up 36% (mainly Micropsectra sp., Polypedilum sp. and Orthocladinae). Elmidae (Zaitzevia sp., Narpus sp.) made up 21%, Ephemeroptera 15% (chiefly large Cinygmula sp., Ephemerella tibialis and Baetis parvus). Plecoptera amounted to 13% (mainly Nemoura sp.).

The standard gravel yielded less than half the number of animals, but the same biomass (Fig. 6), i.e. there were more large invertebrates. Only 14 species occurred and Ephemeroptera made up 55% (Baetis parvus, large Paraleptophlebia sp., large Cinygmula sp., large Baetis sp.). Chironomid larvae made up 22%, of which Polypedilum spp. were the commonest. Plecoptera amounted to 8% and elmids to 5%. The most conspicuous differences from the natural gravel were, therefore, the change in proportions of mayflies and midges, and the reduction in numbers of beetle larvae.

The wheat samples again influenced the proportions of the commonest groups. The gravel with 230 ml of grain gave 17 species of which 43% were Ephemeroptera (B. parvus, Cinygmula sp., E. inermis) and 41% were chironomids (mainly Polypedilum spp.). Plecoptera constituted 9% and elmids were absent. The gravel with 460 ml of grain yielded 25 species of which 52% were Ephemeroptera (mainly B. parvus, Paraleptophlebia sp. and Cinygmula sp.); 37% were Chironomidae (mainly Polypedilum spp. and Corynoneura sp.) and 5% were Plecoptera (Nemoura sp.). Elmids amounted to less than 1%. This sample, gave 3 times the numbers and 3.6 times the weight of animals of the standard gravel (Fig. 6).

The wheat lifted on May 17 had intact grains, but they were soft and tufted with fungal growths.

(3) A grain experiment covered the period May 17 to June 13. When the materials were lifted the temperature was 13.0°C and the flow 54 cm/sec. The results (Fig. 7) followed the pattern of trial (2). By mid-June the natural riffles supported twice the mid-May numbers of insects as a result of the summer generations appearing. The individuals were too small, however, to influence biomass. The composition was 45% Chironomidae (mainly Corynoneura sp.), 28% Ephemeroptera (chiefly Baetis sp. and Paraleptophlebia sp.) and 8% Plecoptera. Thirty-one species were present.

In the standard gravel 25 species were found. Numbers were less, but weights were similar, i.e. the habitat favoured larger organisms. The composition was 53% chironomids (mainly Corynoneura sp. and Micropsectra sp.), 39% Ephemeroptera (small Baetis sp. and large Baetis parvus), 3% Plecoptera.

The gravels with wheat yielded qualitatively similar faunas. The material from 230 ml wheat gave 28 species; 69% were chironomid larvae (mainly Corynoneura spp. and Brillia sp.), 22% Ephemeroptera (mainly Baetis sp.) and 4% Plecoptera (mainly Nemoura sp.). The 460 ml sample had 32 species; 65% were Chironomidae (mainly Brillia sp. and Corynoneura spp.), 27% Ephemeroptera (mainly Baetis sp. and Baetis parvus) and 5% Plecoptera (mainly Nemoura sp.). This sample yielded twice the numbers and 2.6 times the weight of the 230 ml sample, and 3.5 times the numbers and 5.2 times the weight of animals of the standard gravel.

(4) The influence of grain placed in the stream on May 5 was maintained for 2 months. Samples lifted on July 11 (temperature 13.4°C, flow 48 cm/sec) gave a pattern of results similar to the June ones, but the numbers in the natural gravel were higher (Fig. 8). The standard gravel may have given an erroneously low result because the water level was low when the animals were collected. The natural gravel gave 32 species comprising 49% Ephemeroptera (mainly Paraleptophlebia sp.), 29% Chironomidae (mainly Micropsectra sp. and Polypedilum spp.), and 7% Plecoptera (mainly Nemoura sp.). The standard gravel (21 species) gave 56% Ephemeroptera (mainly Baetis sp.), 34% Chironomidae (mainly Polypedilum spp.) and 5% Plecoptera (Nemoura sp.). The gravel with 230 ml of wheat (18 species) gave 44% Ephemeroptera (mainly Baetis parvus, and Baetis sp.), 42% Chironomidae (mainly Polypedilum spp.) and 8% Plecoptera (mainly Nemoura sp.). The 460 ml wheat (24 species) gave the highest proportion of midges: 69% Chironomidae. These were made up mainly of early instar Chironomini, Polypedilum sp. and Corynoneura sp. Ephemeroptera comprised 22% (mainly Baetis parvus) and Plecoptera 5%. These animals weighed 5.1 times the weight of the fauna of the standard gravel.

(5) The wheat introduced on May 17 was left in the stream for 3 months (Fig. 9). When it was lifted on August 2 the temperature was 16.8°C and flows were 44 cm/sec. Water level was low and the sample from the standard gravel was therefore suspect again. The natural gravel gave 44% Ephemeroptera (mainly Heptageniinae as small instars, and Paraleptophlebia sp.), 34% Chironomidae (mainly Micropsectra sp. Polypedilum sp. and Orthoclaidiinae), 5% Plecoptera (mainly Alloperla sp.) and 5% Trichoptera (mainly Hydropsyche sp.); 35 species occurred. The weights showed a wide range partly attributable to large hydropsychids.

The standard gravel gave 57% Chironomidae (half of which were Polypedilum sp.), 26% Ephemeroptera (mainly Baetis parvus, Cinygmula sp., and Iron sp.), 9% Trichoptera (mainly small Hydropsyche sp.); 18 species occurred.

The 230 ml wheat material gave 40% Chironomidae (mainly first and second instars of Polypedilum sp., and Micropsectra sp.), 30% Ephemeroptera (mainly Paraleptophlebia sp.), 6% Plecoptera and 5% Trichoptera; 25 species occurred. The exceptionally high weight of animals in one tube was owing to hydropsyichids and B. parvus nymphs.

The 460 ml wheat gave 56% Chironomidae (mainly small Polypedilum sp. and Corynoneura sp.), 29% Ephemeroptera (mainly large Cinygmula sp., Baetis sp., Paraleptophlebia sp. and Cinygma sp.), 8% Trichoptera (Hydropsyche sp.); 33 species were present. The 2-fold difference in numbers between the two amounts of grain was the most distinctive result of this trial.

(6) The most marked response of benthos to grain took place in August. A 460 ml wheat sample, and a 920 ml sample were placed in the stream, along with a standard gravel, on July 14 (1971). Water temperature was then 13.8°C. The samples were lifted on August 18 (1971), when the temperature was 15.5°C; in the intervening period temperatures reached 17.6°C. Flow was 45 cm/sec. No sample was taken of natural gravel on this occasion. The results (Fig. 10) gave a standard gravel with 64% Chironomidae (mainly Orthocladinae and small instars of Polypedilum sp.), 31% Ephemeroptera (mainly Ephemerella inermis, Baetis parvus and Cinygmula sp.) and 1% Trichoptera (Hydropsyche sp.); 23 species occurred.

The sample with 460 ml of grain gave 67% Chironomidae (mainly Polypedilum sp. and early instar Chironomini), 28% Ephemeroptera (mainly Baetis parvus, Cinygmula sp. and Ephemerella inermis), 1% Plecoptera; 35 species occurred. This sample had 1.8 times the numbers and 16 times the weight of the fauna in the standard gravel.

The gravel with 920 ml of wheat gave 69% Chironomidae (mainly large specimens of Polypedilum spp., early instar Chironomini, and Pentaneura sp.), 23% Ephemeroptera (mainly Paraleptophlebia sp. and Baetis parvus), 1% Plecoptera and 1% Trichoptera; 34 species were present. This fauna was not denser than that of the 460 ml wheat but had 1.4 times the weight. It had 23 times the weight of the animals in the standard gravel.

(7) Grain was left in the stream, in 1972, from August 2, when the temperature was 16.8°C and the flow was 44 cm/sec, until August 31, when the temperature was 13.3°C and the flow 47 cm/sec. The pattern of results (Fig. 11) was similar to that of the previous year. A natural gravel sample was taken. It gave 36% Chironomidae (mainly Polypedilum spp., Micropsectra sp. and Corynoneura sp.), 36% Ephemeroptera (mainly Cinygmula sp., Paraleptophlebia sp. and Baetis sp.) and 7% Trichoptera (Hydropsyche sp.); 30 species occurred. The contents of one tube are illustrated in Fig. 12a. The standard gravel gave 54% Chironomidae (mainly first and second instar Chironomini and Polypedilum sp.), 37% Ephemeroptera (mainly Baetis parvus and Paraleptophlebia sp.), and 10% Trichoptera (Hydropsyche sp.); 23 species occurred.

The 230 ml wheat gave 53% Chironomidae (mainly Polypedilum sp., Corynoneura spp. and Pentaneura sp.), 31% Ephemeroptera (mainly Paraleptophlebia sp., Baetis parvus, and Baetis sp.), 8% Trichoptera (mainly Hydropsyche sp.); 33 species occurred. The contents of 1 tube are shown in Fig. 12b.

The 460 ml wheat gave similar numbers, kinds, and proportions of invertebrates as the 230 ml sample, but 1.6 times the weight. This sample, therefore, gave a fauna 6 times the weight of the animals in the natural gravel.

(8) Grain was introduced to the stream on August 31 (temperature 13.3°C, flow 57 cm/sec) and lifted on September 26 (temperature 8.7°C, flow 66 cm/sec). The natural gravel gave 42% Ephemeroptera (mainly Cinygmula sp.), 31% Chironomidae (mainly Polypedilum sp. and Orthocladinae), 8% Trichoptera (Hydropsyche sp.); 29 species were present. The standard gravel was similar, but with a higher proportion of Baetis parvus, and with relatively fewer Orthocladinae; it gave 22 species.

The 230 ml grain gave 53% Ephemeroptera (mainly Paraleptophlebia sp., Baetis parvus and Cinygmula sp.), 40% Chironomidae (mainly Polypedilum sp. and Corynoneura sp.), 8% Trichoptera (mainly Hydropsyche sp.); 26 species occurred. The 460 ml grain gave 51% Chironomidae (again mainly Polypedilum sp. and Corynoneura sp.), 40% Ephemeroptera, as in the 230 ml sample, and 3% Trichoptera; 27 species were present. This sample gave 2.4 times the numbers and 4.5 times the weight of the fauna in the standard gravel (Fig. 13).

(9) Grain placed in the stream on August 2 (temperature 16.8°C, flow 44 cm/sec) was lifted on September 26 (temperature 8.7°C, flow 66 cm/sec). Its influence was still apparent (Fig. 14). The natural gravel sample was the same as that described in (8). The standard gravel gave 61% Chironomidae (mainly Polypedilum spp., Pentaneura spp. and Corynoneura spp.), 30% Ephemeroptera (mainly Baetis parvus, Cinygmula sp. and Paraleptophlebia sp.), and 3% Trichoptera; 23 species occurred. The 230 ml wheat gave 48% Chironomidae (mainly small Chironomini, Corynoneura spp. and Pentaneura sp.), 38% Ephemeroptera (mainly Paraleptophlebia sp.) and 7% Trichoptera; 25 species occurred. The 460 ml wheat gave 53% Chironomidae of similar composition to the 230 ml sample, 34% Ephemeroptera with Baetis parvus and Paraleptophlebia sp. almost equally abundant, 4% Trichoptera and 3% Plecoptera; 28 species occurred. This sample gave 1.2 times the numbers and 5.3 times the weight of the animals in the standard gravel.

#### DISCUSSION

The field method requires improvement; errors can be introduced by fluctuations in water level and velocity. Collection of the animals and debris is difficult when there is little flow to carry the material into the nets. Of the data obtained only those from the standard gravels seemed suspect, because of local topography, on this account. Sampling animals in known quantities of plant material might be easier if the cylinder method of Coleman and Hynes (1970) were used. To eliminate errors caused by fluctuations in discharge, however, it would be necessary to place the gravel and plant material in troughs with adjustable sills at the inlets. The nets could be applied to the downstream end of the trough.

The numbers and weights of invertebrates/sq m of stream are obtained by multiplying the mean value of the contents of the tubes by 420, a figure derived from the area of the floor of the bucket and of the substrate covered by the sampling apparatus.

The need for replication of trials, in addition to repeated sampling over several months, to give measures of variance, is apparent. For this reason little can be inferred from comparison of natural and standard gravels, except that in six trials out of eight the standard gravel gave a fauna as heavy, or heavier, but with lower numbers, than the natural gravel, i.e. it tended to select larger animals. Coleoptera were almost eliminated from standard gravel, perhaps because of the absence of sand.

It was assumed that the periods of colonization were sufficient to allow complete occupation of the gravel. In support of this there is evidence (Ulfstrand 1968, p. 100) that this is reached in about 8 days.

The main interest in the leaf litter findings are the high weights of fauna associated with litter. Both kinds attracted animals, and the destruction of alder -- the dominant deciduous tree along the stream margins in southern Vancouver Island -- is therefore likely to be detrimental to the stream food web. The trials with leaves, and hay, were insufficient to convey information on the time, following immersion, when these materials would attract most animals. Greater densities might have been found had they been left longer. Leaves of different species decay at different rates (Kaushik and Hynes 1971) and complete disintegration may take months rather than weeks. If the fall of leaves in the autumn is the basis for much of the total annual production in a stream, a very slow rate of decay may be involved. Clearly, much more research is required on the contribution of litter, the rates of breakdown, and the relative merits of deciduous and evergreen trees along streams. The influence, moreover, of the leachable portion has to be taken into account.

In 12 trials out of 18 the presence of grain was associated with an increase in weight of fauna over the weight in the standard gravels. Two of the occasions when there was no response can be attributed to the short duration of the experiment (2 weeks) and to low temperatures (5-7°C in April and May); two can perhaps be attributed to a long (3 monthly) exposure (grain experiment 5); and two were associated with the smaller (230 ml) additions of grain (grain experiments 4 and 8).

It is not possible to say to what extent a community developed in the litter and the grain. Presumably most insects were benefiting from the micro-organisms in the plants, but some predator/prey relationships would exist and the species would not be living independently of each other. Reference to only the common species does not bring out the differences among populations in different trials. (For further details see the Appendix.)

The occurrence of different species, their numbers and their sizes, in the experiments, require detailed comparison with those in the natural stream; and it would be of interest to know whether enrichment influences growth and patterns of emergence. This seems likely as life-cycle phenomena are not solely temperature-dependent (Hynes 1970).

Higher densities would be expected if trials were made in streams of harder water. The creek has a content of about 25 ppm of total dissolved substances. It is known that an increase in weight of benthos occurs, relative to the weight of plant detritus, with increase in calcium content of the water; and it is concluded that water quality exerts its effect on benthos by influencing rates of decomposition of detritus (Egglishaw 1968).

The response of Chironomini to grain is interpreted as the selection and promotion of species which consume bacteria and which are tolerant of low oxygen values. Presumably if the genus Chironomus had been present in the stream it would have taken the place of Polypedilum. Chironomus grows readily in water to which milk has been added (Branch 1923) and it has been raised on a semi-industrial scale on yeast (Konstantinov 1952). Optimum conditions in the grain would depend on the balance of plant material and oxygenation of the medium. The dense mycelium which develops impedes exchange rates. There is likely to be a succession of fungi, accompanied by other micro-organisms, as the resources of the medium become progressively depleted. This will take place in some way akin to the stages seen in the breakdown of soil or woodland leaf litter (see Garrett 1963).

The dense development of Chironomini opens up the possibility of the field-culture of fish-food organisms. Natural high-gradient streams have two features which offer high potential for this: (1) Constant aeration of the water by atmospheric oxygen implies that if heterotrophic production is increased by additions of organic material the conversion processes are likely to remain aerobic. This will give an energy yield about 5 times that of fermentation (Brock 1966). (2) The constant flow of water in one mean direction provides a transport mechanism for delivering invertebrates to fish. About 3 dozen species of invertebrates were found in the grain during different months; all were items acceptable to salmon fry. This variety, the fact that all instars responded, the densities and weights attained, and the slow rate of decay of grain, suggest that low-quality grain and other common plant products might be used in controlled-flow sections of streams for culturing invertebrates. Further research is required to establish whether these could best be conveyed to fish by collecting the nocturnally drifting portions of the population on screens and offering them to the fish in the day-time, or by dislodging the benthos with water forced upwards through the gravel. The permissible rate of cropping would depend on the rate of recolonization from upstream.

#### ACKNOWLEDGMENTS

Mr. R. A. Bams, Dr. T. P. Evelyn, and Dr. C. D. McAllister made valuable criticisms of the manuscript.

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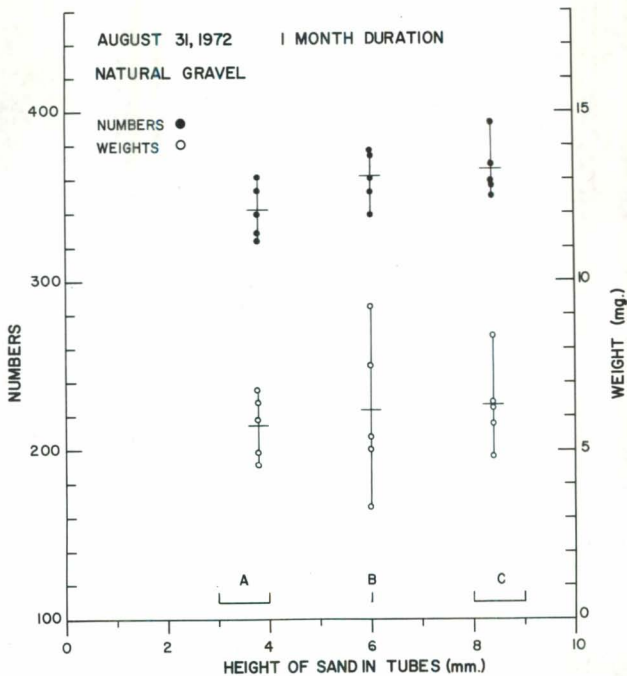
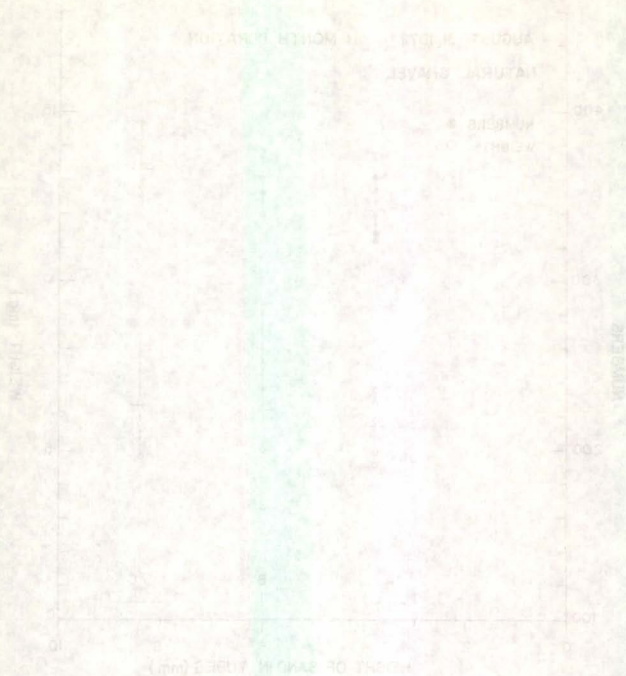


Fig. 1. Numbers and weights of invertebrates in 3 sets of 5 tubes containing different amounts of settled material from a natural gravel sample. A, B and C indicate the range in heights of the material. The values are plotted on the mean of these ranges. Horizontal lines are the means of 5 values.





The graph shows that the weight of the sand is directly proportional to the height of the sand in the tube. This relationship is linear and holds true for both natural and artificial sand. The slope of the line is 1, indicating that the weight of the sand is equal to the height of the sand in the tube.

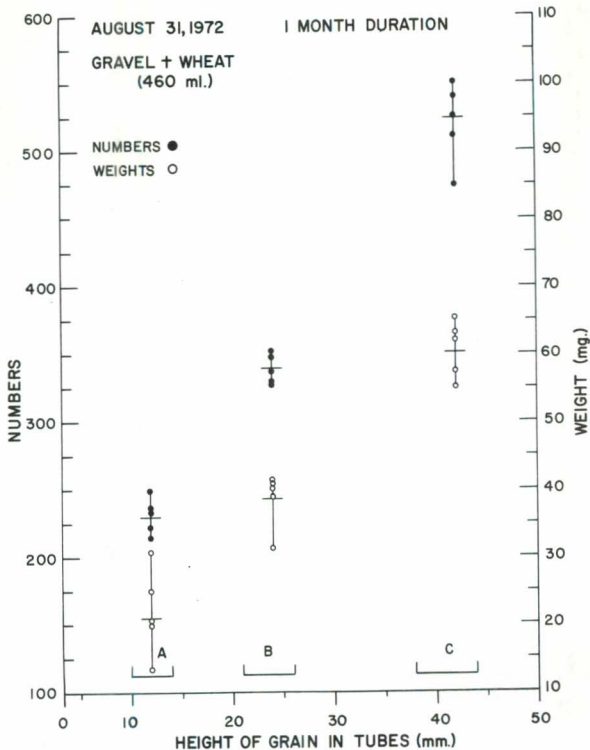
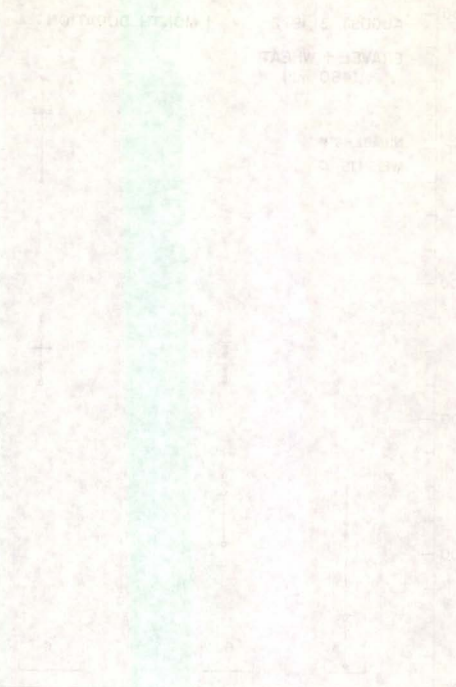


Fig. 2. Numbers and weights of invertebrates in 3 sets of 5 tubes containing different amounts of settled material from a sample of gravel enriched with grain. A, B and C indicate the range in heights of the material.

100  
200  
300  
400  
500  
600  
700  
800  
900  
1000



100  
200  
300  
400  
500  
600  
700  
800  
900  
1000

PERCENTAGE

DEPTH OF GRAV. TUBE

1000

0

1000

0

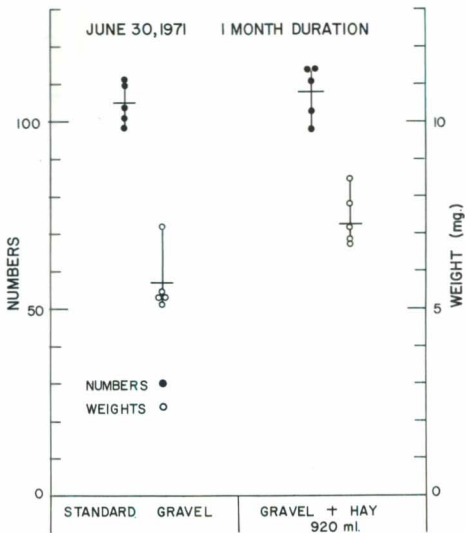


Fig. 3. Numbers and weights of invertebrates in tubes containing material from standard gravel and gravel enriched with hay.

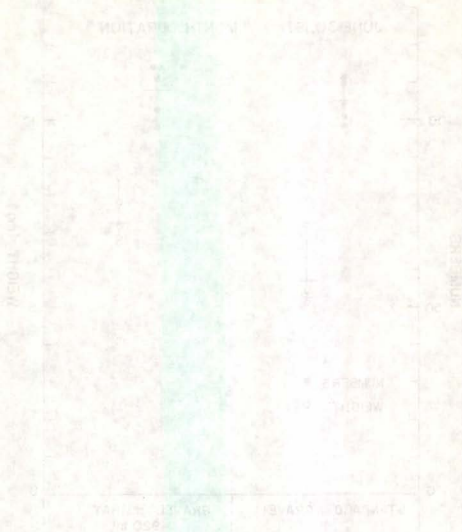


Figure 1. Relationship between Mutual Information and Relationship. The graph shows that Mutual Information and Relationship are highly correlated, with a strong positive relationship.

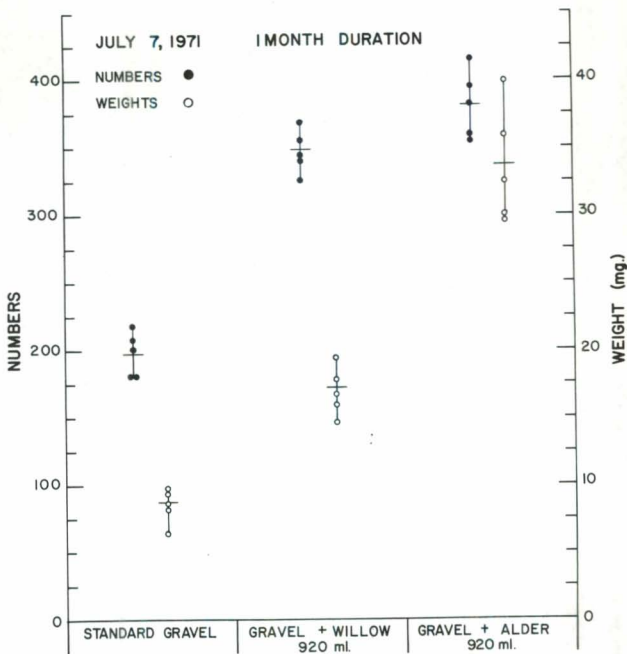
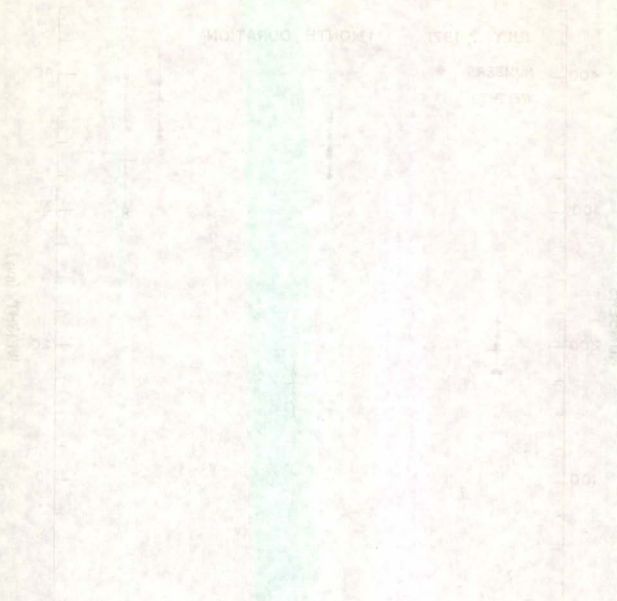


Fig. 4. Numbers and weights of invertebrates in tubes containing material from standard gravel, gravel enriched with willow leaves, and gravel enriched with alder leaves.



STANDARD DEVIATION - WILCOX (1957) (1957)

... ..

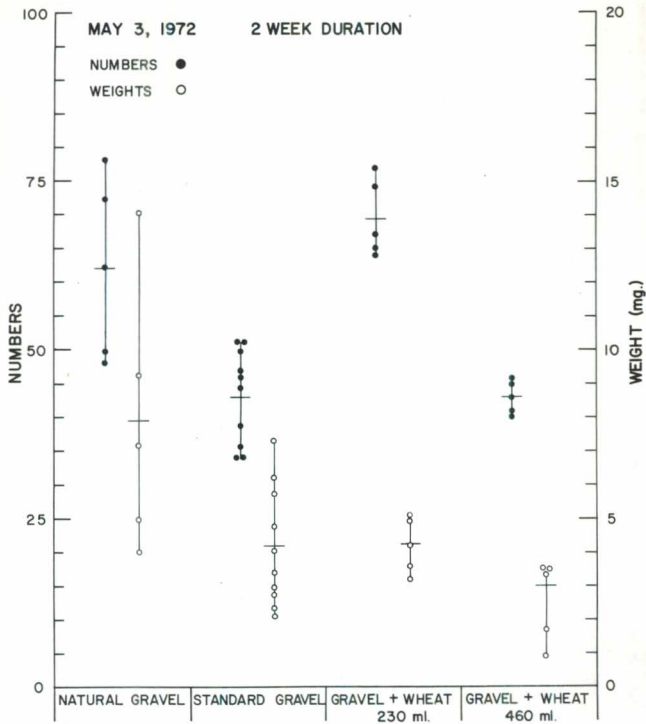


Fig. 5. Numbers and weights of invertebrates in tubes containing material from natural and standard gravel, and gravel enriched with wheat grain left in the stream for 2 weeks during April and May.



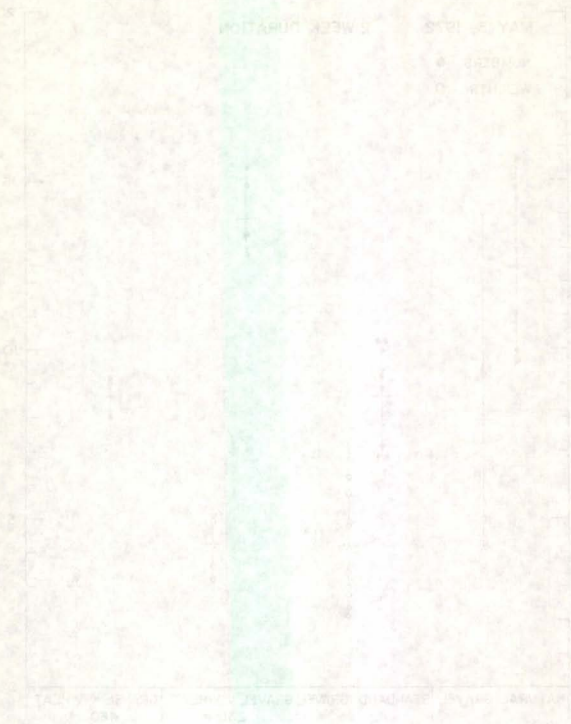
5 WEEK DURATION

NOV 20 1955

WIND DIRECTION  
WIND SPEED

WIND DIRECTION

WIND SPEED



WIND DIRECTION  
WIND SPEED

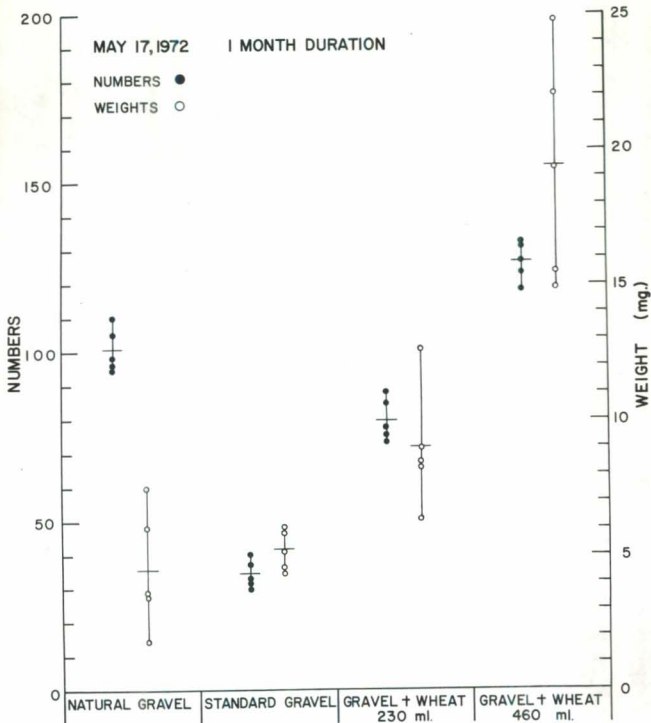


Fig. 6. Numbers and weights of invertebrates in tubes containing material from natural and standard gravel, and gravel enriched with wheat grain left in the stream for one month during April and May.

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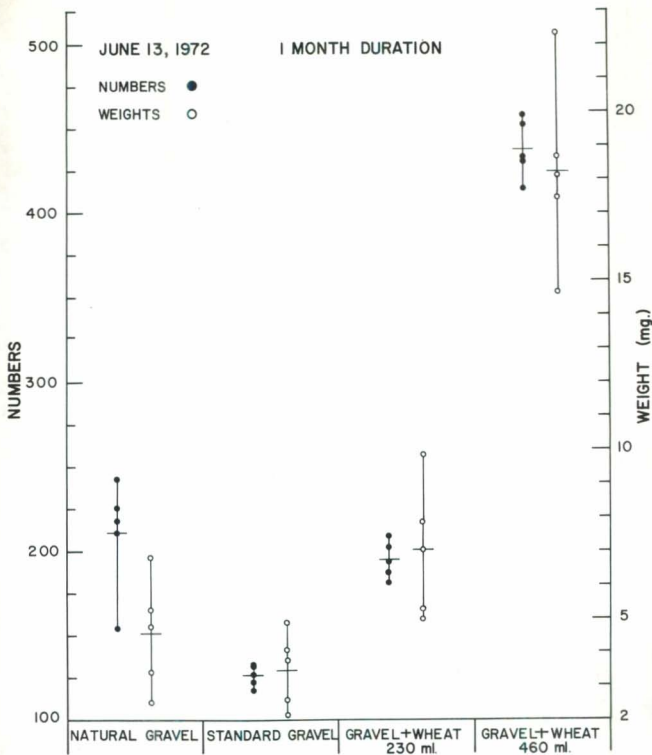


Fig. 7. Numbers and weights of invertebrates in tubes containing material from natural and standard gravel, and gravel enriched with wheat grain left in the stream for one month during May and June.

JUNE 12 1962

100

1000

100

1000

100

100

UNITED STATES GOVERNMENT

DEPARTMENT OF THE INTERIOR

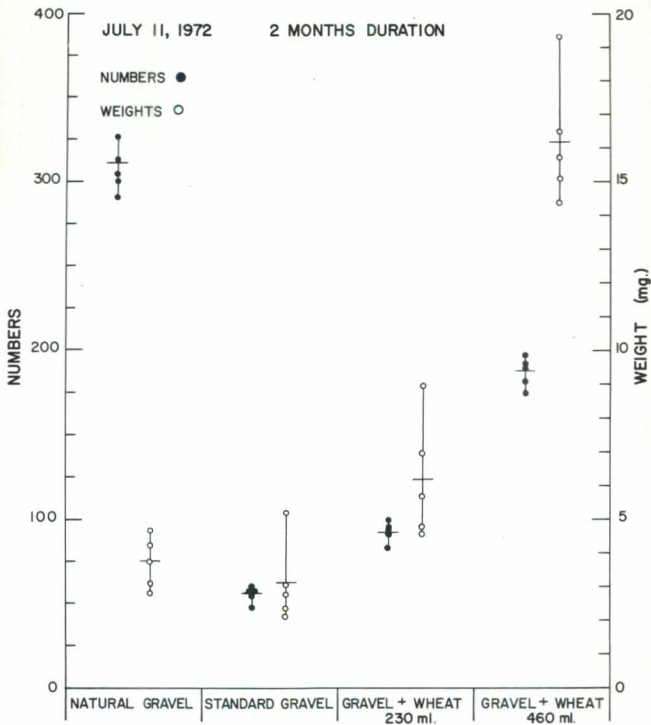
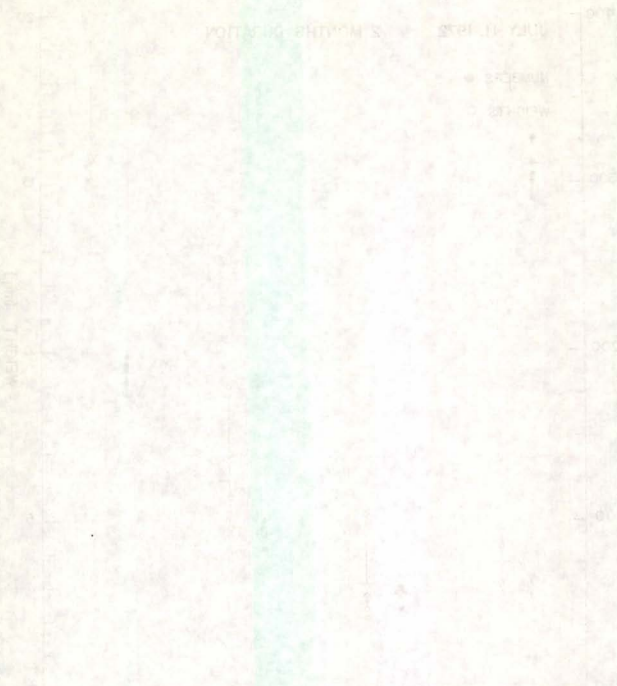


Fig. 8. Numbers and weights of invertebrates in tubes containing material from natural and standard gravel, and gravel enriched with grain left for 2 months from May to July.

WATER QUALITY MONITORING REPORT



WATER QUALITY MONITORING REPORT  
FOR THE YEAR 1985

REPORT NO. WQ-85-01  
DATE OF REPORT: 12/31/85  
PREPARED BY: [Illegible Name]

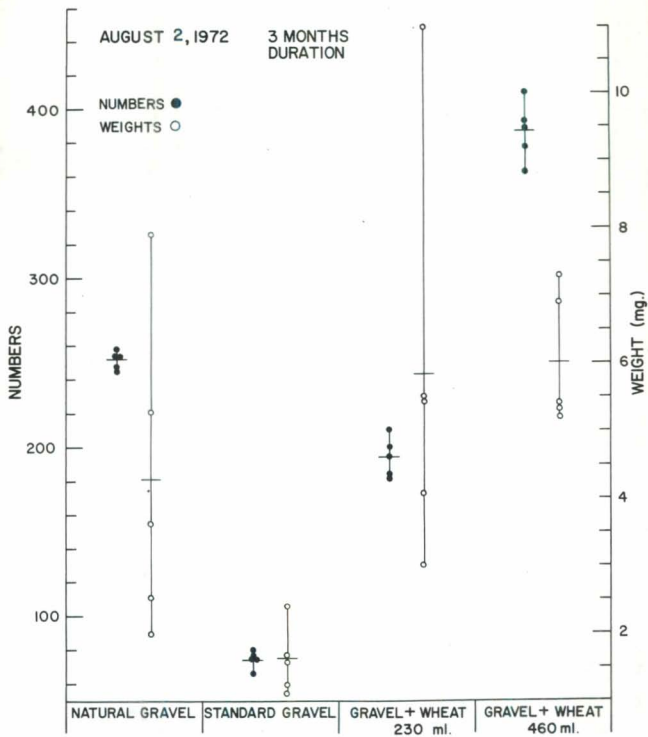


Fig. 9. Numbers and weights of invertebrates in tubes containing material from natural and standard gravel, and gravel enriched with grain left for 3 months from May to August.



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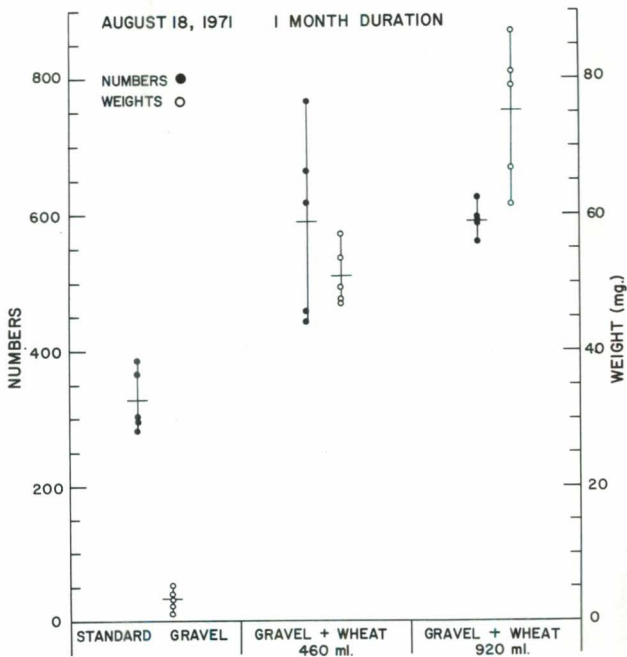


Fig. 10. Numbers and weights of invertebrates in tubes containing material from standard gravel, and gravel enriched with grain left for one month from July to August.

AUGUST 18, 1951 MONTH BURSTION

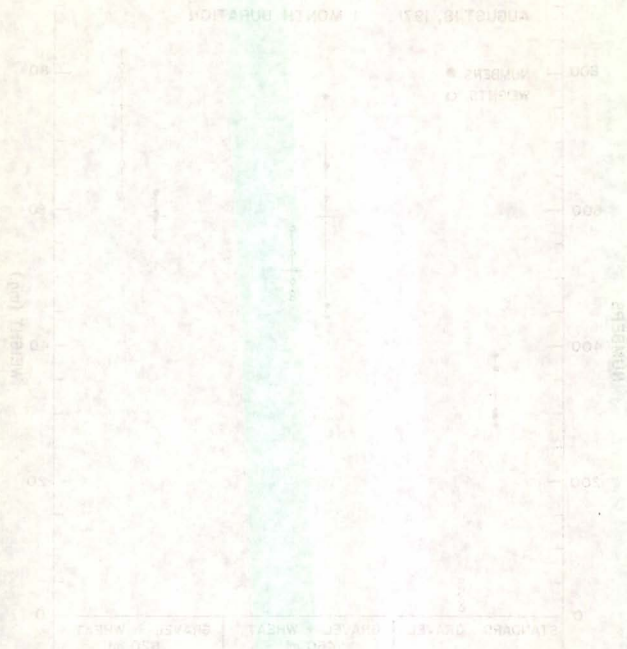


Fig. 1. The weight of wheat and gravel in the samples of the standard gravel and gravel + wheat. The weight of the standard gravel and gravel + wheat is shown in the figure. The weight of the standard gravel and gravel + wheat is shown in the figure. The weight of the standard gravel and gravel + wheat is shown in the figure.

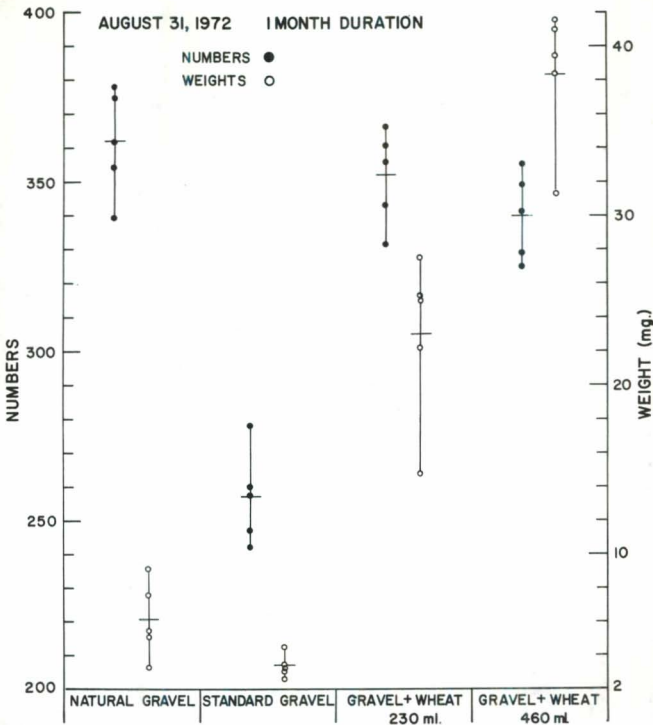
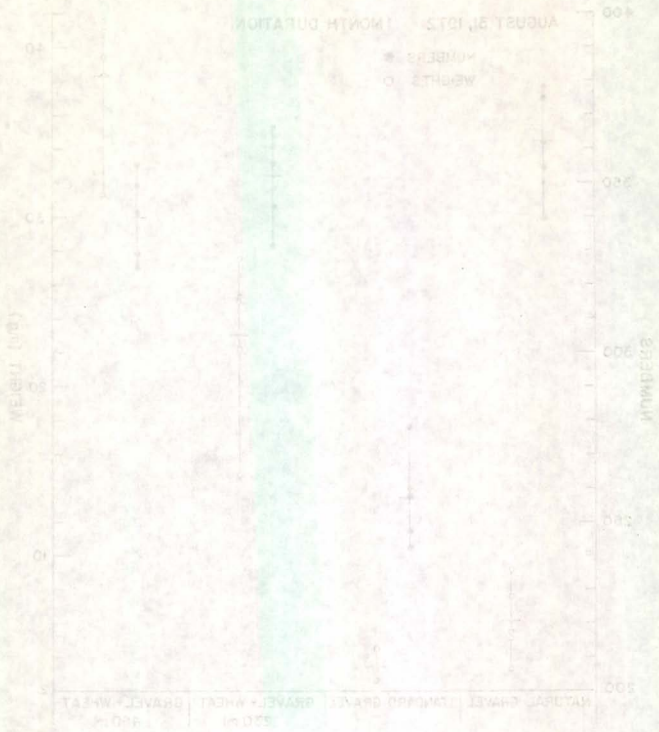
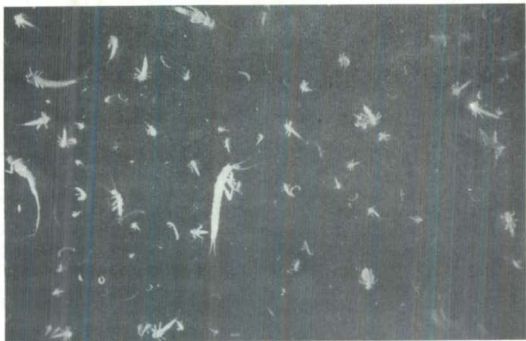


Fig. 11. Numbers and weights of invertebrates in tubes containing material from natural and standard gravel, and gravel enriched with grain left for one month during August.



1. The purpose of this study was to determine the effect of gravel and gravel+wheat treatments on the growth and survival of rainbow trout in a stream. The results show that the gravel+wheat treatment significantly increased the growth and survival of the fish compared to the other treatments.

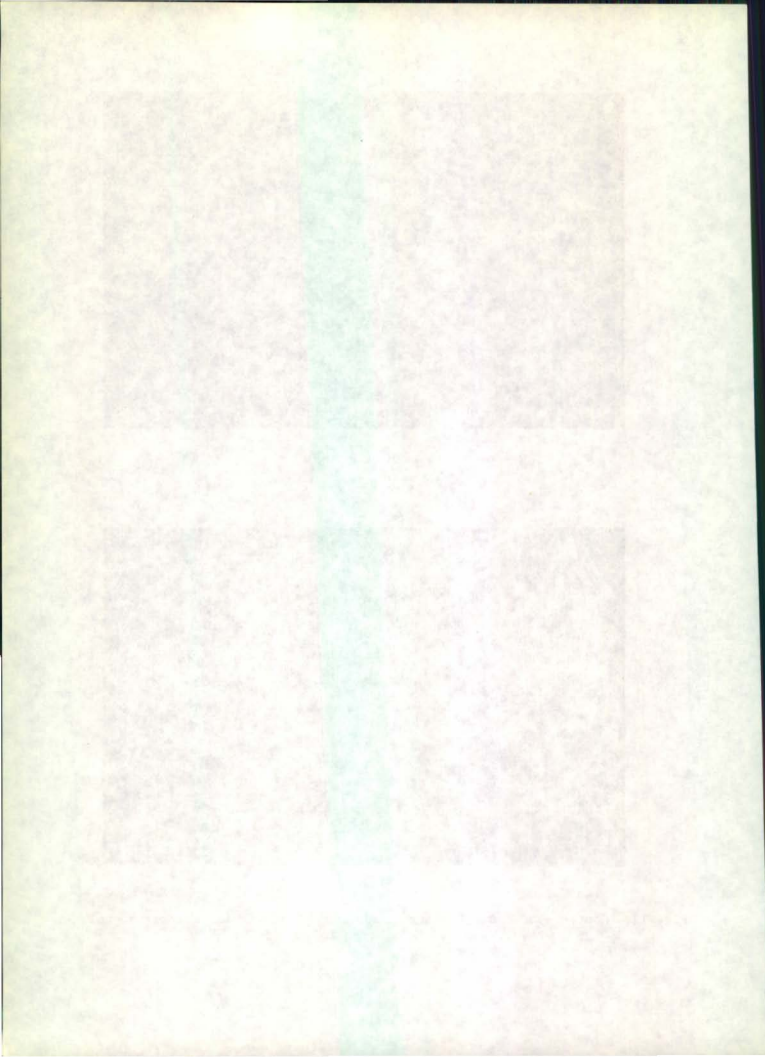


*a*



*b*

Fig. 12. Contents of two tubes from experiment (7); (a) fauna from natural gravel, and (b) fauna from 230 ml grain.



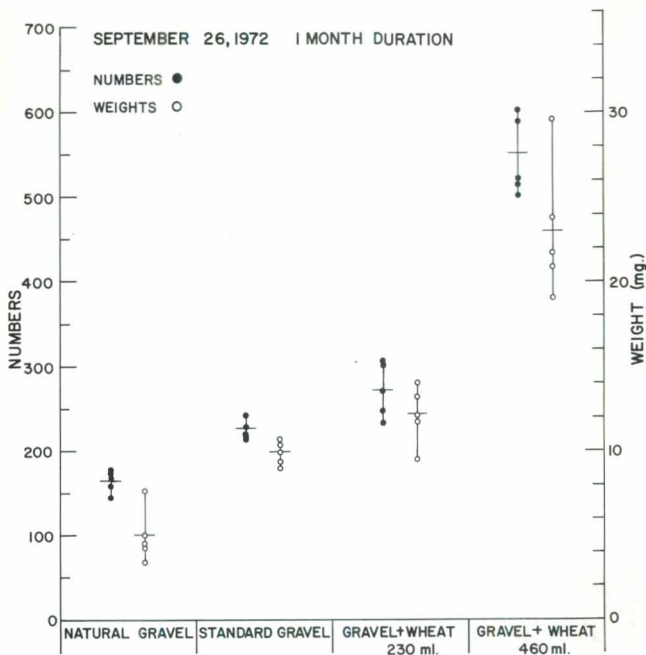
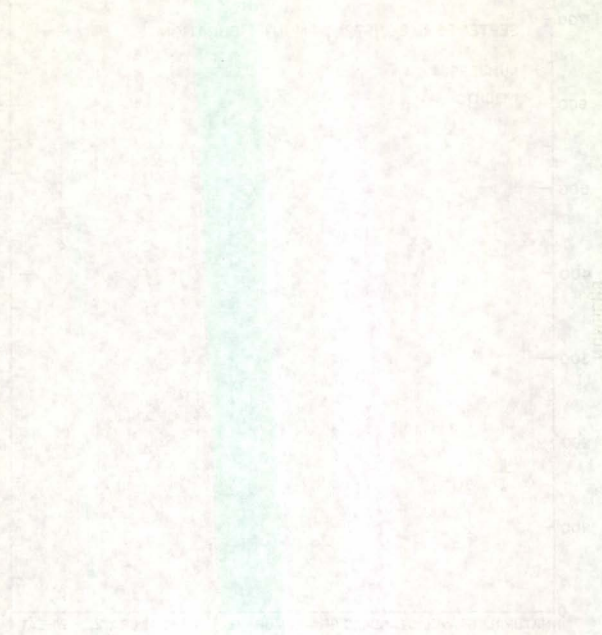


Fig. 13. Numbers and weights of invertebrates in tubes containing material from natural and standard gravel, and gravel enriched with grain left for one month from late August to September.





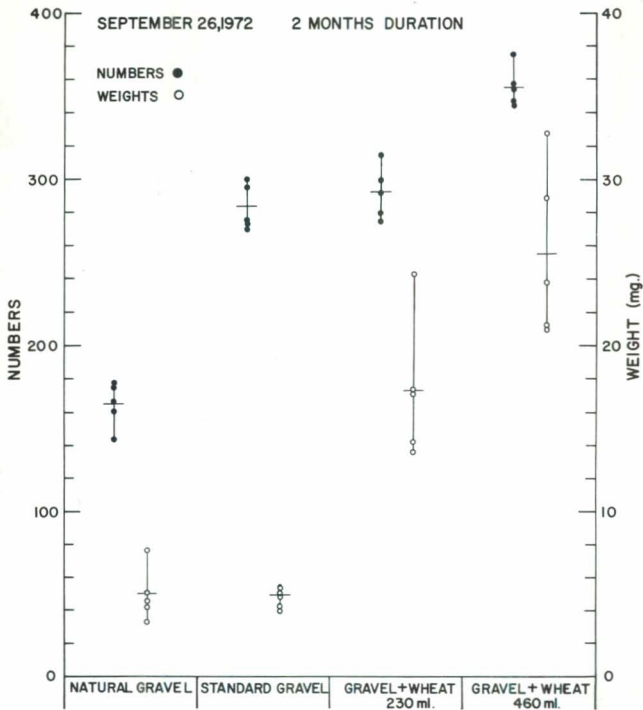


Fig. 14. Numbers and weights of invertebrates in tubes containing material from natural and standard gravel, and gravel enriched with grain left for 2 months, from early August to late September.

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APPENDIX

Data from analysis of substrates

Note: The genus referred to as Polypedilum in the text is numbered Chironomini 1, 1b and 1c in the tables.

Further studies of taxonomy are being undertaken.

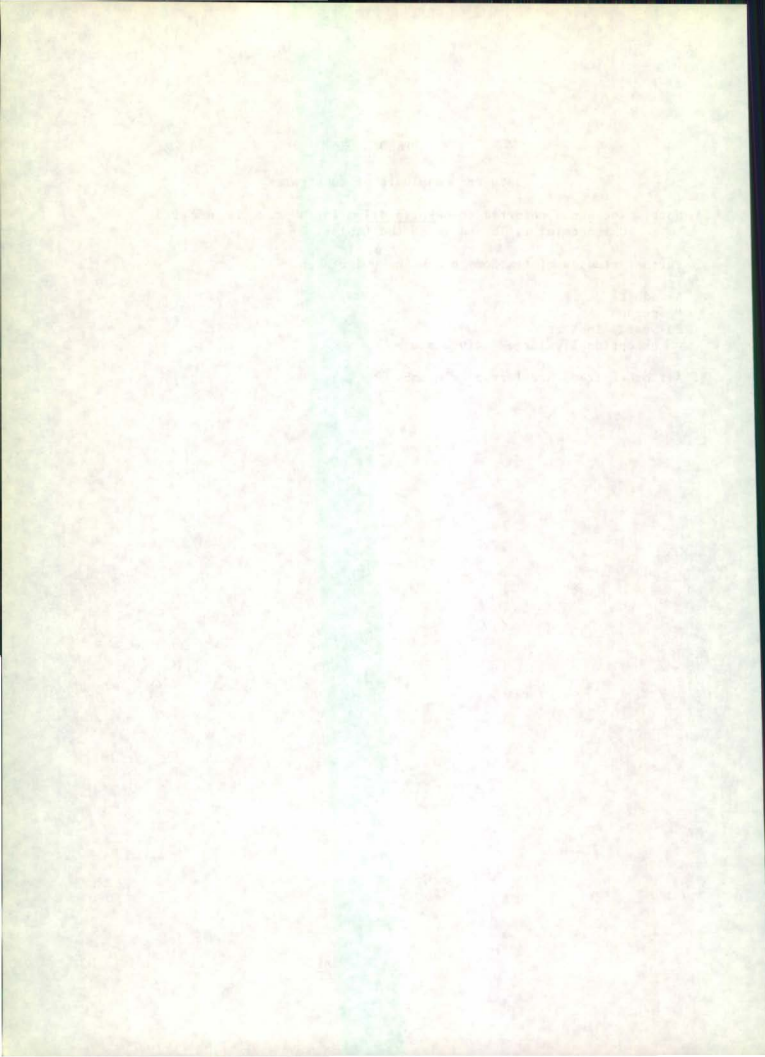
A adults

P pupae

EI early instars

\* exceptionally large individuals

All other items are larvae or nymphs.



Experiment: Natural gravel		Lowest tubes					Medium tubes				
August 31, 1972 1 month duration		Tube 1	Tube 2	Tube 3	Tube 4	Tube 5	Tube 1	Tube 2	Tube 3	Tube 4	Tube 5
COLLEMBOLA		-	-	-	-	-	-	-	-	-	-
EPHEMEROPTERA	nymphs	91	126	119	106	112	130	121	136	144	123
	sub-imago	-	-	-	-	-	-	-	-	-	-
PLECOPTERA	nymphs	6	11	13	6	6	12	14	21	15	13
TRICHOPTERA	larvae	16	21	21	20	27	19	24	30	25	28
	pupae	-	1	-	-	-	-	-	-	-	-
DIPTERA											
Tipulidae	larvae	3	1	3	1	2	2	-	3	6	3
	pupae	-	-	-	-	-	-	-	-	-	-
	adults	-	-	-	-	-	-	-	-	-	-
Chironomidae	larvae	144	122	130	134	148	131	138	128	127	141
	pupae	-	1	3	-	-	-	1	-	1	-
	emerging adult	-	-	-	-	-	-	-	-	-	-
Ceratopogonidae	larvae	-	-	-	-	-	-	-	-	-	-
Simuliidae	larvae	4	3	2	1	3	2	3	2	2	2
	pupae	-	-	-	-	-	-	-	-	-	-
Blepharoceridae	larvae	-	-	-	-	-	-	-	-	-	-
	pupae	-	-	-	-	-	-	-	-	-	-
COLEOPTERA											
Elmidae	larvae	5	6	12	10	7	10	5	10	11	6
	adults	1	1	-	1	2	-	-	-	1	-
OLIGOCHAETA											
Naididae		36	31	30	31	36	24	31	35	32	33
Others		-	-	-	-	-	-	-	-	-	-
ACARI		-	-	-	-	-	-	-	-	-	-
OSTRACODA		19	13	14	10	15	9	11	10	7	10
COPEPODA											
Harpacticoida		3	2	7	4	4	-	6	3	4	3
Numbers		328	339	354	324	362	339	354	378	375	362
Weights (mg)		5.90	4.90	6.45	6.75	4.55	7.55	5.40	5.05	9.25	3.30
Mean numbers		341.4					361.6				
Mean weights (mg)		5.71					6.11				

Experiment: Natural gravel

Highest tubes

August 31, 1972 1 month duration		Tube 1	Tube 2	Tube 3	Tube 4	Tube 5	Tube 1	Tube 2	Tube 3	Tube 4	Tube 5
COLLEMBOLA		-	-	-	-	-					
EPHEMEROPTERA	nymphs	132	131	125	139	135					
	sub-imago	-	-	-	-	-					
PLECOPTERA	nymphs	15	16	11	13	14					
TRICHOPTERA	larvae	36	20	22	8	3					
	pupae	-	-	-	-	-					
DIPTERA											
Tipulidae	larvae	-	4	1	1	-					
	pupae	-	-	-	-	-					
	adults	-	-	-	-	-					
Chironomidae	larvae	109	116	146	141	122					
	pupae	2	1	-	1	-					
	emerging adult	-	-	-	-	-					
Ceratopogonidae	larvae	-	-	-	-	-					
Simuliidae	larvae	2	1	1	2	1					
	pupae	-	-	-	-	-					
Blepharoceridae	larvae	-	-	-	-	-					
	pupae	-	-	-	-	-					
COLEOPTERA											
Elmidae	larvae	15	17	7	9	11					
	adults	1	-	2	1	-					
OLIGOCHAETA											
Naididae		24	31	37	35	32					
	Others	-	-	-	-	-					
ACARI		-	-	-	-	-					
OSTRACODA		14	21	11	14	10					
COPEPODA											
Harpacticoida		-	1	6	8	3					
Numbers		350	359	369	394	357					
Weights (mg)		6.45	5.80	6.25	4.80	8.40					
Mean numbers		365.8									
Mean weights (mg)		6.34									

Experiment: Grain (460 ml)		Lowest tubes					Medium tubes				
August 31, 1972 1 month duration		Tube 1	Tube 2	Tube 3	Tube 4	Tube 5	Tube 1	Tube 2	Tube 3	Tube 4	Tube 5
COLLEMBOLA		-	-	-	-	-	-	-	-	-	-
EPHEMEROPTERA	nymphs	85	78	90	73	68	106	113	102	95	121
	sub-imago	-	-	-	-	-	-	-	-	-	-
PLECOPTERA	nymphs	11	5	13	10	8	10	9	5	14	7
TRICHOPTERA	larvae	14	21	13	22	17	24	26	23	32	36
	pupae	-	-	-	-	-	-	-	-	-	-
DIPTERA											
Tipulidae	larvae	-	1	-	-	-	-	-	-	-	-
	pupae	-	-	-	-	-	-	-	-	-	-
	adults	-	-	-	-	-	-	-	-	-	-
Chironomidae	larvae	133	105	115	126	127	173	184	191	199	180
	pupae	5	2	2	1	3	3	3	5	4	2
	emerging adult	-	-	-	-	-	-	-	-	-	-
Ceratopogonidae	larvae	-	-	-	-	-	-	-	-	-	-
Simuliidae	larvae	-	2	1	-	-	4	2	-	-	2
	pupae	-	-	-	-	-	-	-	-	-	-
Blepharoceridae	larvae	-	-	-	-	-	-	-	-	-	-
	pupae	-	-	-	-	-	-	-	-	-	-
COLEOPTERA											
Elmidae	larvae	3	-	1	3	-	3	3	3	4	6
	adults	-	1	-	1	1	2	1	-	1	1
OLIGOCHAETA											
Naididae		-	-	-	-	-	-	-	-	-	-
Others		-	-	-	-	-	-	-	-	-	-
ACARI		-	-	-	-	-	-	-	-	-	-
OSTRACODA		-	-	-	-	-	-	-	-	-	-
COPEPODA											
Harpacticoida		-	-	-	-	-	-	-	-	-	-
Numbers		251	215	235	236	224	325	341	329	349	355
Weights (mg)		20.10	25.10	20.40	30.90	13.65	31.35	38.40	39.45	41.50	41.05
Mean numbers		232.2					339.8				
Mean weights (mg)		22.03					38.35				



Experiment: Grain (460 ml)

Highest tubes

August 31, 1972 1 month duration		Tube 1	Tube 2	Tube 3	Tube 4	Tube 5	Tube 1	Tube 2	Tube 3	Tube 4	Tube 5	
COLLEMBOLA		-	-	-	-	-						
EPHEMEROPTERA	nymphs	159	145	151	151	136						
	sub-imago	-	-	-	-	1						
PLECOPTERA	nymphs	18	16	28	18	24						
TRICHOPTERA	larvae	36	39	47	50	51						
	pupae	-	-	-	-	-						
DIPTERA												
Tipulidae	larvae	-	-	-	-	-						
	pupae	-	-	-	-	-						
	adults	-	-	-	-	-						
Chironomidae	larvae	318	276	307	281	301						
	pupae	9	7	7	4	5						
	emerging adult	-	-	-	-	-						
Ceratopogonidae	larvae	-	-	-	-	-						
Simuliidae	larvae	-	1	1	-	4						
	pupae	-	-	-	-	-						
Blepharoceridae	larvae	-	-	-	-	-						
	pupae	-	-	-	-	-						
COLEOPTERA												
Elmidae	larvae	-	-	8	7	4						
	adults	2	3	2	2	2						
OLIGOCHAETA												
Naididae		-	-	-	-	-						
Others		-	-	-	-	-						
ACARI		-	-	-	-	-						
OSTRACODA		-	-	-	-	-						
COPEPODA												
Harpacticoida		-	-	-	-	-						
Numbers		542	487	551	513	528						
Weights (mg)		55.05	66.30	63.45	57.50	62.20						
Mean numbers		524.2										
Mean weights (mg)		60.90										

Experiment:		Standard gravel					Gravel + hay				
June 30, 1971 1 month duration		Tube 1	Tube 2	Tube 3	Tube 4	Tube 5	Tube 1	Tube 2	Tube 3	Tube 4	Tube 5
COLLEMBOLA		-	-	-	-	-	-	-	-	-	-
EPHEMEROPTERA	nymphs	60	82	78	71	65	34	35	36	43	38
	sub-imago	-	-	-	-	-	-	-	-	-	-
PLECOPTERA	nymphs	5	2	3	2	5	4	4	2	1	4
TRICHOPTERA	larvae	-	-	-	-	-	1	-	1	1	2
	pupae	-	-	-	-	-	-	-	1	-	-
DIPTERA											
Tipulidae	larvae	-	-	-	-	-	-	-	-	1	-
	pupae	-	-	-	-	-	-	-	-	-	-
	adults	-	-	-	-	-	-	-	-	-	-
Chironomidae	larvae	34	27	29	28	34	63	73	58	65	70
	pupae	-	-	-	-	-	1	1	-	-	-
	emerging adult	-	-	-	-	-	-	-	-	-	-
Ceratopogonidae	larvae	-	-	-	-	-	-	-	-	-	-
Simuliidae	larvae	-	-	-	-	-	-	-	-	-	-
	pupae	-	-	-	-	-	-	-	-	-	-
Blepharoceridae	larvae	-	-	-	-	-	-	-	-	-	-
	pupae	-	-	-	-	-	-	-	-	-	-
COLEOPTERA											
Elmidae	larvae	-	-	-	-	-	-	1	-	-	-
	adults	-	-	-	-	-	-	-	-	-	-
OLIGOCHAETA											
Naididae		-	-	-	-	-	-	-	-	-	-
Others		-	-	-	-	-	-	-	-	-	-
ACARI		-	-	-	-	-	-	-	-	-	-
OSTRACODA		-	-	-	-	-	-	-	-	-	-
COPEPODA		-	-	-	-	-	-	-	-	-	-
Harpacticoida		-	-	-	-	-	-	-	-	-	-
Numbers		99	111	110	101	104	103	114	98	111	114
Weights (mg)		5.45	5.40	7.20	5.20	5.40	8.55	6.85	6.75	7.35	7.80
Mean numbers		105.0					108.0				
Mean weights (mg)		5.73					7.46				

Date: June 30, 1971  
 Experiment: Hay  
 Duration: 1 month duration

	Standard gravel			Gravel + hay								
	No.	Group % comp.	% Total	No.	Group % comp.	% Total	No.	Group % comp.	% Total	No.	Group % comp.	% Total
COLEMBOLA												
Isotomidae	-	-	-	-	-	-						
EPHEMEROPTERA												
<u>Baetis parvus</u>	5	7.8	4.8	2	5.3	1.8						
<u>Baetis parvus</u> (A)	-	-	-	-	-	-						
<u>Baetis</u> sp.2	45	70.3	43.3	23	60.5	20.2						
<u>Ephemerella tibialis</u>	1	1.6	1.0	2	5.3	1.8						
<u>Ephemerella inermis</u>	-	-	-	-	-	-						
<u>Ephemerella grandis</u>	2	3.1	1.9	2	5.3	1.8						
<u>Ameletus</u> sp.	1	1.6	1.0	-	-	-						
<u>Paraleptophlebia</u> sp.1	1	1.6	1.0	5	13.2	4.4						
<u>Rhithrogena</u> sp.	-	-	-	-	-	-						
<u>Cinygmula</u> sp.	2	3.1	1.9	-	-	-						
<u>Cinygma</u> sp.	7	10.9	6.7	4	10.5	3.5						
<u>Iron</u> sp.	-	-	-	-	-	-						
<u>Ironodes</u> sp.	-	-	-	-	-	-						
<u>Stenonema</u> sp.	-	-	-	-	-	-						
Heptageniinae (EI)	-	-	-	-	-	-						
Subtotals	64	100	61.5	38	100	33.5						
No. species	8			6								
PLECOPTERA												
<u>Alloperla</u> sp.	3	50.0	2.9	1	25.0	0.9						
<u>Hastaperla</u> sp.	-	-	-	-	-	-						
<u>Isoperla</u> sp.	2	33.3	1.9	1	25.0	0.9						

Date: June 30, 1971 Duration: 1 month	Standard gravel			Gravel + hay								
	No.	Group % comp.	% Total	No.	Group % comp.	% Total	No.	Group % comp.	% Total	No.	Group % comp.	% Total
<u>Nemoura</u> sp.	-	-	-	2	50.0	1.8						
<u>Leuctrinae</u>	1	16.7	1.0	-	-	-						
Subtotals	6	100	5.8	4	100	3.6						
TRICHOPTERA												
<u>Lepidostoma</u> sp.	-	-	-	-	-	-						
<u>Hydropsyche</u> sp.	-	-	-	-	-	-						
<u>Rhyacophila</u> sp.1	-	-	-	-	-	-						
<u>Rhyacophila</u> sp.3	-	-	-	1	50	0.9						
<u>Rhyacophila</u> sp.4	-	-	-	-	-	-						
<u>Glossosoma</u> sp.	-	-	-	-	-	-						
<u>Glossosoma pyroxum</u> (P)	-	-	-	-	-	-						
Limnephilidae sp.3	-	-	-	-	-	-						
<u>Polycentropus</u> sp.	-	-	-	1	50	0.9						
<u>Neophylax</u> sp.	-	-	-	-	-	-						
Subtotals				2	100	1.8						
COLEOPTERA												
<u>Zaitzevia</u> sp.	-	-	-	-	-	-						
<u>Zaitzevia</u> sp. (A)	-	-	-	-	-	-						
<u>Narpus</u> sp.	-	-	-	-	-	-						
Subtotals	-	-	-	-	-	-						
DIPTERA												
Chironomidae												
<u>Pentaneura</u> sp.1	-	-	-	-	-	-						
" sp.3	-	-	-	-	-	-						
" sp.4	-	-	-	3	4.3	2.6						
" sp.5	-	-	-	-	-	-						
" sp.7	-	-	-	-	-	-						

Date: June 30, 1971 Duration: 1 month	Standard gravel			Gravel + hay			No.	Group % comp.	%	No.	Group % comp.	%
	No.	Group % comp.	% Total	No.	Group % comp.	% Total						
<u>Diamesinae</u>	-	-	-	1	1.4	0.9						
<u>Corynoneura</u> sp.1	1	3.0	1.0	1	1.4	0.9						
<u>Corynoneura</u> sp.2	-	-	-	3	4.3	2.6						
<u>Thienemanniella</u> sp.1	-	-	-	1	1.4	0.9						
<u>Orthocladiinae</u> sp.1	-	-	-	-	-	-						
" sp.2	-	-	-	-	-	-						
" sp.3	-	-	-	-	-	-						
" sp.5	-	-	-	-	-	-						
" sp.6	8	24.2	7.7	5	7.1	4.4						
" sp.7a	4	12.1	3.8	2	2.9	1.8						
" sp.8	-	-	-	-	-	-						
" sp.9	-	-	-	4	5.7	3.5						
" sp.19	-	-	-	-	-	-						
<u>Orthocladiinae</u> (EI)	-	-	-	-	-	-						
<u>Brillia</u> sp.1	1	3.0	1.0	11	15.7	9.6						
<u>Brillia</u> sp.1(A)	-	-	-	-	-	-						
<u>Brillia</u> sp.2	-	-	-	3	4.3	2.6						
<u>Brillia</u> sp.3	-	-	-	-	-	-						
<u>Micropsectra</u> sp.	4	12.1	3.8	6	8.6	5.3						
<u>Rheotanytarsus</u> sp.1	1	3.0	1.0	4	5.7	3.5						
<u>Rheotanytarsus</u> sp.1b	-	-	-	-	-	-						
<u>Cladotanytarsus?</u> sp.3	-	-	-	-	-	-						
<u>Chironomini</u> sp.1	10	30.3	9.6	13	18.6	11.4						
<u>Chironomini</u> sp.1b	2	6.1	1.9	10	14.3	8.8						
<u>Chironomini</u> spp.(EI)	-	-	-	-	-	-						
<u>Chironomini</u> sp.1c	-	-	-	-	-	-						
<u>Chironomini</u> sp.3	-	-	-	-	-	-						
<u>Microtendipes</u> sp.4	2	6.1	1.9	2	2.9	1.8						
<u>Zavrelia</u> sp.6	-	-	-	1	1.4	0.9						
<u>Polypedilum</u> sp.2	-	-	-	-	-	-						
Subtotal	33	100	31.7	70	100	61.6						
No. species	9			16								

Date: June 30, 1971 Duration: 1 month	Standard gravel			Gravel + hay								
	No.	Group % comp.	% Total	No.	Group % comp.	% Total	No.	Group % comp.	% Total	No.	Group % comp.	% Total
Chironomidae pupae												
sp.3	-	-	-	-	-	-						
sp.7b	-	-	-	-	-	-						
sp.10	-	-	-	-	-	-						
sp.12	-	-	-	-	-	-						
sp.14	-	-	-	-	-	-						
sp.16	-	-	-	-	-	-						
<u>Corynoneura</u> sp.2	-	-	-	-	-	-						
<u>Corynoneura</u> sp.3	-	-	-	-	-	-						
<u>Brillia</u> sp.1	-	-	-	-	-	-						
<u>Brillia</u> sp.2	-	-	-	-	-	-						
<u>Stempellina</u> sp.1	-	-	-	-	-	-						
<u>Zavrelia</u> sp.15	-	-	-	-	-	-						
Chironomini sp.1b	-	-	-	-	-	-						
Tipulidae												
<u>Hexatoma</u> sp.	-	-	-	-	-	-						
<u>Antocha</u> sp.	-	-	-	-	-	-						
<u>Pedicia/Dicranota</u> spp.	-	-	-	-	-	-						
<u>Pedicia/Dicranota</u> (P)	-	-	-	-	-	-						
<u>Limnophila</u> sp.	-	-	-	-	-	-						
Blepharoceridae	-	-	-	-	-	-						
Blepharoceridae (P)	-	-	-	-	-	-						
Ceratopogonidae	-	-	-	-	-	-						
Simuliidae												
<u>Simulium</u> sp.1	-	-	-	-	-	-						
<u>Simulium</u> sp.4	-	-	-	-	-	-						
<u>Simulium</u> sp.4(P)	-	-	-	-	-	-						
<u>Simulium arcticum</u>	-	-	-	-	-	-						
<u>Simulium arcticum</u> (P)	-	-	-	-	-	-						
<u>Prosimulium dicum</u>	-	-	-	-	-	-						
<u>Prosimulium dicum</u> (P)	-	-	-	-	-	-						
Empididae	1		1.0	-	-	-						

	Standard gravel			Gravel + hay								
	No.	Group % comp.	% Total	No.	Group % comp.	% Total	No.	Group % comp.	% Total	No.	Group % comp.	% Total
Date: June 30, 1971												
Duration: 1 month												
OLIGOCHAETA												
<u>Nais</u> sp.	-	-	-	-	-	-						
Lumbriculidae	-	-	-	-	-	-						
<u>Stylodrilus</u> sp.	-	-	-	-	-	-						
ACARI	-	-	-	-	-	-						
OSTRACODA												
<u>Cyclocypris</u>												
<u>washingtonensis</u>	-	-	-	-	-	-						
COPEPODA												
Harpacticoida	-	-	-	-	-	-						
Total	104		100	114		100						
Species total	21			27								

Experiment:		Standard gravel					Gravel + alder				
July 7, 1971 1 month duration		Tube 1	Tube 2	Tube 3	Tube 4	Tube 5	Tube 1	Tube 2	Tube 3	Tube 4	Tube 5
COLLEMBOLA		-	-	-	-	-	-	-	-	-	-
EPHEMEROPTERA	nymphs	118	94	104	123	120	52	50	54	73	67
	sub-imago	-	1	-	-	-	-	-	-	-	-
PLECOPTERA	nymphs	6	6	2	8	6	11	11	13	18	6
TRICHOPTERA	larvae	6	-	2	2	2	6	4	1	3	4
	pupae	-	-	-	-	-	-	-	-	-	-
DIPTERA											
Tipulidae	larvae	-	-	-	-	-	-	-	-	-	-
	pupae	-	-	-	-	-	-	-	-	-	-
	adults	-	-	-	1	-	-	-	-	-	-
Chironomidae	larvae	71	78	74	81	72	309	287	320	313	277
	pupae	1	1	-	-	-	5	3	7	6	2
	emerging adult	-	-	-	-	-	-	-	-	-	-
Ceratopogonidae	larvae	-	-	-	-	-	-	-	-	-	-
Simuliidae	larvae	-	-	-	-	1	-	-	-	-	-
	pupae	-	-	-	-	-	-	-	-	-	-
Blepharoceridae	larvae	-	-	-	-	-	-	-	-	-	-
	pupae	-	-	-	-	-	-	-	-	-	-
COLEOPTERA											
Elmidae	larvae	-	-	-	1	1	2	1	2	2	1
	adults	1	2	-	-	2	-	-	-	2	1
OLIGOCHAETA											
Naididae		-	-	-	-	-	-	-	-	-	-
Others		-	-	-	-	-	-	-	-	-	-
ACARI		-	-	-	-	-	-	-	-	-	-
OSTRACODA		-	-	-	-	-	-	-	-	-	-
COPEPODA											
Harpacticoida		-	1	1	2	1	-	-	-	-	-
Numbers		203	183	183	218	205	385	356	397	417	358
Weights (mg)		9.45	7.40	8.45	9.70	8.60	29.95	30.00	36.20	40.15	32.65
Mean numbers		198.4					382.6				
Mean weights (mg)		8.72					33.79				



Experiment:		Gravel + willow									
July 7, 1971 1 month duration		Tube 1	Tube 2	Tube 3	Tube 4	Tube 5	Tube 1	Tube 2	Tube 3	Tube 4	Tube 5
COLLEMBOLA		-	-	-	-	-					
EPHEMEROPTERA	nymphs	85	81	95	89	104					
	sub-imago	-	-	-	-	-					
PLECOPTERA	nymphs	42	42	38	41	30					
TRICHOPTERA	larvae	-	-	-	-	2					
	pupae	-	-	-	-	-					
DIPTERA											
Tipulidae	larvae	-	-	-	-	-					
	pupae	-	-	-	-	-					
	adults	-	-	-	-	-					
Chironomidae	larvae	194	217	232	222	205					
	pupae	1	3	1	2	1					
	emerging adult	-	-	-	-	-					
Ceratopogonidae	larvae	-	-	-	-	-					
Simuliidae	larvae	-	-	-	-	-					
	pupae	-	-	-	-	-					
Blepharoceridae	larvae	-	-	-	-	-					
	pupae	-	-	-	-	-					
COLEOPTERA											
Elmidae	larvae	-	-	-	-	-					
	adults	1	-	-	-	-					
OLIGOCHAETA											
Naididae		1	-	1	-	-					
	Others	-	-	-	-	-					
ACARI		-	-	-	-	-					
OSTRACODA		-	-	-	-	-					
COPEPODA											
Harpacticoida		2	2	4	2	-					
Numbers		326	345	371	356	342					
Weights (mg)		20.70	17.85	14.45	16.05	16.60					
Mean numbers		348.0									
Mean weights (mg)		17.13									

Date: July 7, 1971  
 Experiment: Leaf litter  
 Duration: 1 month

	Standard gravel			Gravel + alder			Gravel + willow			No.	Group % comp.	% Total
	No.	Group % comp.	% Total	No.	Group % comp.	% Total	No.	Group % comp.	% Total			
COLLEMBOLA												
Isotomidae	-	-	-	-	-	-	-	-	-			
EPHEMEROPTERA												
<u>Baetis parvus</u>	13	11.2	6.3	4	6.0	1.2	8	7.4	2.3			
<u>Baetis parvus</u> (A)	-	-	-	-	-	-	-	-	-			
<u>Baetis</u> sp.2	75	64.7	36.6	49	73.1	14.2	79	73.1	23.1			
<u>Ephemerella tibialis</u>	4	3.4	1.9	7	10.4	2.0	5	4.6	1.5			
<u>Ephemerella inermis</u>	-	-	-	-	-	-	-	-	-			
<u>Ephemerella grandis</u>	2	1.7	1.0	-	-	-	-	-	-			
<u>Ameletus</u> sp.	-	-	-	-	-	-	-	-	-			
<u>Paraleptophlebia</u> sp.1	9	7.8	4.4	-	-	-	11	10.2	3.2			
<u>Rhithrogena</u> sp.	-	-	-	-	-	-	-	-	-			
<u>Cinygmula</u> sp.	5	4.3	2.4	7	10.4	2.0	-	-	-			
<u>Cinygma</u> sp.	8	6.9	3.9	-	-	-	5	4.6	1.5			
<u>Iron</u> sp.	-	-	-	-	-	-	-	-	-			
<u>Ironodes</u> sp.	-	-	-	-	-	-	-	-	-			
<u>Stenonema</u> sp.	-	-	-	-	-	-	-	-	-			
Heptageniinae (EI)	-	-	-	-	-	-	-	-	-			
Subtotals	116	100	56.6	67	100	19.4	108	100	31.6			
No. species	7			4			5					
PLECOPTERA												
<u>Alloperla</u> sp.	1	10.0	0.5	4	66.7	1.2	11	42.4	3.2			
<u>Hastaperla</u> sp.	-	-	-	-	-	-	-	-	-			
<u>Isoperla</u> sp.	1	10.0	0.5	1	16.7	0.3	-	-	-			

Date: July 7, 1971 Duration: 1 month	Standard gravel			Gravel + alder			Gravel + willow			No.	Group % comp.	% Total
	No.	Group % comp.	% Total	No.	Group % comp.	% Total	No.	Group % comp.	% Total			
<u>Nemoura</u> sp.	8	80.0	3.9	1	16.7	0.3	13	50.0	3.8			
<u>Leuctrinae</u>	-	-	-	-	-	-	2	7.6	0.6			
Subtotals	10	100	4.9	6	100	1.8	26	100	7.6			
TRICHOPTERA												
<u>Lepidostoma</u> sp.	-	-	-	1	16.7	0.3	1	50	0.3			
<u>Hydropsyche</u> sp.	1	50.0	0.5	1	16.7	0.3	-	-	-			
<u>Rhyacophila</u> sp.1	-	-	-	-	-	-	-	-	-			
<u>Rhyacophila</u> sp.3	-	-	-	2	33.3	0.6	-	-	-			
<u>Rhyacophila</u> sp.4	-	-	-	-	-	-	-	-	-			
<u>Glossosoma</u> sp.	1	50.0	0.5	-	-	-	1	50	0.3			
<u>Glossosoma pyroxum</u> (P)	-	-	-	-	-	-	-	-	-			
<u>Limnephilidae</u> sp.3	-	-	-	-	-	-	-	-	-			
<u>Polycentropus</u> sp.	-	-	-	2	33.3	0.6	-	-	-			
<u>Neophylax</u> sp.	-	-	-	-	-	-	-	-	-			
Subtotals	2	100	1.0	6	100	1.8	2	100	0.6			
COLEOPTERA												
<u>Zaitzevia</u> sp.	1	33.3	0.5	1	50.0	0.3	-	-	-			
<u>Zaitzevia</u> sp. (A)	2	66.7	1.0	1	50.0	0.3	-	-	-			
<u>Narpus</u> sp.	-	-	-	-	-	-	-	-	-			
Subtotals	3	100	1.5	2	100	0.6	-	-	-			
DIPTERA												
Chironomidae												
<u>Pentaneura</u> sp.1	3	4.2	1.5	8	3.1	2.3	13	6.4	3.8			
" sp.3	-	-	-	3	1.2	0.9	-	-	-			
" sp.4	-	-	-	-	-	-	-	-	-			
" sp.5	-	-	-	-	-	-	-	-	-			
" sp.7	-	-	-	-	-	-	-	-	-			

Date: July 7, 1971 Duration: 1 month	Standard gravel			Gravel + alder			Gravel + willow			No.	Group % comp.	%
	No.	Group % comp.	% Total	No.	Group % comp.	% Total	No.	Group % comp.	% Total			
<u>Diamesinae</u>	1	1.4	0.5	-	-	-	-	-	-			
<u>Corynoneura</u> sp.1	3	4.2	1.5	12	4.6	3.5	3	1.5	0.9			
<u>Corynoneura</u> sp.2	1	1.4	0.5	-	-	-	6	3.0	1.8			
<u>Thienemanniella</u> sp.1	2	2.8	1.0	-	-	-	3	1.5	0.9			
<u>Orthocladiinae</u> sp.1	-	-	-	-	-	-	-	-	-			
" sp.2	-	-	-	-	-	-	-	-	-			
" sp.3	-	-	-	-	-	-	-	-	-			
" sp.5	1	1.4	0.5	-	-	-	4	2.0	1.2			
" sp.6	17	23.6	8.3	21	8.1	6.1	3	1.5	0.9			
" sp.7a	19	26.4	9.3	4	1.6	1.2	3	1.5	0.9			
" sp.8	-	-	-	3	1.2	0.9	5	2.5	1.5			
" sp.9	3	4.2	1.5	14	5.4	4.1	2	1.0	0.6			
" sp.19	-	-	-	2	0.8	0.6	-	-	-			
<u>Orthocladiinae</u> (EI)	-	-	-	-	-	-	23	11.3	6.7			
<u>Brillia</u> sp.1	-	-	-	41	15.8	11.9	16	7.9	4.7			
<u>Brillia</u> sp.1(A)	-	-	-	-	-	-	-	-	-			
<u>Brillia</u> sp.2	-	-	-	13	5.0	3.8	17	8.4	5.0			
<u>Brillia</u> sp.3	-	-	-	1	0.4	0.3	1	0.5	0.3			
<u>Micropsectra</u> sp.	2	2.8	1.0	-	-	-	-	-	-			
<u>Rheotanytarsus</u> sp.1	-	-	-	-	-	-	6	3.0	1.8			
<u>Rheotanytarsus</u> sp.1b	-	-	-	6	2.3	1.8	-	-	-			
<u>Cladotanytarsus?</u> sp.3	-	-	-	-	-	-	-	-	-			
Chironomini sp.1	17	23.6	8.3	51	19.6	14.8	68	33.5	19.9			
Chironomini sp.1b	2	2.8	1.0	41	15.8	11.9	7	3.4	2.1			
Chironomini spp.(EI)	-	-	-	-	-	-	-	-	-			
Chironomini sp.1c	-	-	-	-	-	-	-	-	-			
Chironomini sp.3	-	-	-	6	2.3	1.8	3	1.5	0.9			
<u>Microtendipes</u> sp.4	-	-	-	2	0.8	0.6	-	-	-			
<u>Zavrelia</u> sp.6	-	-	-	-	-	-	-	-	-			
<u>Polypedilum</u> sp.2	-	-	-	-	-	-	1	-	0.3			
Subtotal	72	100	35.1	260	100	75.6	203	100	59.4			
No. species	13			17			18					

Date: July 7, 1971 Duration: 1 month	Standard gravel			Gravel + alder			Gravel + willow			No.	Group % comp.	%
	No.	Group % comp.	% Total	No.	Group % comp.	% Total	No.	Group % comp.	% Total			
Chironomidae pupae												
sp.3	-	-	-	-	-	-	-	-	-			
sp.7b	-	-	-	-	-	-	-	-	-			
sp.10	-	-	-	-	-	-	-	-	-			
sp.12	-	-	-	-	-	-	-	-	-			
sp.14	-	-	-	-	-	-	-	-	-			
sp.16	-	-	-	-	-	-	1	-	0.3			
<u>Corynoneura</u> sp.2	-	-	-	-	-	-	-	-	-			
<u>Corynoneura</u> sp.3	-	-	-	1	-	0.3	-	-	-			
<u>Brillia</u> sp.1	-	-	-	-	-	-	-	-	-			
<u>Brillia</u> sp.2	-	-	-	-	-	-	-	-	-			
<u>Stempellina</u> sp.1	-	-	-	1	-	0.3	-	-	-			
<u>Zavrelia</u> sp.15	-	-	-	1	-	0.3	-	-	-			
Chironomini sp.1b	-	-	-	-	-	-	-	-	-			
Tipulidae												
<u>Hexatoma</u> sp.	-	-	-	-	-	-	-	-	-			
<u>Antocha</u> sp.	-	-	-	-	-	-	-	-	-			
<u>Pedicia/Dicranota</u> spp.	-	-	-	-	-	-	-	-	-			
<u>Pedicia/Dicranota</u> (P)	-	-	-	-	-	-	-	-	-			
<u>Limnophila</u> sp.	-	-	-	-	-	-	-	-	-			
Blepharoceridae	-	-	-	-	-	-	-	-	-			
Blepharoceridae (P)	-	-	-	-	-	-	-	-	-			
Ceratopogonidae	-	-	-	-	-	-	-	-	-			
Simuliidae												
<u>Simulium</u> sp.1	-	-	-	1	-	0.3	-	-	-			
<u>Simulium</u> sp.4	-	-	-	-	-	-	-	-	-			
<u>Simulium</u> sp.4(P)	-	-	-	-	-	-	-	-	-			
<u>Simulium arcticum</u>	-	-	-	-	-	-	-	-	-			
<u>Simulium arcticum</u> (P)	-	-	-	-	-	-	-	-	-			
<u>Prosimulium dicum</u>	1	-	0.5	-	-	-	-	-	-			
<u>Prosimulium dicum</u> (P)	-	-	-	-	-	-	-	-	-			
Epididae	-	-	-	-	-	-	1	-	0.3			

Date: July 7, 1971 Duration: 1 month	Standard gravel			Gravel + alder			Gravel + willow			No.	Group % comp.	% Total
	No.	Group % comp.	% Total	No.	Group % comp.	% Total	No.	Group % comp.	% Total			
OLIGOCHAETA												
<u>Nais</u> sp.	-	-	-	-	-	-	1	-	0.3			
Lumbriculidae	-	-	-	-	-	-	-	-	-			
<u>Stylodrilus</u> sp.	-	-	-	-	-	-	-	-	-			
ACARI	-	-	-	-	-	-	-	-	-			
OSTRACODA												
<u>Cyclocypris</u> <u>washingtonensis</u>	-	-	-	-	-	-	-	-	-			
COPEPODA												
Harpacticoida	1	-	0.5									
Total	205		100	345		100	342		100			
Species total	28			30			31					

Experiment:

## Natural gravel

May 3, 1972

2 weeks' duration

		Tube 1	Tube 2	Tube 3	Tube 4	Tube 5	Tube 1	Tube 2	Tube 3	Tube 4	Tube 5	
COLLEMBOLA		-	-	-	-	-						
EPHEMEROPTERA	nymphs	23	10	21	11	6						
	sub-imago	-	-	-	-	-						
PLECOPTERA	nymphs	-	-	-	2	-						
TRICHOPTERA	larvae	3	1	9	4	10						
	pupae	-	-	-	-	-						
DIPTERA												
Tipulidae	larvae	4	8	8	8	10						
	pupae	-	-	-	-	-						
	adults	-	-	-	-	-						
Chironomidae	larvae	25	17	9	12	17						
	pupae	1	-	1	1	1						
	emerging adult	-	-	-	-	-						
Ceratopogonidae	larvae	-	-	-	-	-						
Simuliidae	larvae	4	7	13	4	1						
	pupae	-	-	-	2	1						
Blepharoceridae	larvae	-	-	-	-	1						
	pupae	-	-	-	1	-						
COLEOPTERA												
Elmidae	larvae	16	4	10	3	11						
	adults	-	-	-	-	-						
OLIGOCHAETA												
Naididae		2	3	1	-	2						
Others		-	-	-	-	-						
ACARI		-	-	-	-	1						
OSTRACODA		-	-	-	-	1						
COPEPODA												
Harpacticoida		-	-	-	-	-						
Numbers		78	50	72	48	62						
Weights (mg)		7.15	4.05	4.95	9.20	14.05						
Mean numbers		62.0										
Mean weights (mg)		7.88										

Experiment:		Gravel + wheat 230 ml					Gravel + wheat 460 ml				
May 3, 1972 2 weeks' duration		Tube 1	Tube 2	Tube 3	Tube 4	Tube 5	Tube 1	Tube 2	Tube 3	Tube 4	Tube 5
COLLEMBOLA		-	-	-	-	-	-	-	-	-	-
EPHEMEROPTERA	nymphs	35	30	22	23	25	16	16	12	15	16
	sub-imago	-	-	-	-	-	-	-	-	-	-
PLECOPTERA	nymphs	4	3	5	1	2	-	4	1	3	2
TRICHOPTERA	larvae	-	-	-	1	1	2	-	1	-	-
	pupae	-	-	-	-	-	-	-	-	-	-
DIPTERA											
Tipulidae	larvae	-	-	-	-	2	-	-	-	-	-
	pupae	-	-	-	-	-	-	-	-	-	-
	adults	-	-	-	-	-	-	-	-	-	-
Chironomidae	larvae	37	33	34	44	31	21	20	31	25	21
	pupae	-	-	-	1	-	-	-	-	-	1
	emerging adult	-	-	-	-	-	-	-	-	-	-
Ceratopogonidae	larvae	-	-	-	-	-	-	-	-	-	-
Simuliidae	larvae	1	1	2	1	2	1	-	-	1	-
	pupae	-	-	-	-	-	-	-	-	-	-
Blepharoceridae	larvae	-	-	-	1	-	-	-	-	-	-
	pupae	-	-	-	-	-	-	-	-	-	-
COLEOPTERA											
Elmidae	larvae	-	-	1	-	2	-	1	-	1	-
	adults	-	-	-	-	-	-	-	-	-	-
OLIGOCHAETA											
Naididae		-	-	-	-	-	-	-	-	-	-
Others		-	-	-	-	-	-	-	-	-	-
ACARI		-	-	-	-	-	-	-	-	-	-
OSTRACODA		-	-	-	-	-	-	-	-	-	-
COPEPODA											
Harpacticoida		-	-	1	1	-	1	2	1	-	-
Numbers		77	67	65	74	64	41	43	46	45	40
Weights (mg)		5.15	4.30	3.25	5.00	3.60	3.55	3.40	2.70	3.55	1.95
Mean numbers		69.4					43.0				
Mean weights (mg)		4.26					3.03				



Experiment:

Standard gravel

May 3, 1972 2 weeks' duration		Tube 1	Tube 2	Tube 3	Tube 4	Tube 5	Tube 6	Tube 7	Tube 8	Tube 9	Tube 10
COLLEMBOLA		-	-	-	-	-	-	-	-	-	-
EPHEMEROPTERA	nymphs	18	16	30	26	19	23	19	12	22	25
	sub-imago	-	-	-	-	-	-	-	-	-	-
PLECOPTERA	nymphs	-	-	-	-	-	-	-	-	-	-
TRICHOPTERA	larvae	4	-	1	-	-	-	-	-	-	-
	pupae	-	-	-	-	-	-	-	-	-	-
DIPTERA											
Tipulidae	larvae	-	1	-	-	-	-	-	-	1	-
	pupae	-	-	-	-	-	-	-	-	-	-
	adults	-	-	-	-	-	-	-	-	-	-
Chironomidae	larvae	8	18	15	19	7	26	13	22	12	21
	pupae	1	-	-	-	-	-	-	-	-	-
	emerging adult	-	-	-	-	-	-	-	-	-	-
Ceratopogonidae	larvae	-	-	-	-	-	-	-	-	-	-
Simuliidae	larvae	12	3	4	4	8	-	4	-	9	-
	pupae	-	-	1	-	-	-	-	-	-	-
Blepharoceridae	larvae	-	-	-	-	-	-	-	-	-	-
	pupae	-	-	-	-	-	-	-	-	-	-
COLEOPTERA											
Elmidae	larvae	2	1	-	1	-	-	-	-	-	-
	adults	-	-	-	-	-	-	-	-	-	-
OLIGOCHAETA											
Naididae		2	-	-	1	-	1	-	-	-	-
Others		-	-	-	-	-	-	-	-	-	-
ACARI		-	-	-	-	-	-	-	-	-	-
OSTRACODA		-	-	-	-	-	-	-	-	-	-
COPEPODA											
Harpacticoida		-	-	-	-	-	-	-	-	-	-
Numbers		47	39	51	51	34	50	36	34	44	46
Weights (mg)		4.10	2.45	6.25	4.80	7.30	5.75	2.75	3.00	3.40	2.15
Mean numbers		43.2									
Mean weights (mg)		4.20									

Date: May 3, 1972  
 Experiment: Grain  
 Duration: 2 weeks

	Natural gravel			Standard gravel			Gravel + wheat 230 ml			Gravel + wheat 460 ml		
	No.	Group % comp.	% Total	No.	Group % comp.	% Total	No.	Group % comp.	% Total	No.	Group % comp.	% Total
COLLEMBOLA												
Isotomidae	-	-	-	-	-	-	-	-	-	-	-	-
EPHEMEROPTERA												
<u>Baetis parvus</u>	-	-	-	7	35.0	15.9	12	48.0	18.8	12	75.0	30.0
<u>Baetis parvus</u> (A)	-	-	-	-	-	-	-	-	-	-	-	-
<u>Baetis</u> sp.2	2	18.2	4.2	1	5.0	2.3	3	12.0	4.7	1	6.3	2.5
<u>Ephemerella tibialis</u>	-	-	-	2	10.0	4.5	-	-	-	2	12.5	5.0
<u>Ephemerella inermis</u>	-	-	-	2*	10.0	4.5	-	-	-	-	-	-
<u>Ephemerella grandis</u>	-	-	-	-	-	-	-	-	-	-	-	-
<u>Ameletus</u> sp.	-	-	-	1	5.0	2.3	2	8.0	3.1	-	-	-
<u>Paraleptophlebia</u> sp.1	-	-	-	1	5.0	2.3	1	4.0	1.6	-	-	-
<u>Rhithrogena</u> sp.	1	9.1	2.1	1*	5.0	2.3	-	-	-	-	-	-
<u>Cinygmula</u> sp.	8	72.7	16.7	5	25.0	11.4	7	28.0	10.9	1	6.3	2.5
<u>Cinygma</u> sp.	-	-	-	-	-	-	-	-	-	-	-	-
<u>Iron</u> sp.	-	-	-	-	-	-	-	-	-	-	-	-
<u>Ironodes</u> sp.	-	-	-	-	-	-	-	-	-	-	-	-
<u>Stenonema</u> sp.	-	-	-	-	-	-	-	-	-	-	-	-
Heptageniinae (EI)	-	-	-	-	-	-	-	-	-	-	-	-
Subtotals	11	100	23.0	20	100	45.5	25	100	39.1	16	100	40.0
No. species	3			8			5			4		
PLECOPTERA												
<u>Alloperla</u> sp.	2	100	4.2	2	100	4.5	-	-	-	-	-	-
<u>Hastaperla</u> sp.	-	-	-	-	-	-	-	-	-	-	-	-
<u>Isoperla</u> sp.	-	-	-	-	-	-	1	100	1.6	1	50.0	2.5

Date: May 3, 1972 Duration: 2 weeks	Natural gravel			Standard gravel			Gravel + wheat 230 ml			Gravel + wheat 460 ml		
	No.	Group % comp.	% Total	No.	Group % comp.	% Total	No.	Group % comp.	% Total	No.	Group % comp.	% Total
<u>Nemoura</u> sp.	-	-	-	-	-	-	-	-	-	1	50.0	2.5
<u>Leuctrinae</u>	-	-	-	-	-	-	-	-	-	-	-	-
Subtotals	2	100	4.2	2	100	4.5	1	100	1.6	2	100	5.0
TRICHOPTERA												
<u>Lepidostoma</u> sp.	-	-	-	-	-	-	-	-	-	-	-	-
<u>Hydropsyche</u> sp.	3	75.0	6.3	-	-	-	1	100	1.6	-	-	-
<u>Rhyacophila</u> sp.1	-	-	-	-	-	-	-	-	-	-	-	-
<u>Rhyacophila</u> sp.3	-	-	-	-	-	-	-	-	-	-	-	-
<u>Rhyacophila</u> sp.4	-	-	-	-	-	-	-	-	-	-	-	-
<u>Glossosoma</u> sp.	-	-	-	-	-	-	-	-	-	-	-	-
<u>Glossosoma pyroxum</u> (P)	-	-	-	-	-	-	-	-	-	-	-	-
<u>Limnephilidae</u> sp.3	1	25.0	2.1	-	-	-	-	-	-	-	-	-
<u>Polycentropus</u> sp.	-	-	-	-	-	-	-	-	-	-	-	-
<u>Neophylax</u> sp.	-	-	-	-	-	-	-	-	-	-	-	-
Subtotals	4	100	8.4	-	-	-	1	100	1.6	-	-	-
COLEOPTERA												
<u>Zaitzevia</u> sp.	3	100	6.3	-	-	-	2	100	3.1	-	-	-
<u>Zaitzevia</u> sp. (A)	-	-	-	-	-	-	-	-	-	-	-	-
<u>Narpus</u> sp.	-	-	-	-	-	-	-	-	-	-	-	-
Subtotals	3	100	6.3	-	-	-	2	100	3.1	-	-	-
DIPTERA												
Chironomidae												
<u>Pentaneura</u> sp.1	-	-	-	2	15.4	4.5	6	19.4	9.4	1	4.8	2.5
" sp.3	-	-	-	-	-	-	-	-	-	-	-	-
" sp.4	-	-	-	-	-	-	-	-	-	-	-	-
" sp.5	-	-	-	-	-	-	-	-	-	-	-	-
" sp.7	3	25.0	6.3	-	-	-	-	-	-	-	-	-

Date: May 3, 1972 Duration: 2 weeks	Natural gravel			Standard gravel			Gravel + wheat 230 ml			Gravel + wheat 460 ml		
	No.	Group % comp.	% Total	No.	Group % comp.	% Total	No.	Group % comp.	% Total	No.	Group % comp.	% Total
Diamesinae	-	-	-	-	-	-	-	-	-	-	-	-
<u>Corynoneura</u> sp.1	-	-	-	5	38.5	11.4	10	32.3	15.6	12	57.1	30.0
<u>Corynoneura</u> sp.2	2	16.7	4.2	2	15.4	4.5	2	6.5	3.1	3	14.3	7.5
<u>Thienemanniella</u> sp.1	-	-	-	3	23.1	6.8	3	9.7	4.7	-	-	-
Orthocladiinae sp.1	-	-	-	-	-	-	-	-	-	-	-	-
" sp.2	-	-	-	-	-	-	-	-	-	-	-	-
" sp.3	-	-	-	-	-	-	-	-	-	-	-	-
" sp.5	-	-	-	-	-	-	-	-	-	-	-	-
" sp.6	-	-	-	-	-	-	1	3.2	1.6	1	4.8	2.5
" sp.7a	2	16.7	4.2	-	-	-	2	6.5	3.1	1	4.8	2.5
" sp.8	1	8.3	2.1	-	-	-	1	-	-	1	4.8	2.5
" sp.9	1	8.3	2.1	-	-	-	1	3.2	1.6	1	4.8	2.5
" sp.19	-	-	-	-	-	-	-	-	-	-	-	-
Orthocladiinae (EI)	-	-	-	-	-	-	-	-	-	-	-	-
<u>Brillia</u> sp.1	-	-	-	-	-	-	-	-	-	-	-	-
<u>Brillia</u> sp.1(A)	-	-	-	-	-	-	-	-	-	-	-	-
<u>Brillia</u> sp.2	-	-	-	-	-	-	-	-	-	-	-	-
<u>Brillia</u> sp.3	-	-	-	-	-	-	-	-	-	-	-	-
<u>Micropsectra</u> sp.	-	-	-	-	-	-	-	-	-	-	-	-
<u>Rheotanytarsus</u> sp.1	-	-	-	-	-	-	-	-	-	-	-	-
<u>Rheotanytarsus</u> sp.1b	-	-	-	-	-	-	-	-	-	-	-	-
<u>Cladotanytarsus?</u> sp.3	-	-	-	-	-	-	-	-	-	-	-	-
Chironomini sp.1	3	25.0	6.3	1	7.8	2.3	2	6.5	3.1	-	-	-
Chironomini sp.1b	-	-	-	-	-	-	4	12.9	6.3	-	-	-
Chironomini spp.(EI)	-	-	-	-	-	-	-	-	-	-	-	-
Chironomini sp.1c	-	-	-	-	-	-	-	-	-	-	-	-
Chironomini sp.3	-	-	-	-	-	-	-	-	-	-	-	-
<u>Microtendipes</u> sp.4	-	-	-	-	-	-	-	-	-	1	4.8	2.5
<u>Zavrelia</u> sp.6	-	-	-	-	-	-	-	-	-	-	-	-
<u>Polypedilum</u> sp.2	-	-	-	-	-	-	-	-	-	-	-	-
Subtotal	12	100	25.2	13	100	29.5	31	100	48.5	21	100	52.5
No. species	6			5			9			8		

Date: May 3, 1972 Duration: 2 weeks	Natural gravel			Standard gravel			Gravel + wheat 230 ml			Gravel + wheat 460 ml		
	No.	Group % comp.	% Total	No.	Group % comp.	% Total	No.	Group % comp.	% Total	No.	Group % comp.	% Total
Chironomidae pupae												
sp.3	1	100	2.1	-	-	-	-	-	-	-	-	-
sp.7b	-	-	-	-	-	-	-	-	-	-	-	-
sp.10	-	-	-	-	-	-	-	-	-	-	-	-
sp.12	-	-	-	-	-	-	-	-	-	-	-	-
sp.14	-	-	-	-	-	-	-	-	-	-	-	-
sp.16	-	-	-	-	-	-	-	-	-	-	-	-
<u>Corynoneura</u> sp.2	-	-	-	-	-	-	-	-	-	-	-	-
<u>Corynoneura</u> sp.3	-	-	-	-	-	-	-	-	-	-	-	-
<u>Brillia</u> sp.1	-	-	-	-	-	-	-	-	-	-	-	-
<u>Brillia</u> sp.2	-	-	-	-	-	-	-	-	-	-	-	-
<u>Stempellina</u> sp.1	-	-	-	-	-	-	-	-	-	-	-	-
<u>Zavrelia</u> sp.15	-	-	-	-	-	-	-	-	-	-	-	-
Chironomini sp.1b	-	-	-	-	-	-	-	-	-	-	-	-
Tipulidae												
Hexatoma sp.	-	-	-	-	-	-	-	-	-	-	-	-
Antocha sp.	-	-	-	-	-	-	-	-	-	-	-	-
Pedicia/Dicranota spp.	-	-	-	-	-	-	-	-	-	-	-	-
Pedicia/Dicranota (P)	-	-	-	-	-	-	-	-	-	-	-	-
Limnophila sp.	8	100	16.7	1	100	2.3	2	100	3.0	-	-	-
Blepharoceridae	-	-	-	-	-	-	-	-	-	-	-	-
Blepharoceridae (P)	1	100	2.1	-	-	-	-	-	-	-	-	-
Ceratopogonidae	-	-	-	-	-	-	-	-	-	-	-	-
Simuliidae												
Simulium sp.1	1	16.7	2.1	6	75.0	13.6	2	100	3.0	-	-	-
Simulium sp.4	-	-	-	-	-	-	-	-	-	-	-	-
Simulium sp.4(P)	-	-	-	-	-	-	-	-	-	-	-	-
Simulium arcticum	-	-	-	-	-	-	-	-	-	-	-	-
Simulium arcticum (P)	-	-	-	-	-	-	-	-	-	-	-	-
Prosimulium dicum	3	50.0	6.3	2	25.0	4.5	-	-	-	-	-	-
Prosimulium dicum (P)	2	33.3	4.2	-	-	-	-	-	-	-	-	-
Empididae	-	-	-	-	-	-	-	-	-	-	-	-

Date: May 3, 1972 Duration: 2 weeks	Natural gravel			Standard gravel			Gravel + wheat 230 ml			Gravel + wheat 460 ml		
	No.	Group % comp.	% Total	No.	Group % comp.	% Total	No.	Group % comp.	% Total	No.	Group % comp.	% Total
OLIGOCHAETA												
<u>Nais</u> sp.	-	-	-	-	-	-	-	-	-	-	-	-
Lumbriculidae	-	-	-	-	-	-	-	-	-	-	-	-
<u>Stylodrilus</u> sp.	-	-	-	-	-	-	-	-	-	-	-	-
ACARI	-	-	-	-	-	-	-	-	-	-	-	-
OSTRACODA												
<u>Cyclocypris</u>												
<u>washingtonensis</u>	-	-	-	-	-	-	-	-	-	-	-	-
COPEPODA												
Harpacticoida	-	-	-	-	-	-	-	-	-	-	-	-
Total	48		100	44		100	64		100	40		100
Species total	18			17			19			14		

Experiment:		Natural gravel					Standard gravel				
May 17, 1972 1 month duration		Tube 1	Tube 2	Tube 3	Tube 4	Tube 5	Tube 1	Tube 2	Tube 3	Tube 4	Tube 5
COLLEMBOLA		-	-	-	-	-	-	-	-	-	-
EPHEMEROPTERA	nymphs	15	15	16	14	17	22	13	24	19	18
	sub-imago	-	-	-	-	-	-	-	-	-	-
PLECOPTERA	nymphs	12	13	14	14	14	3	6	3	1	2
TRICHOPTERA	larvae	-	2	1	2	1	1	1	1	-	3
	pupae	-	-	-	-	-	-	-	-	-	-
DIPTERA											
Tipulidae	larvae	1	1	-	-	-	-	-	-	-	-
	pupae	-	-	-	-	-	-	-	-	-	-
	adults	-	-	-	-	-	-	-	-	-	-
Chironomidae	larvae	35	33	37	36	40	8	6	11	6	7
	pupae	-	-	-	-	-	-	-	-	-	-
	emerging adult	-	-	-	-	-	-	-	-	-	-
Ceratopogonidae	larvae	-	-	2	1	1	-	-	-	-	-
Simuliidae	larvae	4	2	3	1	2	2	1	-	2	2
	pupae	-	-	-	-	-	-	-	-	-	-
Blepharoceridae	larvae	-	-	-	-	-	-	-	-	-	-
	pupae	-	-	-	-	-	-	-	-	-	-
COLEOPTERA											
Elmidae	larvae	18	24	22	18	26	1	5	1	2	1
	adults	-	-	-	-	1	-	-	-	-	-
OLIGOCHAETA											
Naididae		8	2	4	7	7	-	-	-	-	-
Others		1	-	-	-	-	-	-	-	-	-
ACARI		-	-	-	-	-	-	-	-	-	-
OSTRACODA		-	-	-	-	-	-	-	-	-	-
COPEPODA											
Harpacticoida		1	4	6	5	1	-	-	-	-	-
Numbers		95	96	105	98	110	37	32	40	30	33
Weights (mg)		3.65	7.40	1.75	3.60	6.00	6.05	4.45	4.40	5.95	5.15
Mean numbers		100.8					34.4				
Mean weights (mg)		4.48					5.20				

Experiment:		Gravel + wheat 230 ml					Gravel + wheat 460 ml				
May 17, 1972 1 month duration		Tube 1	Tube 2	Tube 3	Tube 4	Tube 5	Tube 1	Tube 2	Tube 3	Tube 4	Tube 5
COLLEMBOLA		-	-	-	-	-	-	-	-	-	-
EPHEMEROPTERA	nymphs	37	38	34	33	35	65	71	65	63	69
	sub-imago	-	-	-	-	-	-	-	-	-	-
PLECOPTERA	nymphs	7	11	6	6	8	5	6	9	7	9
TRICHOPTERA	larvae	-	2	2	-	-	-	1	2	2	-
	pupae	-	-	-	-	-	-	-	-	-	-
DIPTERA											
Tipulidae	larvae	-	-	-	-	-	-	-	-	-	-
	pupae	-	-	-	-	-	-	-	-	-	-
	adults	-	-	-	-	-	-	-	-	-	-
Chironomidae	larvae	37	37	32	31	29	44	50	40	55	47
	pupae	-	-	-	-	-	-	-	1	-	-
	emerging adult	-	-	-	-	-	-	-	-	-	-
Ceratopogonidae	larvae	-	-	-	-	-	-	-	-	-	-
Simuliidae	larvae	4	-	2	3	-	4	1	3	4	1
	pupae	-	-	-	-	1	-	-	1	-	-
Blepharoceridae	larvae	-	-	-	-	-	-	-	-	-	-
	pupae	-	-	-	-	-	-	-	-	-	-
COLEOPTERA											
Elmidae	larvae	-	-	-	-	1	-	-	2	-	-
	adults	-	-	-	-	-	-	1	-	-	1
OLIGOCHAETA											
Naididae		-	-	-	-	1	-	2	-	-	-
Others		-	-	-	-	-	-	-	-	-	-
ACARI		-	-	-	-	-	-	-	-	-	-
OSTRACODA		-	-	-	-	-	-	-	-	-	-
COPEPODA											
Harpacticoida		-	-	1	-	-	-	-	-	-	-
Numbers		85	88	77	73	75	118	132	123	131	127
Weights (mg)		8.25	8.45	12.60	6.25	8.75	22.05	14.85	15.50	24.75	19.25
Mean numbers		79.6					126.2				
Mean weights (mg)		8.86					19.28				



Date: May 17, 1972

Experiment: Grain

Duration: 1 month

	Natural gravel			Standard gravel			Gravel + wheat 230 ml			Gravel + wheat 460 ml		
	No.	Group % comp.	% Total	No.	Group % comp.	% Total	No.	Group % comp.	% Total	No.	Group % comp.	% Total
COLLEMBOLA												
Isotomidae	-	-	-	-	-	-	-	-	-	-	-	-
EPHEMEROPTERA												
<u>Baetis parvus</u>	3	17.6	2.7	7	38.9	21.2	15	42.9	20.0	31	47.7	25.2
<u>Baetis parvus</u> (A)	-	-	-	-	-	-	-	-	-	-	-	-
<u>Baetis</u> sp.2	1	5.9	0.9	3*	16.7	9.1	2	5.7	2.7	6	9.2	4.9
<u>Ephemerella tibialis</u>	4	23.5	3.6	-	-	-	4	11.4	5.3	3	4.6	2.4
<u>Ephemerella inermis</u>	-	-	-	1*	5.6	3.0	5*	14.3	6.7	2*	3.1	1.6
<u>Ephemerella grandis</u>	-	-	-	-	-	-	-	-	-	-	-	-
<u>Ameletus</u> sp.	-	-	-	-	-	-	-	-	-	1	1.5	0.8
<u>Paraleptophlebia</u> sp.1	1	5.9	0.9	4*	22.2	12.1	3	8.6	4.0	13	20.0	10.6
<u>Rhithrogena</u> sp.	-	-	-	-	-	-	-	-	-	-	-	-
<u>Cinygmula</u> sp.	7*	41.2	6.4	3*	16.7	9.1	6*	17.1	8.0	7	10.8	5.7
<u>Cinygma</u> sp.	-	-	-	-	-	-	-	-	-	2	3.1	1.6
<u>Iron</u> sp.	1*	5.9	0.9	-	-	-	-	-	-	-	-	-
<u>Ironodes</u> sp.	-	-	-	-	-	-	-	-	-	-	-	-
<u>Stenonema</u> sp.	-	-	-	-	-	-	-	-	-	-	-	-
Heptageniinae (EI)	-	-	-	-	-	-	-	-	-	-	-	-
Subtotals	17	100	15.4	18	100	54.5	35	100	46.7	65	100	52.8
No. species	6			5			6			8		
PLECOPTERA												
<u>Alloperla</u> sp.	1	7.1	0.9	-	-	-	-	-	-	4	44.4	3.3
<u>Hastaperla</u> sp.	-	-	-	-	-	-	-	-	-	1	11.1	0.8
<u>Isoperla</u> sp.	1	7.1	0.9	-	-	-	-	-	-	-	-	-

Date: May 17, 1972 Duration: 1 month	Natural gravel			Standard gravel			Gravel + wheat 230 ml			Gravel + wheat 460 ml		
	No.	Group % comp.	% Total	No.	Group % comp.	% Total	No.	Group % comp.	% Total	No.	Group % comp.	% Total
<u>Nemoura</u> sp.	11	78.6	10.0	2	100	6.1	6	66.7	8.0	3	33.3	2.4
<u>Leuctrinae</u>	1	7.1	0.9	-	-	-	2	33.3	2.7	1	11.1	0.8
Subtotals	14	100	11.8	2	100	6.1	8	100	10.7	9	100	7.3
TRICHOPTERA												
<u>Lepidostoma</u> sp.	-	-	-	-	-	-	-	-	-	-	-	-
<u>Hydropsyche</u> sp.	1	100	0.9	1*	33.3	3.0	-	-	-	-	-	-
<u>Rhyacophila</u> sp.1	-	-	-	-	-	-	-	-	-	-	-	-
<u>Rhyacophila</u> sp.3	-	-	-	2*	66.7	6.1	-	-	-	1	50	0.8
<u>Rhyacophila</u> sp.4	-	-	-	-	-	-	-	-	-	-	-	-
<u>Glossosoma</u> sp.	-	-	-	-	-	-	-	-	-	-	-	-
<u>Glossosoma pyroxum</u> (P)	-	-	-	-	-	-	-	-	-	-	-	-
<u>Limnephilidae</u> sp.3	-	-	-	-	-	-	-	-	-	1	50	0.8
<u>Polycentropus</u> sp.	-	-	-	-	-	-	-	-	-	-	-	-
<u>Neophylax</u> sp.	-	-	-	-	-	-	-	-	-	-	-	-
Subtotals	1	100	0.9	3	100	9.1	-	-	-	2	100	1.6
COLEOPTERA												
<u>Zaitzevia</u> sp.	24	88.9	21.8	1	100	3.0	1	100	1.3	2	100	1.6
<u>Zaitzevia</u> sp. (A)	1	3.7	0.9	-	-	-	-	-	-	-	-	-
<u>Narpus</u> sp.	2	7.4	1.8	-	-	-	-	-	-	-	-	-
Subtotals	27	100	24.5	1	100	3.0	1	100	1.3	2	100	1.6
DIPTERA												
Chironomidae												
<u>Pentaneura</u> sp.1	-	-	-	-	-	-	-	-	-	-	-	-
" sp.3	-	-	-	-	-	-	-	-	-	2	5.0	1.6
" sp.4	1	2.5	0.9	-	-	-	1	3.4	1.3	-	-	-
" sp.5	-	-	-	-	-	-	-	-	-	-	-	-
" sp.7	2	5.0	1.8	-	-	-	-	-	-	-	-	-

Date: May 17, 1972 Duration: 1 month	Natural gravel			Standard gravel			Gravel + wheat 230 ml			Gravel + wheat 460 ml		
	No.	Group % comp.	% Total	No.	Group % comp.	% Total	No.	Group % comp.	% Total	No.	Group % comp.	% Total
Diamesinae	-	-	-	-	-	-	-	-	-	-	-	-
<u>Corynoneura</u> sp.1	-	-	-	-	-	-	1	3.4	1.3	6	15.0	4.9
<u>Corynoneura</u> sp.2	-	-	-	-	-	-	-	-	-	-	-	-
<u>Thienemanniella</u> sp.1	-	-	-	-	-	-	-	-	-	-	-	-
Orthocladiinae sp.1	-	-	-	-	-	-	-	-	-	-	-	-
" sp.2	-	-	-	-	-	-	-	-	-	-	-	-
" sp.3	3	7.5	2.7	1	14.3	3.0	-	-	-	-	-	-
" sp.5	-	-	-	-	-	-	-	-	-	-	-	-
" sp.6	1	2.5	0.9	-	-	-	4	13.8	5.3	2	5.0	1.6
" sp.7a	5	12.5	4.5	2	28.6	6.1	7	24.1	9.3	5	12.5	4.1
" sp.8	1	2.5	0.9	-	-	-	-	-	-	-	-	-
" sp.9	2	5.0	1.8	1	14.3	3.0	-	-	-	4	10.0	3.3
" sp.19	-	-	-	-	-	-	-	-	-	-	-	-
Orthocladiinae (EI)	-	-	-	-	-	-	-	-	-	-	-	-
<u>Brillia</u> sp.1	-	-	-	-	-	-	-	-	-	-	-	-
<u>Brillia</u> sp.1(A)	-	-	-	-	-	-	-	-	-	-	-	-
<u>Brillia</u> sp.2	-	-	-	-	-	-	-	-	-	-	-	-
<u>Brillia</u> sp.3	-	-	-	-	-	-	-	-	-	-	-	-
<u>Micropsectra</u> sp.	11	27.5	10.0	-	-	-	-	-	-	1	2.5	0.8
<u>Rheotanytarsus</u> sp.1	4	10.0	3.6	-	-	-	-	-	-	-	-	-
<u>Rheotanytarsus</u> sp.1b	-	-	-	-	-	-	-	-	-	-	-	-
<u>Cladotanytarsus?</u> sp.3	-	-	-	-	-	-	-	-	-	-	-	-
Chironomini sp.1	-	-	-	3	42.9	9.1	7	24.1	9.3	15	37.5	12.2
Chironomini sp.1b	-	-	-	-	-	-	7	24.1	9.3	5	12.5	4.1
Chironomini spp. (EI)	-	-	-	-	-	-	-	-	-	-	-	-
Chironomini sp.1c	-	-	-	-	-	-	-	-	-	-	-	-
Chironomini sp.3	-	-	-	-	-	-	-	-	-	-	-	-
<u>Microtendipes</u> sp.4	-	-	-	-	-	-	2	6.9	2.7	-	-	-
<u>Zavrelia</u> sp.6	-	-	-	-	-	-	-	-	-	-	-	-
<u>Polypedilum</u> sp.2	-	-	-	-	-	-	-	-	-	-	-	-
Subtotal	40	100	37.0	7	100	21.2	29	100	38.5	40	100	32.6
No. species	12			4			7			8		

Date: May 17, 1972 Duration: 1 month	Natural gravel			Standard gravel			Gravel + wheat 230 ml			Gravel + wheat 460 ml		
	No.	Group % comp.	% Total	No.	Group % comp.	% Total	No.	Group % comp.	% Total	No.	Group % comp.	% Total
Chironomidae pupae												
sp.3	-	-	-	-	-	-	-	-	-	-	-	-
sp.7b	-	-	-	-	-	-	-	-	-	-	-	-
sp.10	-	-	-	-	-	-	-	-	-	-	-	-
sp.12	-	-	-	-	-	-	-	-	-	-	-	-
sp.14	-	-	-	-	-	-	-	-	-	-	-	-
sp.16	-	-	-	-	-	-	-	-	-	-	-	-
<u>Corynoneura</u> sp.2	-	-	-	-	-	-	-	-	-	-	-	-
<u>Corynoneura</u> sp.3	-	-	-	-	-	-	-	-	-	1	-	0.8
<u>Brillia</u> sp.1	-	-	-	-	-	-	-	-	-	-	-	-
<u>Brillia</u> sp.2	-	-	-	-	-	-	-	-	-	-	-	-
<u>Stempellina</u> sp.1	-	-	-	-	-	-	-	-	-	-	-	-
<u>Zavrelia</u> sp.15	-	-	-	-	-	-	-	-	-	-	-	-
Chironomini sp.1b	-	-	-	-	-	-	-	-	-	-	-	-
Tipulidae												
<u>Hexatoma</u> sp.	-	-	-	-	-	-	-	-	-	-	-	-
<u>Antocha</u> sp.	-	-	-	-	-	-	-	-	-	-	-	-
<u>Pedicia/Dicranota</u> spp.	-	-	-	-	-	-	-	-	-	-	-	-
<u>Pedicia/Dicranota</u> (P)	-	-	-	-	-	-	-	-	-	-	-	-
<u>Limnophila</u> sp.	-	-	-	-	-	-	-	-	-	-	-	-
Blepharoceridae	-	-	-	-	-	-	-	-	-	-	-	-
Blepharoceridae (P)	-	-	-	-	-	-	-	-	-	-	-	-
Ceratopogonidae	1	100	0.9	-	-	-	-	-	-	-	-	-
Simuliidae												
<u>Simulium</u> sp.1	2	-	1.8	-	-	-	-	-	-	1	-	0.8
<u>Simulium</u> sp.4	-	-	-	-	-	-	-	-	-	-	-	-
<u>Simulium</u> sp.4(P)	-	-	-	-	-	-	1	-	1.3	1	-	0.8
<u>Simulium arcticum</u>	-	-	-	-	-	-	-	-	-	-	-	-
<u>Simulium arcticum</u> (P)	-	-	-	-	-	-	-	-	-	-	-	-
<u>Prosimulium dicum</u>	-	-	-	2	-	6.1	-	-	-	2	-	1.6
<u>Prosimulium dicum</u> (P)	-	-	-	-	-	-	-	-	-	-	-	-
Empididae	-	-	-	-	-	-	-	-	-	-	-	-

Date: May 17, 1972 Duration: 1 month	Natural gravel			Standard gravel			Gravel + wheat 230 ml			Gravel + wheat 460 ml		
	No.	Group % comp.	% Total	No.	Group % comp.	% Total	No.	Group % comp.	% Total	No.	Group % comp.	% Total
OLIGOCHAETA												
<u>Nais</u> sp.	7	-	6.4	-	-	-	1	-	1.3	-	-	-
Lumbriculidae	-	-	-	-	-	-	-	-	-	-	-	-
<u>Styiodrilus</u> sp.	-	-	-	-	-	-	-	-	-	-	-	-
ACARI	-	-	-	-	-	-	-	-	-	-	-	-
OSTRACODA												
<u>Cyclocypris</u>												
<u>washingtonensis</u>	-	-	-	-	-	-	-	-	-	-	-	-
COPEPODA												
Harpacticoida	1	-	0.9	-	-	-	-	-	-	-	-	-
Total	110		100	33		100	75		100	123		100
Species total	29			14			17			25		

Experiment:	Natural gravel					Standard gravel				
	Tube 1	Tube 2	Tube 3	Tube 4	Tube 5	Tube 1	Tube 2	Tube 3	Tube 4	Tube 5
June 13, 1972 1 month duration										
COLLEMBOLA	-	-	-	-	-	-	-	-	-	-
EPHEMEROPTERA	65	64	69	44	54	37	53	57	58	44
nymphs	-	-	-	-	-	-	-	-	-	-
sub-imago	-	-	-	-	-	-	-	-	-	-
PLECOPTERA	25	19	17	7	21	4	6	-	5	7
nymphs	-	-	-	-	-	-	-	-	-	-
larvae	-	-	3	3	5	2	1	1	3	1
TRICHOPTERA	-	-	-	-	-	-	-	-	-	-
pupae	-	-	-	-	-	-	-	-	-	-
DIPTERA	-	-	-	-	-	-	-	-	-	-
Tipulidae	4	6	5	4	2	-	-	-	-	-
larvae	-	-	-	-	2	-	-	-	-	-
pupae	-	-	-	-	2	-	-	-	-	-
adults	-	-	-	-	-	-	-	-	-	-
Chironomidae	120	111	81	69	95	69	71	68	61	70
larvae	-	-	-	-	-	-	-	-	-	-
pupae	3	1	-	1	-	-	-	-	1	-
emerging adult	-	-	-	-	-	-	-	-	-	-
Ceratopogonidae	1	2	3	1	3	-	-	-	-	-
larvae	8	8	10	13	9	2	1	1	4	-
Simuliidae	-	2	-	-	1	-	-	-	-	-
pupae	-	-	-	-	-	-	-	-	-	-
Blepharoceridae	-	-	-	-	-	-	-	-	-	-
larvae	-	-	-	-	-	-	-	-	-	-
pupae	-	-	-	-	-	-	-	-	-	-
COLEOPTERA	10	2	13	10	13	-	-	-	-	-
Elmidae	-	-	-	1	1	1	-	-	-	-
adults	-	-	-	-	-	-	-	-	-	-
OLIGOCHAETA	2	1	-	-	-	-	-	-	-	-
Naididae	1	-	8	1	4	-	-	-	-	-
Others	1	-	-	-	-	-	-	-	-	-
ACARI	-	-	-	-	-	-	-	-	-	-
OSTRACODA	-	-	-	-	-	-	-	-	-	-
COPEPODA	4	10	2	1	8	3	2	-	2	1
Harpacticoida	-	-	-	-	-	-	-	-	-	-
Numbers	243	226	211	155	218	118	133	127	134	123
Weights (mg)	3.45	2.55	5.25	4.80	6.85	4.85	4.05	2.60	3.80	2.15
Mean numbers	210.6					127.0				
Mean weights (mg)	4.58					3.49				

Experiment:	Gravel + wheat					Gravel + wheat				
	Tube 1	Tube 2	Tube 3	Tube 4	Tube 5	Tube 1	Tube 2	Tube 3	Tube 4	Tube 5
June 13, 1972 1 month duration										
COLLEMBOLA	-	-	-	-	-	-	-	-	-	-
EPHEMEROPTERA	40	50	41	40	51	119	124	123	111	125
nymphs	-	-	-	-	-	-	-	-	-	-
sub-imago	-	-	-	-	-	-	-	-	-	-
nymphs	6	7	14	7	9	17	23	32	21	16
larvae	1	-	-	2	3	3	1	2	1	1
pupae	-	-	-	-	-	-	-	-	-	-
DIPTERA	-	-	-	-	-	-	-	-	-	-
Tipulidae	-	1	-	-	-	1	-	-	-	-
larvae	-	-	-	-	-	-	-	-	-	-
pupae	-	-	-	-	-	-	-	-	-	-
adults	-	-	-	-	-	-	-	-	-	-
Chironomidae	130	146	140	136	128	270	297	284	293	282
larvae	4	-	4	1	1	1	2	4	1	1
pupae	-	-	-	-	-	-	-	-	-	-
emerging adult	-	-	-	-	-	-	-	-	-	-
Ceratopogonidae	-	-	-	-	-	-	-	-	-	-
larvae	-	-	-	-	-	-	-	-	-	-
Simuliidae	1	5	1	-	2	3	9	8	4	6
larvae	-	-	-	-	-	-	-	-	-	-
pupae	-	-	-	-	-	-	-	-	-	-
larvae	-	-	-	-	-	-	-	-	-	-
pupae	-	-	-	-	-	-	-	-	-	-
COLEOPTERA	-	-	-	-	-	-	-	-	-	-
Elmidae	-	-	-	1	-	-	1	-	1	1
larvae	-	-	-	-	-	-	-	-	-	-
adults	-	-	-	-	-	-	-	-	-	-
OLIGOCHAETA	-	-	-	-	-	-	-	-	-	-
Naididae	-	-	-	-	-	-	-	-	-	-
Others	-	-	-	-	-	-	-	-	-	-
ACARI	-	-	-	-	-	-	-	-	-	-
OSTRACODA	-	-	-	-	-	-	-	-	-	-
COPEPODA	-	-	-	-	-	-	-	-	-	-
Harpacticoida	-	-	2	1	-	-	2	1	-	-
Numbers	182	209	202	188	194	414	459	454	432	433
Weights (mg)	5.30	5.00	7.05	9.25	7.85	14.60	18.10	17.50	18.70	22.35
Mean numbers	195.0					438.4				
Mean weights (mg)	7.01					18.25				

Date: June 13, 1972

Experiment: Grain

Duration: 1 month

	Natural gravel			Standard gravel			Gravel + wheat 230 ml			Gravel + wheat 460 ml		
	No.	Group % comp.	% Total	No.	Group % comp.	% Total	No.	Group % comp.	% Total	No.	Group % comp.	% Total
COLLEMBOLA												
Isotomidae	-	-	-	-	-	-	-	-	-	-	-	-
EPHEMEROPTERA												
<u>Baetis parvus</u>	5	9.3	2.3	8*	18.2	6.5	14*	27.5	7.2	42*	34.1	9.3
<u>Baetis parvus</u> (A)	-	-	-	-	-	-	-	-	-	-	-	-
<u>Baetis</u> sp.2	37	68.5	17.0	27	61.4	22.0	24	47.1	12.4	56	45.5	12.3
<u>Ephemerella tibialis</u>	1	1.9	0.5	1*	2.3	0.8	2*	3.9	1.0	4*	3.3	0.9
<u>Ephemerella inermis</u>	-	-	-	-	-	-	-	-	-	-	-	-
<u>Ephemerella grandis</u>	-	-	-	-	-	-	-	-	-	-	-	-
<u>Ameletus</u> sp.	-	-	-	-	-	-	-	-	-	-	-	-
<u>Paraleptophlebia</u> sp.1	9	16.7	4.1	4	9.1	3.3	6*	11.8	3.1	10	8.1	2.2
<u>Rhithrogena</u> sp.	-	-	-	-	-	-	-	-	-	-	-	-
<u>Cinygmula</u> sp.	2	3.7	0.9	-	-	-	4*	7.8	2.1	5*	4.1	1.1
<u>Cinygma</u> sp.	-	-	-	3	6.8	2.4	-	-	-	-	-	-
<u>Iron</u> sp.	-	-	-	1	2.3	0.8	-	-	-	-	-	-
<u>Ironodes</u> sp.	-	-	-	-	-	-	-	-	-	-	-	-
<u>Stenonema</u> sp.	-	-	-	-	-	-	1	2.0	0.5	-	-	-
Heptageniinae (EI)	-	-	-	-	-	-	-	-	-	6	4.9	1.3
Subtotals	54	100	24.8	44	100	35.8	51	100	26.3	123	100	27.1
No. species	5			6			6			6		
PLECOPTERA												
<u>Alloperla</u> sp.	8	38.1	3.7	-	-	-	1	11.1	0.5	2	6.3	0.4
<u>Hastaperla</u> sp.	-	-	-	-	-	-	-	-	-	-	-	-
<u>Isoperla</u> sp.	-	-	-	1	14.3	0.8	-	-	-	4	12.5	0.9



Date: June 13, 1972 Duration: 1 month	Natural gravel			Standard gravel			Gravel + wheat 230 ml			Gravel + wheat 460 ml		
	No.	Group % comp.	% Total	No.	Group % comp.	% Total	No.	Group % comp.	% Total	No.	Group % comp.	% Total
<u>Nemoura</u> sp.	13	61.9	6.0	5	71.4	4.1	5	55.6	2.6	22	68.8	4.8
<u>Leuctrinae</u>	-	-	-	1	14.3	0.8	3	33.3	1.5	4	12.5	0.9
Subtotals	21	100	9.7	7	100.0	5.7	9	100	4.6	100	100	7.0
TRICHOPTERA												
<u>Lepidostoma</u> sp.	-	-	-	-	-	-	1	33.3	0.5	-	-	-
<u>Hydropsyche</u> sp.	1*	20.0	0.5	-	-	-	-	-	-	-	-	-
<u>Rhyacophila</u> sp.1	-	-	-	-	-	-	-	-	-	-	-	-
<u>Rhyacophila</u> sp.3	-	-	-	-	-	-	-	-	-	-	-	-
<u>Rhyacophila</u> sp.4	1	20.0	0.5	-	-	-	-	-	-	-	-	-
<u>Glossosoma</u> sp.	3	60.0	1.4	-	-	-	1	33.3	0.5	-	-	-
<u>Glossosoma pyroxum</u> (P)	-	-	-	-	-	-	-	-	-	-	-	-
<u>Limnephilidae</u> sp.3	-	-	-	1	-	0.8	1	33.3	0.5	1	50.0	0.2
<u>Polycentropus</u> sp.	-	-	-	-	-	-	-	-	-	1	50.0	0.2
<u>Neophylax</u> sp.	-	-	-	-	-	-	-	-	-	-	-	-
Subtotals	5	100	2.4	1	100	0.8	3	100	1.5	2	100	0.4
COLEOPTERA												
<u>Zaitzevia</u> sp.	13	92.8	6.0	-	-	-	-	-	-	-	-	-
<u>Zaitzevia</u> sp. (A)	1	7.2	0.5	-	-	-	-	-	-	-	-	-
<u>Narpus</u> sp.	-	-	-	-	-	-	-	-	-	-	-	-
Subtotals	14	100	6.5	-	-	-	-	-	-	-	-	-
DIPTERA												
Chironomidae												
<u>Pentaneura</u> sp.1	-	-	-	2	2.9	1.6	1	0.8	0.5	8	2.8	1.8
" sp.3	-	-	-	-	-	-	3	2.3	1.5	3	1.1	0.7
" sp.4	4	4.2	1.8	-	-	-	-	-	-	1	0.4	0.2
" sp.5	-	-	-	1	1.4	0.8	1	0.8	0.5	-	-	-
" sp.7	-	-	-	-	-	-	-	-	-	-	-	-

Date: June 13, 1972 Duration: 1 month	Natural gravel			Standard gravel			Gravel + wheat 230 ml			Gravel + wheat 460 ml		
	No.	Group % comp.	% Total	No.	Group % comp.	% Total	No.	Group % comp.	% Total	No.	Group % comp.	% Total
<u>Diamesinae</u>	1	1.1	0.5	-	-	-	-	-	-	-	-	-
<u>Corynoneura</u> sp.1	27	28.4	12.4	21	30.0	17.1	38	29.7	19.6	78	27.5	17.2
<u>Corynoneura</u> sp.2	2	2.1	0.9	2	2.9	1.6	18	14.1	9.3	22	7.7	4.8
<u>Thienemanniella</u> sp.1	-	-	-	1	1.4	0.8	4	3.1	2.1	4	1.4	0.9
<u>Orthocladiinae</u> sp.1	-	-	-	-	-	-	-	-	-	-	-	-
" sp.2	-	-	-	-	-	-	-	-	-	-	-	-
" sp.3	6	6.3	2.8	1	1.4	0.8	1	0.8	0.5	-	-	-
" sp.5	-	-	-	-	-	-	5	3.9	2.6	8	2.8	1.8
" sp.6	8	8.4	3.7	3	4.3	2.4	5	3.9	2.6	3	1.1	0.7
" sp.7a	8	8.4	3.7	2	2.9	1.6	3	2.3	1.5	3	1.1	0.7
" sp.8	-	-	-	1	1.4	0.8	-	-	-	4	1.4	0.9
" sp.9	12	12.6	5.5	7	10.0	5.7	3	2.3	1.5	18	6.3	4.0
" sp.19	-	-	-	-	-	-	-	-	-	-	-	-
<u>Orthocladiinae</u> (EI)	-	-	-	-	-	-	-	-	-	-	-	-
<u>Brillia</u> sp.1	2	2.1	0.9	1	1.4	0.8	18*	14.1	9.3	83*	29.2	18.3
<u>Brillia</u> sp.1(A)	-	-	-	-	-	-	-	-	-	-	-	-
<u>Brillia</u> sp.2	-	-	-	-	-	-	-	-	-	2	0.7	0.4
<u>Brillia</u> sp.3	-	-	-	-	-	-	-	-	-	-	-	-
<u>Micropsectra</u> sp.	8	8.4	3.7	18	25.7	14.6	13	10.2	6.7	26	9.2	5.7
<u>Rheotanytarsus</u> sp.1	6	6.3	2.8	3	4.3	2.4	-	-	-	4	1.4	0.9
<u>Rheotanytarsus</u> sp.lb	-	-	-	-	-	-	-	-	-	-	-	-
<u>Cladotanytarsus?</u> sp.3	-	-	-	-	-	-	-	-	-	-	-	-
Chironomini sp.1	11	11.6	5.0	7	1.0	5.7	4	3.1	2.1	12	4.2	2.6
Chironomini sp.lb	-	-	-	-	-	-	7	5.5	3.6	3	1.1	0.7
Chironomini spp.(EI)	-	-	-	-	-	-	-	-	-	-	-	-
Chironomini sp.lc	-	-	-	-	-	-	-	-	-	-	-	-
Chironomini sp.3	-	-	-	-	-	-	-	-	-	-	-	-
<u>Microtendipes</u> sp.4	-	-	-	-	-	-	-	-	-	2	0.7	0.4
<u>Zavrelia</u> sp.6	-	-	-	-	-	-	-	-	-	-	-	-
<u>Polypedilum</u> sp.2	-	-	-	-	-	-	-	-	-	-	-	-
Subtotal	95	100	43.7	70	100	56.7	128	100	66.0	284	100	62.7
No. species	12			14			15			18		

	Natural gravel			Standard gravel			Gravel + wheat 230 ml			Gravel + wheat 460 ml		
	No.	Group % comp.	% Total	No.	Group % comp.	% Total	No.	Group % comp.	% Total	No.	Group % comp.	% Total
Date: June 13, 1972												
Duration: 1 month												
Chironomidae pupae												
sp.3	-	-	-	-	-	-	-	-	-	-	-	-
sp.7b	-	-	-	-	-	-	-	-	-	1	-	0.2
sp.10	-	-	-	-	-	-	-	-	-	-	-	-
sp.12	-	-	-	-	-	-	-	-	-	-	-	-
sp.14	-	-	-	-	-	-	-	-	-	-	-	-
sp.16	-	-	-	-	-	-	-	-	-	-	-	-
<u>Corynoneura</u> sp.2	-	-	-	-	-	-	1	-	0.5	2	-	0.4
<u>Corynoneura</u> sp.3	-	-	-	-	-	-	-	-	-	1	-	0.2
<u>Brillia</u> sp.1	-	-	-	-	-	-	-	-	-	-	-	-
<u>Brillia</u> sp.2	-	-	-	-	-	-	-	-	-	-	-	-
<u>Stempellina</u> sp.1	-	-	-	-	-	-	-	-	-	-	-	-
<u>Zavrelia</u> sp.15	-	-	-	-	-	-	-	-	-	-	-	-
Chironomini sp.1b	-	-	-	-	-	-	-	-	-	-	-	-
Tipulidae												
<u>Hexatoma</u> sp.	1	-	0.5	-	-	-	-	-	-	-	-	-
<u>Antocha</u> sp.	-	-	-	-	-	-	-	-	-	-	-	-
<u>Pedicia/Dicranota</u> spp.	-	-	-	-	-	-	-	-	-	-	-	-
<u>Pedicia/Dicranota</u> (P)	1	-	0.5	-	-	-	-	-	-	-	-	-
<u>Limnophila</u> sp.	1	-	0.5	-	-	-	-	-	-	-	-	-
Blepharoceridae	-	-	-	-	-	-	-	-	-	-	-	-
Blepharoceridae (P)	-	-	-	-	-	-	-	-	-	-	-	-
Ceratopogonidae	3	-	1.4	-	-	-	-	-	-	-	-	-
Simuliidae												
<u>Simulium</u> sp.1	-	-	-	-	-	-	-	-	-	-	-	-
<u>Simulium</u> sp.4	3	-	1.4	-	-	-	-	-	-	-	-	-
<u>Simulium</u> sp.4(P)	-	-	-	-	-	-	-	-	-	-	-	-
<u>Simulium arcticum</u>	6	-	2.8	-	-	-	2	-	100	8	-	1.8
<u>Simulium arcticum</u> (P)	1	-	0.5	-	-	-	-	-	-	-	-	-
<u>Prosimulium dicum</u>	-	-	-	-	-	-	-	-	-	-	-	-
<u>Prosimulium dicum</u> (P)	-	-	-	-	-	-	-	-	-	-	-	-
Empididae	-	-	-	-	-	-	-	-	-	-	-	-

Date: June 13, 1972 Duration: 1 month	Natural gravel			Standard gravel			Gravel + wheat 230 ml			Gravel + wheat 460 ml		
	No.	Group % comp.	% Total	No.	Group % comp.	% Total	No.	Group % comp.	% Total	No.	Group % comp.	% Total
OLIGOCHAETA												
<u>Nais</u> sp.	-	-	-	-	-	-	-	-	-	-	-	-
Lumbriculidae	-	-	-	-	-	-	-	-	-	-	-	-
<u>Stylodrilus</u> sp.	4	-	1.8	-	-	-	-	-	-	-	-	-
ACARI	-	-	-	-	-	-	-	-	-	-	-	-
OSTRACODA												
<u>Cyclocypris</u> <u>washingtonensis</u>	-	-	-	-	-	-	-	-	-	-	-	-
COPEPODA												
Harpacticoida	8	-	3.7	-	-	-	-	-	-	1	-	0.2
Total	218		100	123		100	194		100	454		100
Species total	31			25			28			32		

Experiment:		Natural gravel					Standard gravel				
July 11, 1972 2 months duration		Tube 1	Tube 2	Tube 3	Tube 4	Tube 5	Tube 1	Tube 2	Tube 3	Tube 4	Tube 5
COLLEMBOLA		-	-	-	-	-	-	-	-	-	-
EPHEMEROPTERA	nymphs	163	147	144	151	155	26	26	31	38	38
	sub-imago	-	-	-	-	-	-	-	-	-	-
PLECOPTERA	nymphs	14	21	23	22	29	1	2	4	4	3
TRICHOPTERA	larvae	10	9	10	5	14	-	3	1	-	2
	pupae	-	-	-	-	-	-	-	-	-	-
DIPTERA											
Tipulidae	larvae	1	-	-	2	-	-	-	-	-	-
	pupae	-	-	-	-	-	-	-	-	-	-
	adults	-	-	-	-	-	-	-	-	-	-
Chironomidae	larvae	81	88	93	91	96	20	23	23	16	14
	pupae	-	-	1	-	-	-	-	-	-	-
	emerging adult	-	-	-	-	-	-	-	-	-	-
Ceratopogonidae	larvae	-	-	4	3	-	-	-	-	-	-
Simuliidae	larvae	8	4	6	7	7	-	1	-	-	-
	pupae	-	-	-	-	-	-	-	-	-	-
Blepharoceridae	larvae	-	-	-	-	-	-	-	-	-	-
	pupae	-	-	-	-	-	-	-	-	-	-
COLEOPTERA											
Elmidae	larvae	8	14	11	11	12	-	-	-	1	-
	adults	-	-	-	-	2	-	2	-	1	-
OLIGOCHAETA											
Naididae		12	6	10	8	4	-	-	-	-	-
Others		-	-	-	-	2	-	-	-	-	-
ACARI		-	-	-	-	-	-	-	-	-	-
OSTRACODA		-	-	-	-	-	-	-	-	-	-
COPEPODA											
Harpacticoida		5	2	10	5	6	1	-	-	-	1
Numbers		302	291	312	305	327	48	57	59	60	58
Weights (mg)		3.80	4.30	2.85	3.10	4.75	2.10	5.20	2.40	3.10	2.80
Mean numbers		307.4					56.4				
Mean weights (mg)		3.76					3.12				

Experiment:		Gravel + wheat (230 ml)					Gravel + wheat (460 ml)				
July 11, 1972 2 months duration		Tube 1	Tube 2	Tube 3	Tube 4	Tube 5	Tube 1	Tube 2	Tube 3	Tube 4	Tube 5
COLLEMBOLA		-	-	-	-	-	-	-	-	-	-
EPHEMEROPTERA	nymphs	43	46	44	36	36	36	39	47	41	44
	sub-imago	-	-	-	-	-	-	-	-	-	-
PLECOPTERA	nymphs	6	5	8	11	7	13	5	9	12	11
TRICHOPTERA	larvae	4	4	6	2	2	6	1	2	1	2
	pupae	-	-	-	-	-	-	-	-	-	-
DIPTERA											
	Tipulidae										
	larvae	-	-	-	-	-	-	-	-	-	-
	pupae	-	-	-	-	-	-	-	-	-	-
	adults	-	-	-	-	-	-	-	-	-	-
Chironomidae	larvae	35	37	41	33	49	130	148	132	122	124
	pupae	-	1	-	-	-	2	2	2	-	-
	emerging adult	1	-	-	-	-	-	-	-	-	-
Ceratopogonidae	larvae	-	-	-	-	-	-	-	-	-	-
Simuliidae	larvae	-	-	-	2	-	-	-	-	-	-
	pupae	-	-	-	-	-	-	-	-	-	-
Blepharoceridae	larvae	-	-	-	-	-	-	-	-	-	-
	pupae	-	-	-	-	-	-	-	-	-	-
COLEOPTERA											
	Elmidae	1	-	-	-	-	2	-	-	-	1
	adults	1	-	-	-	-	3	2	2	-	-
OLIGOCHAETA											
	Naididae	-	-	-	-	-	-	-	-	-	-
	Others	-	-	-	-	-	-	-	-	-	-
ACARI		-	-	-	-	-	-	-	-	-	-
OSTRACODA		-	-	-	-	-	-	-	-	-	-
COPEPODA											
	Harpacticoida	-	-	1	-	-	-	-	-	-	-
Numbers		91	93	100	84	94	192	197	194	176	182
Weights (mg)		6.95	5.70	8.95	4.75	4.65	14.35	16.50	19.30	15.75	15.10
Mean numbers		92.4					188.2				
Mean weights (mg)		6.20					16.20				

Date: July 11, 1972  
 Experiment: Grain  
 Duration: 2 months

	Natural gravel			Standard gravel			Gravel + wheat 230 ml			Gravel + wheat 460 ml		
	No.	Group % comp.	% Total	No.	Group % comp.	% Total	No.	Group % comp.	% Total	No.	Group % comp.	% Total
COLLEMBOLA												
Isotomidae	-	-	-	-	-	-	-	-	-	-	-	-
EPHEMEROPTERA												
<u>Baetis parvus</u>	5	3.2	1.5	5	19.2	8.8	17	39.5	18.7	14	38.9	7.3
<u>Baetis parvus</u> (A)	-	-	-	-	-	-	-	-	-	-	-	-
<u>Baetis</u> sp.2	47	30.3	14.4	10	38.5	17.5	12	27.9	13.2	4	13.0	2.1
<u>Ephemerella tibialis</u>	1	0.6	0.3	3	11.5	5.3	2	4.7	2.2	-	-	-
<u>Ephemerella inermis</u>	2	1.3	0.6	-	-	-	-	-	-	-	-	-
<u>Ephemerella grandis</u>	-	-	-	-	-	-	-	-	-	-	-	-
<u>Ameletus</u> sp.	-	-	-	-	-	-	-	-	-	-	-	-
<u>Paraleptophlebia</u> sp.1	62	40.0	19.0	3	11.5	5.3	1	2.3	1.1	6	16.7	3.1
<u>Rhithrogena</u> sp.	-	-	-	-	-	-	-	-	-	-	-	-
<u>Cinygmula</u> sp.	2	1.3	0.6	1	3.8	1.8	4	9.3	4.4	6	16.7	3.1
<u>Cinygma</u> sp.	34	21.9	10.4	4	15.4	7.0	5	11.6	5.5	6	16.7	3.1
<u>Iron</u> sp.	2	1.3	0.6	-	-	-	2	4.7	2.2	-	-	-
<u>Ironodes</u> sp.	-	-	-	-	-	-	-	-	-	-	-	-
<u>Stenonema</u> sp.	-	-	-	-	-	-	-	-	-	-	-	-
Heptageniinae (EI)	-	-	-	-	-	-	-	-	-	-	-	-
Subtotals	155	100	47.4	26	100	45.7	43	100	47.3	36	100	18.7
No. species	8			6			7			5		
PLECOPTERA												
<u>Alloperla</u> sp.	5	17.2	1.5	-	-	-	1	16.7	1.1	3	23.1	1.6
<u>Hastaperla</u> sp.	-	-	-	-	-	-	-	-	-	-	-	-
<u>Isoperla</u> sp.	2	6.9	0.6	-	-	-	-	-	-	-	-	-

Date: July 11, 1972 Duration: 2 months	Natural gravel			Standard gravel			Gravel + wheat 230 ml			Gravel + wheat 460 ml		
	No.	Group % comp.	% Total	No.	Group % comp.	% Total	No.	Group % comp.	% Total	No.	Group % comp.	% Total
<u>Nemoura</u> sp.	15	51.7	4.6	2	100	3.5	5	83.3	5.5	9	69.1	4.7
<u>Leuctrinae</u>	7	24.2	2.1	-	-	-	-	-	-	1	7.8	0.5
Subtotals	29	100	8.8	2	100	3.5	6	100	6.6	13	100	6.8
TRICHOPTERA												
<u>Lepidostoma</u> sp.	-	-	-	-	-	-	-	-	-	-	-	-
<u>Hydropsyche</u> sp.	12	85.7	3.7	1	33.3	1.8	4	100	4.4	5	83.3	2.6
<u>Rhyacophila</u> sp.1	-	-	-	-	-	-	-	-	-	-	-	-
<u>Rhyacophila</u> sp.3	-	-	-	1	33.3	1.8	-	-	-	-	-	-
<u>Rhyacophila</u> sp.4	2	14.3	0.6	-	-	-	-	-	-	-	-	-
<u>Glossosoma</u> sp.	-	-	-	-	-	-	-	-	-	-	-	-
<u>Glossosoma pyroxum</u> (P)	-	-	-	-	-	-	-	-	-	-	-	-
<u>Limnephilidae</u> sp.3	-	-	-	-	-	-	-	-	-	-	-	-
<u>Polycentropus</u> sp.	-	-	-	1	33.3	1.8	-	-	-	-	-	-
<u>Neophylax</u> sp.	-	-	-	-	-	-	-	-	-	1	16.7	0.5
Subtotals	14	100	4.3	3	100	5.4	4	100	4.4	6	100	3.1
COLEOPTERA												
<u>Zaitzevia</u> sp.	12	85.7	3.7	-	-	-	1	50.0	1.1	2	40.0	1.0
<u>Zaitzevia</u> sp. (A)	2	14.3	0.6	2	100	3.5	1	50.0	1.1	3	60.0	1.6
<u>Narpus</u> sp.	-	-	-	-	-	-	-	-	-	-	-	-
Subtotals	14	100	4.3	2	100	3.5	2	100	2.2	5	100	2.6
DIPTERA												
Chironomidae												
<u>Pentaneura</u> sp.1	-	-	-	-	-	-	-	-	-	6	4.6	3.1
" sp.3	3	3.1	0.9	-	-	-	2	5.7	2.2	3	2.3	1.6
" sp.4	-	-	-	-	-	-	-	-	-	-	-	-
" sp.5	-	-	-	-	-	-	-	-	-	-	-	-
" sp.7	-	-	-	-	-	-	-	-	-	-	-	-



Date: July 11, 1972 Duration: 2 months	Natural gravel			Standard gravel			Gravel + wheat 230 ml			Gravel + wheat 460 ml		
	No.	Group % comp.	% Total	No.	Group % comp.	% Total	No.	Group % comp.	% Total	No.	Group % comp.	% Total
Diamesinae	-	-	-	-	-	-	-	-	-	-	-	-
<u>Corynoneura</u> sp.1	4	4.2	1.2	3	13.0	5.3	-	-	-	4	3.1	2.1
<u>Corynoneura</u> sp.2	-	-	-	2	8.7	3.5	-	-	-	19	14.6	9.9
<u>Thienemanniella</u> sp.1	-	-	-	-	-	-	-	-	-	-	-	-
Orthocladiinae sp.1	-	-	-	-	-	-	-	-	-	-	-	-
" sp.2	-	-	-	-	-	-	-	-	-	-	-	-
" sp.3	17	17.7	5.2	-	-	-	-	-	-	-	-	-
" sp.5	-	-	-	-	-	-	-	-	-	-	-	-
" sp.6	4	4.2	1.2	1	4.3	1.8	1	2.9	1.1	-	-	-
" sp.7a	9	9.4	2.8	1	4.3	1.8	8	22.9	8.8	1	0.8	0.5
" sp.8	-	-	-	-	-	-	-	-	-	-	-	-
" sp.9	4	4.2	1.2	2	8.7	3.5	-	-	-	-	-	-
" sp.19	-	-	-	-	-	-	-	-	-	-	-	-
Orthocladiinae (EI)	-	-	-	-	-	-	-	-	-	-	-	-
<u>Brillia</u> sp.1	-	-	-	-	-	-	2	5.7	2.2	13*	10.0	6.8
<u>Brillia</u> sp.1(A)	-	-	-	-	-	-	-	-	-	-	-	-
<u>Brillia</u> sp.2	-	-	-	-	-	-	-	-	-	3	2.3	1.6
<u>Brillia</u> sp.3	-	-	-	-	-	-	-	-	-	-	-	-
<u>Micropsectra</u> sp.	27	28.1	8.3	2	8.7	3.5	-	-	-	3	2.3	1.6
<u>Rheotanytarsus</u> sp.1	2	2.1	0.6	1	4.3	1.8	-	-	-	-	-	-
<u>Rheotanytarsus</u> sp.1b	-	-	-	-	-	-	-	-	-	-	-	-
<u>Cladotanytarsus</u> ? sp.3	-	-	-	-	-	-	-	-	-	-	-	-
Chironomini sp.1	23	24.0	7.0	10	43.5	17.5	17	48.6	18.7	8	6.2	4.2
Chironomini sp.1b	-	-	-	-	-	-	4	11.4	4.4	16*	12.3	8.3
Chironomini spp.(EI)	-	-	-	-	-	-	-	-	-	46	35.4	24.0
Chironomini sp.1c	-	-	-	-	-	-	-	-	-	2	1.5	1.0
Chironomini sp.3	-	-	-	-	-	-	-	-	-	-	-	-
<u>Microtendipes</u> sp.4	3	3.1	0.9	1	4.3	1.8	1	2.9	1.1	4	3.1	2.1
<u>Zavrelia</u> sp.6	-	-	-	-	-	-	-	-	-	-	-	-
<u>Polypedilum</u> sp.2	-	-	-	-	-	-	-	-	-	-	-	-
Subtotal	96	100	29.3	23	100	40.5	35	100	38.5	130	100	67.8
No. species	10			9			7			13		

	Natural gravel			Standard gravel			Gravel + wheat 230 ml			Gravel + wheat 460 ml		
	No.	Group % comp.	% Total	No.	Group % comp.	% Total	No.	Group % comp.	% Total	No.	Group % comp.	% Total
Date: July 11, 1972												
Duration: 2 months												
Chironomidae pupae												
sp.3	-	-	-	-	-	-	-	-	-	-	-	-
sp.7b	-	-	-	-	-	-	-	-	-	-	-	-
sp.10	-	-	-	-	-	-	-	-	-	-	-	-
sp.12	-	-	-	-	-	-	-	-	-	-	-	-
sp.14	-	-	-	-	-	-	-	-	-	-	-	-
sp.16	-	-	-	-	-	-	-	-	-	-	-	-
<u>Corynoneura</u> sp.2	-	-	-	-	-	-	-	-	-	-	-	-
<u>Corynoneura</u> sp.3	-	-	-	-	-	-	-	-	-	-	-	-
<u>Brillia</u> sp.1	-	-	-	-	-	-	1	-	1.1	1	-	0.5
<u>Brillia</u> sp.2	-	-	-	-	-	-	-	-	-	1	-	0.5
<u>Stempellina</u> sp.1	-	-	-	-	-	-	-	-	-	-	-	-
<u>Zavrelia</u> sp.15	-	-	-	-	-	-	-	-	-	-	-	-
Chironomini sp.1b	-	-	-	-	-	-	-	-	-	-	-	-
Tipulidae												
<u>Hexatoma</u> sp.	-	-	-	-	-	-	-	-	-	-	-	-
<u>Antocha</u> sp.	-	-	-	-	-	-	-	-	-	-	-	-
<u>Pedicia/Dicranota</u> spp.	-	-	-	-	-	-	-	-	-	-	-	-
<u>Pedicia/Dicranota</u> (P)	-	-	-	-	-	-	-	-	-	-	-	-
<u>Limnophila</u> sp.	-	-	-	-	-	-	-	-	-	-	-	-
Blepharoceridae												
Blepharoceridae (P)	-	-	-	-	-	-	-	-	-	-	-	-
Ceratopogonidae	-	-	-	-	-	-	-	-	-	-	-	-
Simuliidae												
<u>Simulium</u> sp.1	7	-	2.1	1	-	1.8	-	-	-	-	-	-
<u>Simulium</u> sp.4	-	-	-	-	-	-	-	-	-	-	-	-
<u>Simulium</u> sp.4(P)	-	-	-	-	-	-	-	-	-	-	-	-
<u>Simulium arcticum</u>	-	-	-	-	-	-	-	-	-	-	-	-
<u>Simulium arcticum</u> (P)	-	-	-	-	-	-	-	-	-	-	-	-
<u>Prosimulium dicum</u>	-	-	-	-	-	-	-	-	-	-	-	-
<u>Prosimulium dicum</u> (P)	-	-	-	-	-	-	-	-	-	-	-	-
Empididae	-	-	-	-	-	-	-	-	-	-	-	-

Date: July 11, 1972 Duration: 2 months	Natural gravel			Standard gravel			Gravel + wheat 230 ml			Gravel + wheat 460 ml		
	No.	Group % comp.	% Total	No.	Group % comp.	% Total	No.	Group % comp.	% Total	No.	Group % comp.	% Total
OLIGOCHAETA												
<u>Nais</u> sp.	4	-	1.2	-	-	-	-	-	-	-	-	-
Lumbriculidae	-	-	-	-	-	-	-	-	-	-	-	-
<u>Stylodrilus</u> sp.	2	-	0.6	-	-	-	-	-	-	-	-	-
ACARI	-	-	-	-	-	-	-	-	-	-	-	-
OSTRACODA												
<u>Cyclocypris</u> <u>washingtonensis</u>	-	-	-	-	-	-	-	-	-	-	-	-
COPEPODA												
Harpacticoida	6	-	1.8	-	-	-	-	-	-	-	-	-
Total	327		100	57		100	91		100	192		100
Species total	27			21			18			24		

Experiment:	Natural gravel					Standard gravel				
	Tube 1	Tube 2	Tube 3	Tube 4	Tube 5	Tube 1	Tube 2	Tube 3	Tube 4	Tube 5
August 2, 1972 3 month's duration										
COLLEMBOLA	117	106	103	113	118	18	18	21	20	21
EPHEMEROPTERA										
nymphs										
sub-imago										
nymphs	9	8	14	19	16	1	1	3	-	1
larvae	7	15	11	18	12	14	11	7	10	7
pupae										
DIPTERA										
Tipulidae										
larvae	1	2	2	4	1	-	-	-	-	-
pupae	-	1	-	-	-	-	-	-	-	-
adults	-	-	-	-	-	-	-	-	-	-
larvae	94	80	100	82	82	40	51	41	35	48
pupae	-	-	-	-	-	-	-	-	-	-
emerging adult	-	-	-	-	-	-	-	-	-	-
Ceratopogonidae	2	1	-	1	2	-	-	-	-	-
larvae	-	-	1	1	-	-	-	-	1	-
pupae	-	-	-	-	-	-	-	-	-	-
larvae	-	-	-	-	-	-	-	-	-	-
pupae	-	-	-	-	-	-	-	-	-	-
COLEOPTERA										
Elmidae	5	11	4	3	4	1	-	1	1	-
adults	-	-	-	-	1	-	-	1	-	-
OLIGOCHAETA										
Naididae	6	6	7	5	3	-	-	-	-	-
Others	-	-	-	-	2	-	-	-	-	-
ACARI	-	-	-	-	-	-	-	-	-	-
OSTRACODA	-	-	-	-	-	-	-	-	-	-
COPEPODA	-	-	-	-	-	-	-	-	-	-
Harpacticoida	17	16	10	8	7	-	-	-	-	-
Numbers	258	246	252	254	248	74	81	74	67	77
Weights (mg)	2.00	7.90	3.65	5.30	2.60	1.15	2.35	1.25	1.70	1.60
Mean numbers	251.6									
Mean weights (mg)	74.6									
	1.61									

Experiment:		Gravel + wheat (230 ml)					Gravel + wheat (460 ml)				
		Tube 1	Tube 2	Tube 3	Tube 4	Tube 5	Tube 1	Tube 2	Tube 3	Tube 4	Tube 5
COLLEMBOLA		-	-	-	-	-	-	-	-	-	-
EPHEMEROPTERA	nymphs	54	67	45	59	67	118	112	110	117	110
	sub-imago	-	-	-	-	-	-	-	-	-	-
PLECOPTERA	nymphs	12	12	19	10	9	15	14	8	14	14
TRICHOPTERA	larvae	8	11	16	9	5	49	31	35	31	26
	pupae	-	-	-	-	-	-	-	-	-	-
DIPTERA											
Tipulidae	larvae	-	2	1	2	2	-	-	-	-	-
	pupae	-	-	-	-	-	-	-	-	-	-
	adults	-	-	-	-	-	-	-	-	-	-
Chironomidae	larvae	76	80	82	84	74	224	192	222	210	237
	pupae	-	-	-	-	1	-	2	-	-	-
	emerging adult	-	-	-	-	-	-	-	-	-	-
Ceratopogonidae	larvae	-	1	-	-	-	-	-	-	-	-
Simuliidae	larvae	-	-	-	-	-	-	2	2	-	-
	pupae	-	-	-	-	-	-	-	-	-	-
Blepharoceridae	larvae	-	-	-	-	-	-	-	-	-	-
	pupae	-	-	-	-	-	-	-	-	-	-
COLEOPTERA											
Elmidae	larvae	3	6	-	-	1	3	1	3	3	5
	adults	4	1	1	-	1	1	1	-	1	-
OLIGOCHAETA											
Naididae		19	19	13	15	12	-	-	2	-	-
Others		-	-	-	3	3	-	-	-	-	-
ACARI		-	-	-	-	-	-	-	-	-	-
OSTRACODA		-	-	-	-	-	-	-	-	-	-
COPEPODA											
Harpacticoida		6	11	18	18	10	1	9	7	3	2
Numbers		182	210	195	200	185	411	364	389	379	394
Weights (mg)		5.45	5.50	11.00	4.10	3.00	7.30	6.90	5.40	5.20	5.30
Mean numbers		194.4					387.4				
Mean weights (mg)		5.81					6.02				

Date: August 2, 1972

Experiment: Grain

Duration: 3 months

	Natural gravel			Standard gravel			Gravel + wheat 230 ml			Gravel + wheat 460 ml		
	No.	Group % comp.	% Total	No.	Group % comp.	% Total	No.	Group % comp.	% Total	No.	Group % comp.	% Total
COLLEMBOLA												
Isotomidae	-	-	-	-	-	-	-	-	-	-	-	-
EPHEMEROPTERA												
<u>Baetis parvus</u>	7	5.9	2.8	6	28.6	7.8	14*	20.9	7.6	11	10.0	2.8
<u>Baetis parvus</u> (A)	-	-	-	-	-	-	-	-	-	-	-	-
<u>Baetis</u> sp.2	16	13.6	6.5	-	-	-	7	10.4	3.8	24	21.8	6.1
<u>Ephemerella tibialis</u>	-	-	-	1*	4.8	1.3	-	-	-	3	2.7	0.8
<u>Ephemerella inermis</u>	5	4.2	2.0	3	14.3	3.9	5	7.5	2.7	9	8.2	2.3
<u>Ephemerella grandis</u>	-	-	-	-	-	-	-	-	-	-	-	-
<u>Ameletus</u> sp.	-	-	-	-	-	-	-	-	-	-	-	-
<u>Paraleptophlebia</u> sp.1	26	22.0	10.5	-	-	-	26	38.8	14.1	16	14.5	4.1
<u>Rhithrogena</u> sp.	5	4.2	2.0	-	-	-	1	1.5	0.5	1	0.9	0.3
<u>Cinygmula</u> sp.	14	11.9	5.6	6	28.6	7.8	10	14.9	5.4	29*	26.4	7.4
<u>Cinygma</u> sp.	7	5.9	2.8	-	-	-	4	6.0	2.2	16*	14.5	4.1
<u>Iron</u> sp.	-	-	-	4	19.0	5.2	-	-	-	1	0.9	0.3
<u>Ironodes</u> sp.	-	-	-	1	4.8	1.3	-	-	-	-	-	-
<u>Stenonema</u> sp.	-	-	-	-	-	-	-	-	-	-	-	-
Heptageniinae (EI)	38	32.2	15.3	-	-	-	-	-	-	-	-	-
Subtotals	118	100	47.6	21	100	27.3	67	100	36.3	110	100	28.2
No. species	7			6			7			9		
PLECOPTERA												
<u>Alloperla</u> sp.	7	43.8	2.8	-	-	-	-	-	-	-	-	-
<u>Hastaperla</u> sp.	-	-	-	-	-	-	-	-	-	-	-	-
<u>Isoperla</u> sp.	3	18.8	1.2	-	-	-	-	-	-	-	-	-

Date: August 2, 1972 Duration: 3 months	Natural gravel			Standard gravel			Gravel + wheat 230 ml			Gravel + wheat 460 ml		
	No.	Group % comp.	% Total	No.	Group % comp.	% Total	No.	Group % comp.	% Total	No.	Group % comp.	% Total
<u>Nemoura</u> sp.	4	25.0	1.6	1	100	1.3	9	100	4.9	14	100	3.6
<u>Leuctrinae</u>	2	12.5	0.8	-	-	-	-	-	-	-	-	-
Subtotals	16	100	6.4	1	100	1.3	9	100	4.9	14	100	3.6
TRICHOPTERA												
<u>Lepidostoma</u> sp.	-	-	-	-	-	-	-	-	-	-	-	-
<u>Hydropsyche</u> sp.	12*	100	4.8	7	100	9.1	5*	100	2.7	26	100	6.6
<u>Rhyacophila</u> sp.1	-	-	-	-	-	-	-	-	-	-	-	-
<u>Rhyacophila</u> sp.3	-	-	-	-	-	-	-	-	-	-	-	-
<u>Rhyacophila</u> sp.4	-	-	-	-	-	-	-	-	-	-	-	-
<u>Glossosoma</u> sp.	-	-	-	-	-	-	-	-	-	-	-	-
<u>Glossosoma pyroxum</u> (P)	-	-	-	-	-	-	-	-	-	-	-	-
<u>Limnephilidae</u> sp.3	-	-	-	-	-	-	-	-	-	-	-	-
<u>Polycentropus</u> sp.	-	-	-	-	-	-	-	-	-	-	-	-
<u>Neophylax</u> sp.	-	-	-	-	-	-	-	-	-	-	-	-
Subtotals	12	100	4.8	7	100	9.1	5	100	2.7	26	100	6.6
COLEOPTERA												
<u>Zaitzevia</u> sp.	4	80.0	1.6	-	-	-	1	50.0	0.5	4	80.0	1.0
<u>Zaitzevia</u> sp. (A)	1	20.0	0.4	-	-	-	1	50.0	0.5	-	-	-
<u>Narpus</u> sp.	-	-	-	-	-	-	-	-	-	1	20.0	0.3
Subtotals	5	100	2.0	-	-	-	2	100	1.0	5	100	1.3
DIPTERA												
Chironomidae												
<u>Pentaneura</u> sp.1	-	-	-	-	-	-	-	-	-	22	9.3	5.6
" sp.3	2	2.4	0.8	-	-	-	2	2.7	1.1	8	3.4	2.0
" sp.4	-	-	-	-	-	-	-	-	-	-	-	-
" sp.5	2	2.4	0.8	-	-	-	-	-	-	8	3.4	2.0
" sp.7	1	1.2	0.4	-	-	-	-	-	-	2	0.8	0.5

Date: August 2, 1972 Duration: 3 months	Natural gravel			Standard gravel			Gravel + wheat 230 ml			Gravel + wheat 460 ml		
	No.	Group % comp.	% Total	No.	Group % comp.	% Total	No.	Group % comp.	% Total	No.	Group % comp.	% Total
Diamesinae	-	-	-	-	-	-	-	-	-	1	0.4	0.3
<u>Corynoneura</u> sp.1	5	6.1	2.0	4	8.3	5.2	6	8.1	3.2	21	8.9	5.3
<u>Corynoneura</u> sp.2	1	1.2	0.4	1	2.1	1.3	3	4.1	1.6	5	2.1	1.3
<u>Thienemanniella</u> sp.1	4	4.9	1.6	-	-	-	-	-	-	3	1.3	0.8
Orthoclaadiinae sp.1	-	-	-	-	-	-	-	-	-	2	0.8	0.5
" sp.2	4	4.9	1.6	-	-	-	-	-	-	-	-	-
" sp.3	6	7.3	2.4	1	2.1	1.3	-	-	-	-	-	-
" sp.5	1	1.2	0.4	-	-	-	-	-	-	1	0.4	0.3
" sp.6	8	9.8	3.2	3	6.3	3.9	6	8.1	3.2	15	6.3	3.8
" sp.7a	12	14.6	4.8	2	4.2	2.6	4	5.4	2.2	5	2.1	1.3
" sp.8	-	-	-	-	-	-	2	2.7	1.1	2	0.8	0.5
" sp.9	3	3.7	1.2	-	-	-	3	4.1	1.6	13	5.5	3.3
" sp.19	-	-	-	-	-	-	-	-	-	-	-	-
Orthoclaadiinae (EI)	-	-	-	-	-	-	-	-	-	23	9.7	5.8
<u>Brillia</u> sp.1	-	-	-	-	-	-	2	2.7	1.1	-	-	-
<u>Brillia</u> sp.1(A)	-	-	-	-	-	-	-	-	-	-	-	-
<u>Brillia</u> sp.2	-	-	-	-	-	-	-	-	-	-	-	-
<u>Brillia</u> sp.3	-	-	-	-	-	-	-	-	-	-	-	-
<u>Micropsectra</u> sp.	15	18.3	6.0	5	10.4	6.5	9	12.2	4.9	9	3.8	2.3
<u>Rheotanytarsus</u> sp.1	4	4.9	1.6	2	4.2	2.6	-	-	-	14	5.9	3.6
<u>Rheotanytarsus</u> sp.lb	-	-	-	-	-	-	-	-	-	-	-	-
<u>Cladotanytarsus?</u> sp.3	-	-	-	-	-	-	-	-	-	-	-	-
Chironomini sp.1	10	12.2	4.0	24	50.0	31.2	3	4.1	1.6	19	8.0	4.8
Chironomini sp.lb	-	-	-	3	6.3	3.9	-	-	-	2	0.8	0.5
Chironomini spp.(EI)	-	-	-	-	-	-	28	37.8	15.1	59	24.9	15.0
Chironomini sp.lc	-	-	-	-	-	-	-	-	-	-	-	-
Chironomini sp.3	-	-	-	-	-	-	-	-	-	-	-	-
<u>Microtendipes</u> sp.4	4	4.9	1.6	3	6.3	3.9	6	8.1	3.2	3	1.3	0.8
<u>Zavrelia</u> sp.6	-	-	-	-	-	-	-	-	-	-	-	-
<u>Polypedilum</u> sp.2	-	-	-	-	-	-	-	-	-	-	-	-
Subtotal	82	100	32.8	48	100	62.4	74	100	39.9	237	100	60.2
No. species	17			10			11			19		



Date: August 2, 1972 Duration: 3 months	Natural gravel			Standard gravel			Gravel + wheat 230 ml			Gravel + wheat 460 ml		
	No.	Group % comp.	% Total	No.	Group % comp.	% Total	No.	Group % comp.	% Total	No.	Group % comp.	% Total
Chironomidae pupae												
sp.3	-	-	-	-	-	-	-	-	-	-	-	-
sp.7b	-	-	-	-	-	-	-	-	-	-	-	-
sp.10	-	-	-	-	-	-	-	-	-	-	-	-
sp.12	-	-	-	-	-	-	1	-	0.5	-	-	-
sp.14	-	-	-	-	-	-	-	-	-	-	-	-
sp.16	-	-	-	-	-	-	-	-	-	-	-	-
<u>Corynoneura</u> sp.2	-	-	-	-	-	-	-	-	-	-	-	-
<u>Corynoneura</u> sp.3	-	-	-	-	-	-	-	-	-	-	-	-
<u>Brillia</u> sp.1	-	-	-	-	-	-	-	-	-	-	-	-
<u>Brillia</u> sp.2	-	-	-	-	-	-	-	-	-	-	-	-
<u>Stempellina</u> sp.1	-	-	-	-	-	-	-	-	-	-	-	-
<u>Zavrelia</u> sp.15	-	-	-	-	-	-	-	-	-	-	-	-
Chironomini sp.1b	-	-	-	-	-	-	-	-	-	-	-	-
Tipulidae												
<u>Hexatoma</u> sp.	-	-	-	-	-	-	-	-	-	-	-	-
<u>Antocha</u> sp.	-	-	-	-	-	-	-	-	-	-	-	-
<u>Pedicia/Dicranota</u> spp.	-	-	-	-	-	-	-	-	-	-	-	-
<u>Pedicia/Dicranota</u> (P)	-	-	-	-	-	-	-	-	-	-	-	-
<u>Limnophila</u> sp.	1	-	0.4	-	-	-	2	-	1.1	-	-	-
Blepharoceridae	-	-	-	-	-	-	-	-	-	-	-	-
Blepharoceridae (P)	-	-	-	-	-	-	-	-	-	-	-	-
Ceratopogonidae	2	-	0.8	-	-	-	-	-	-	-	-	-
Simuliidae												
<u>Simulium</u> sp.1	-	-	-	-	-	-	-	-	-	-	-	-
<u>Simulium</u> sp.4	-	-	-	-	-	-	-	-	-	-	-	-
<u>Simulium</u> sp.4(P)	-	-	-	-	-	-	-	-	-	-	-	-
<u>Simulium arcticum</u>	-	-	-	-	-	-	-	-	-	-	-	-
<u>Simulium arcticum</u> (P)	-	-	-	-	-	-	-	-	-	-	-	-
<u>Prosimulium dicum</u>	-	-	-	-	-	-	-	-	-	-	-	-
<u>Prosimulium dicum</u> (P)	-	-	-	-	-	-	-	-	-	-	-	-
Empididae	-	-	-	-	-	-	-	-	-	-	-	-

Date: August 2, 1972 Duration: 3 months	Natural gravel			Standard gravel			Gravel + wheat 230 ml			Gravel + wheat 460 ml		
	No.	Group % comp.	% Total	No.	Group % comp.	% Total	No.	Group % comp.	% Total	No.	Group % comp.	% Total
OLIGOCHAETA												
<u>Nais</u> sp.	3	-	1.2	-	-	-	12	-	6.5	-	-	-
Lumbriculidae	-	-	-	-	-	-	-	-	-	-	-	-
<u>Stylodrilus</u> sp.	2	-	0.8	-	-	-	3	-	1.6	-	-	-
ACARI	-	-	-	-	-	-	-	-	-	-	-	-
OSTRACODA												
<u>Cyclocypris</u> <u>washingtonensis</u>	-	-	-	-	-	-	-	-	-	-	-	-
COPEPODA												
Harpacticoida	7	-	2.8	-	-	-	10	-	5.4	2	-	0.5
Total	248	-	100	77	-	100	185	-	100	394	-	100
Species total	35			18			25			33		

Experiment:		Standard gravel					Gravel + wheat 460 ml				
August 18, 1971 1 month duration		Tube 1	Tube 2	Tube 3	Tube 4	Tube 5	Tube 1	Tube 2	Tube 3	Tube 4	Tube 5
COLLEMBOLA		-	-	-	1	-	-	-	-	-	-
EPHEMEROPTERA	nymphs	125	96	100	109	84	194	153	192	135	154
	sub-imago	-	-	-	-	-	-	-	-	-	-
PLECOPTERA	nymphs	4	4	5	2	2	8	8	14	1	-
TRICHOPTERA	larvae	6	3	4	6	3	10	3	6	3	2
	pupae	-	-	-	-	-	-	-	-	-	-
DIPTERA											
Tipulidae	larvae	-	-	-	-	-	2	-	1	-	-
	pupae	-	-	-	-	-	-	-	-	-	-
	adults	-	-	-	-	-	-	-	-	-	-
Chironomidae	larvae	242	256	192	180	192	523	437	439	293	290
	pupae	-	-	1	-	-	10	11	9	11	11
	emerging adult	-	-	-	-	-	-	-	-	-	-
Ceratopogonidae	larvae	-	-	-	-	-	-	-	-	-	-
Simuliidae	larvae	-	-	-	-	-	-	-	-	-	-
	pupae	-	-	-	-	-	-	-	-	-	-
Blepharoceridae	larvae	-	-	-	-	-	-	-	-	-	-
	pupae	-	-	-	-	-	-	-	-	-	-
COLEOPTERA											
Elmidae	larvae	1	1	-	-	-	-	-	-	-	-
	adults	-	-	-	-	-	1	1	-	-	1
OLIGOCHAETA											
Naididae		1	5	1	-	-	3	2	2	-	-
	Others	-	-	-	-	-	-	-	-	-	-
ACARI		5	-	-	1	1	9	-	-	-	-
OSTRACODA		-	-	-	-	-	5	1	1	-	-
COPEPODA											
Harpacticoida		1	-	-	-	-	3	1	-	-	-
Numbers		385	365	303	299	282	768	617	664	443	458
Weights (mg)		2.71	2.74	5.01	4.05	1.15	49.49	57.21	53.70	47.50	46.95
Mean numbers		326.8					590.0				
Mean weights (mg)		3.15					50.97				

Experiment:		Gravel + wheat 920 ml										
August 18, 1971 1 month duration		Tube 1	Tube 2	Tube 3	Tube 4	Tube 5	Tube 1	Tube 2	Tube 3	Tube 4	Tube 5	
COLLEMBOLA		-	-	-	-	-						
EPHEMEROPTERA	nymphs	136	122	164	127	148						
	sub-imago	-	-	-	-	1						
PLECOPTERA	nymphs	4	14	5	11	16						
TRICHOPTERA	larvae	7	15	11	8	9						
	pupae	-	-	-	-	-						
DIPTERA												
Tipulidae	larvae	1	-	1	-	1						
	pupae	-	-	-	-	-						
	adults	-	-	-	-	-						
Chironomidae	larvae	394	451	385	418	402						
	pupae	13	16	12	21	8						
	emerging adult	-	-	-	-	-						
Ceratopogonidae	larvae	-	-	-	-	-						
Simuliidae	larvae	-	-	-	-	-						
	pupae	-	-	-	-	-						
Blepharoceridae	larvae	-	-	-	-	-						
	pupae	-	-	-	-	-						
COLEOPTERA												
Elmidae	larvae	2	3	3	1	3						
	adults	1	1	-	-	-						
OLIGOCHAETA												
Naididae		-	-	-	-	2						
Others		-	-	-	-	-						
ACARI		-	-	-	-	-						
OSTRACODA		-	-	-	-	-						
COPEPODA												
Harpacticoida		-	-	-	-	-						
Numbers		558	622	581	586	590						
Weights (mg)		78.90	86.95	67.15	80.95	61.30						
Mean numbers		587.4										
Mean weights (mg)		75.05										

Date: August 18, 1971  
 Experiment: Grain  
 Duration: 1 month

	Standard gravel			Gravel + wheat 460 ml			Gravel + wheat 920 ml			No.	Group % comp.	% Total
	No.	Group % comp.	% Total	No.	Group % comp.	% Total	No.	Group % comp.	% Total			
COLLEMBOLA												
Isotomidae	-	-	-	-	-	-	-	-	-			
EPHEMEROPTERA												
<u>Baetis parvus</u>	20	23.8	7.1	52	27.1	7.9	33	22.3	5.6			
<u>Baetis parvus</u> (A)	-	-	-	-	-	-	1*	0.7	0.2			
<u>Baetis sp.2</u>	4	4.8	1.4	10	5.2	1.5	9	6.1	1.5			
<u>Ephemerella tibialis</u>	-	-	-	1	0.5	0.1	-	-	-			
<u>Ephemerella inermis</u>	24	28.6	8.5	42	21.9	6.4	24	16.2	4.1			
<u>Ephemerella grandis</u>	-	-	-	-	-	-	2	1.4	0.3			
<u>Ameletus sp.</u>	-	-	-	-	-	-	-	-	-			
<u>Paraleptophlebia sp.1</u>	14	16.7	4.9	34	17.2	5.1	53	35.8	9.0			
<u>Rhithrogena sp.</u>	2	2.4	0.7	8	4.2	1.2	3	2.0	0.5			
<u>Cinygmula sp.</u>	20	23.8	7.1	-	-	-	23	15.5	3.9			
<u>Cinygma sp.</u>	-	-	-	43	22.4	6.5	-	-	-			
<u>Iron sp.</u>	-	-	-	2	1.0	0.3	1	0.7	0.2			
<u>Ironodes sp.</u>	-	-	-	-	-	-	-	-	-			
<u>Stenonema sp.</u>	-	-	-	-	-	-	-	-	-			
Heptageniinae (EI)	-	-	-	-	-	-	-	-	-			
Subtotals	84	100	29.9	192	100	29.0	149	100	25.1			
No. species	6			8			8					
PLECOPTERA												
<u>Alloperla sp.</u>	-	-	-	2	1.4	0.3	3	18.8	0.5			
<u>Hastaperla sp.</u>	-	-	-	-	-	-	-	-	-			
<u>Isoperla sp.</u>	-	-	-	1	7.1	0.1	1	6.2	0.2			

Date: August 18, 1971 Duration: 1 month	Standard gravel			Gravel + wheat 460 ml			Gravel + wheat 920 ml			No.	Group % comp.	% Total
	No.	Group % comp.	% Total	No.	Group % comp.	% Total	No.	Group % comp.	% Total			
Nemoura sp. Leuctrinae	2 -	100 -	0.7 -	10 1	71.4 7.1	1.5 0.1	12 -	75.0 -	2.0 -			
Subtotals	2	100	0.7	14	100	2.0	16	100	2.7			
TRICHOPTERA												
<u>Lepidostoma</u> sp.	2	66.7	0.7	6	100	0.9	8	88.9	1.4			
<u>Hydropsyche</u> sp.	-	-	-	-	-	-	1	11.1	0.2			
<u>Rhyacophila</u> sp.1	-	-	-	-	-	-	-	-	-			
<u>Rhyacophila</u> sp.3	-	-	-	-	-	-	-	-	-			
<u>Rhyacophila</u> sp.4	-	-	-	-	-	-	-	-	-			
<u>Glossosoma</u> sp.	-	-	-	-	-	-	-	-	-			
<u>Glossosoma pyroxum</u> (P)	-	-	-	-	-	-	-	-	-			
<u>Limnephilidae</u> sp.3	-	-	-	-	-	-	-	-	-			
<u>Polycentropus</u> sp.	1	33.3	0.4	-	-	-	-	-	-			
<u>Neophylax</u> sp.	-	-	-	-	-	-	-	-	-			
Subtotals	3	100	1.1	6	100	0.9	9	100	1.6			
COLEOPTERA												
<u>Zaitzevia</u> sp.	-	-	-	-	-	-	3	100	0.5			
<u>Zaitzevia</u> sp. (A)	-	-	-	-	-	-	-	-	-			
<u>Narpus</u> sp.	-	-	-	-	-	-	-	-	-			
Subtotals	-	-	-	-	-	-	3	100	0.5			
DIPTERA												
Chironomidae												
<u>Pentaneura</u> sp.1	-	-	-	-	-	-	2	0.5	0.3			
" sp.3	23	12.0	8.2	29	6.6	4.4	38	9.5	6.4			
" sp.4	4	2.1	1.4	1	0.2	0.1	-	-	-			
" sp.5	-	-	-	-	-	-	-	-	-			
" sp.7	-	-	-	-	-	-	1	0.2	0.2			

Date: August 18, 1971 Duration: 1 month	Standard gravel			Gravel + wheat 460 ml			Gravel + wheat 920 ml			No.	Group % comp.	%
	No.	Group % comp.	% Total	No.	Group % comp.	% Total	No.	Group % comp.	% Total			
<u>Diamesinae</u>	-	-	-	1	0.2	0.1	-	-	-			
<u>Corynoneura</u> sp.1	4	2.1	1.4	3	0.7	0.5	2	0.5	0.3			
<u>Corynoneura</u> sp.2	19	9.9	6.8	18	4.1	2.7	5	1.2	0.8			
<u>Thienemanniella</u> sp.1	2	1.0	0.7	2	0.5	0.3	2	0.5	0.3			
<u>Orthoclaadiinae</u> sp.1	-	-	-	-	-	-	-	-	-			
" sp.2	-	-	-	-	-	-	-	-	-			
" sp.3	-	-	-	-	-	-	-	-	-			
" sp.5	-	-	-	-	-	-	-	-	-			
" sp.6	4	2.1	1.4	4	0.9	0.6	3	0.7	0.5			
" sp.7a	43	22.4	15.3	29	6.6	4.4	18	4.5	3.1			
" sp.8	-	-	-	2	0.5	0.3	1	0.2	0.2			
" sp.9	2	1.0	0.7	3	0.7	0.5	3	0.7	0.5			
" sp.19	-	-	-	-	-	-	-	-	-			
<u>Orthoclaadiinae</u> (EI)	-	-	-	18	4.1	2.7	-	-	-			
<u>Brillia</u> sp.1	1	0.5	0.4	9	2.1	1.4	9	2.2	1.5			
<u>Brillia</u> sp.1(A)	-	-	-	-	-	-	-	-	-			
<u>Brillia</u> sp.2	-	-	-	-	-	-	-	-	-			
<u>Brillia</u> sp.3	-	-	-	-	-	-	-	-	-			
<u>Micropsectra</u> sp.	6	3.1	2.1	17	3.9	2.6	27	6.7	4.6			
<u>Rheotanytarsus</u> sp.1	4	2.1	1.4	8	1.8	1.2	6	1.5	1.0			
<u>Rheotanytarsus</u> sp.1b	-	-	-	-	-	-	-	-	-			
<u>Cladotanytarsus?</u> sp.3	-	-	-	-	-	-	1	0.2	0.2			
<u>Chironomini</u> sp.1	29	15.1	10.3	19	4.3	2.9	21	5.2	3.6			
<u>Chironomini</u> sp.1b	-	-	-	123*	28.1	18.6	168*	41.8	28.5			
<u>Chironomini</u> spp.(EI)	44	22.9	15.7	136	31.1	20.6	67	16.7	11.4			
<u>Chironomini</u> sp.1c	-	-	-	6	1.4	0.9	22	5.5	3.7			
<u>Chironomini</u> sp.3	-	-	-	3	0.7	0.5	-	-	-			
<u>Microtendipes</u> sp.4	7	3.7	2.5	4	0.9	0.6	6	1.5	1.0			
<u>Zavrelia</u> sp.6	-	-	-	2	0.5	0.3	-	-	-			
<u>Polypedilum</u> sp.2	-	-	-	-	-	-	-	-	-			
Subtotal	192	100	68.3	437	100	66.2	402	100	68.1			
No. species	14			19			18					

Date: August 18, 1971 Duration: 1 month	Standard gravel			Gravel + wheat 460 ml			Gravel + wheat 920 ml			No.	Group % comp.	% Total
	No.	Group % comp.	% Total	No.	Group % comp.	% Total	No.	Group % comp.	% Total			
Chironomidae pupae												
sp.3	-	-	-	-	-	-	-	-	-	-	-	-
sp.7b	-	-	-	-	-	-	-	-	-	-	-	-
sp.10	-	-	-	-	-	-	-	-	-	-	-	-
sp.12	-	-	-	-	-	-	-	-	-	-	-	-
sp.14	-	-	-	-	-	-	-	-	-	-	-	-
sp.16	-	-	-	-	-	-	-	-	-	-	-	-
<u>Corynoneura</u> sp.2	-	-	-	-	-	-	-	-	-	-	-	-
<u>Corynoneura</u> sp.3	-	-	-	-	-	-	-	-	-	-	-	-
<u>Brillia</u> sp.1	-	-	-	-	-	-	-	-	-	-	-	-
<u>Brillia</u> sp.2	-	-	-	-	-	-	-	-	-	-	-	-
<u>Stempellina</u> sp.1	-	-	-	-	-	-	-	-	-	-	-	-
<u>Zavrelia</u> sp.15	-	-	-	-	-	-	-	-	-	-	-	-
Chironomini sp.1b	-	-	-	9	-	1.4	8	-	1.4			
Tipulidae												
<u>Hexatoma</u> sp.	-	-	-	-	-	-	-	-	-	-	-	-
<u>Antocha</u> sp.	-	-	-	1	-	0.1	-	-	-	-	-	-
<u>Pedicia/Dicranota</u> spp.	-	-	-	-	-	-	1	-	0.2			
<u>Pedicia/Dicranota</u> (P)	-	-	-	-	-	-	-	-	-			
<u>Limnophila</u> sp.	-	-	-	-	-	-	-	-	-			
Blepharoceridae												
Blepharoceridae (P)	-	-	-	-	-	-	-	-	-			
Ceratopogonidae	-	-	-	-	-	-	-	-	-			
Simuliidae												
<u>Simulium</u> sp.1	-	-	-	-	-	-	-	-	-			
<u>Simulium</u> sp.4	-	-	-	-	-	-	-	-	-			
<u>Simulium</u> sp.4(P)	-	-	-	-	-	-	-	-	-			
<u>Simulium arcticum</u>	-	-	-	-	-	-	-	-	-			
<u>Simulium arcticum</u> (P)	-	-	-	-	-	-	-	-	-			
<u>Prosimulium dicum</u>	-	-	-	-	-	-	-	-	-			
<u>Prosimulium dicum</u> (P)	-	-	-	-	-	-	-	-	-			
Empididae	-	-	-	-	-	-	-	-	-			



Date: August 18, 1971 Duration: 1 month	Standard gravel			Gravel + wheat 460 ml			Gravel + wheat 920 ml			No.	Group % comp.	% Total
	No.	Group % comp.	% Total	No.	Group % comp.	% Total	No.	Group % comp.	% Total			
OLIGOCHAETA												
<u>Nais</u> sp.	-	-	-	2	-	0.3	2	-	0.3			
<u>Lumbriculidae</u>	-	-	-	-	-	-	-	-	-			
<u>Stylocypris</u> sp.	-	-	-	-	-	-	-	-	-			
ACARI	-	-	-	-	-	-	-	-	-			
OSTRACODA												
<u>Cyclocypris</u>												
<u>washingtonensis</u>	-	-	-	-	-	-	-	-	-			
COPEPODA												
<u>Harpacticoida</u>	-	-	-	-	-	-	-	-	-			
Total	281		100	661		100	590		100			
Species total	23			35			34					

Experiment:	Gravel + wheat					Gravel + wheat				
	Tube 1	Tube 2	Tube 3	Tube 4	Tube 5	Tube 1	Tube 2	Tube 3	Tube 4	Tube 5
August 31, 1972 1 month duration										
COLLEMBOLA										
EPHEMEROPTERA										
nymphs	133	126	111	131	112	106	113	102	95	121
sub- imago										
nymphs	11	16	9	10	17	10	9	5	14	7
PLECOPTERA	19	12	15	17	21	24	26	23	32	36
larvae										
pupae										
DIPTERA										
Tipulidae										
larvae										
pupae										
adults										
Chironomidae	191	198	187	188	182	173	184	191	199	180
larvae	3	5	4	2	4	3	3	5	4	2
pupae										
emerging adult										
Ceratopogonidae										
larvae										
Simuliidae										
larvae		1		2	1	4	2			2
pupae										
Blepharoceridae										
larvae										
pupae										
COLEOPTERA										
Elmidae	5	1	4	2	4	3	3	3	4	6
larvae										
adults						2	1		1	1
OLIGOCHAETA										
Naididae	1	1	1	1	1					
Others										
ACARI										
OSTRACODA										
COPEPODA										
Harpacticoida	3	1	1	3	1					
Numbers	366	361	332	356	343	325	341	329	349	355
Weights (mg)	22.20	25.30	25.05	14.85	27.60	31.35	38.40	39.45	41.50	41.05
Mean numbers	351.6									
Mean weights (mg)	23.00									
	339.8									
	38.35									

Experiment:		Natural gravel					Standard gravel				
August 31, 1972 1 month duration		Tube 1	Tube 2	Tube 3	Tube 4	Tube 5	Tube 1	Tube 2	Tube 3	Tube 4	Tube 5
COLLEMBOLA		-	-	-	-	-	-	-	-	-	-
EPHEMEROPTERA	nymphs	130	121	136	144	123	78	100	117	83	105
	sub- imago	-	-	-	-	-	-	-	-	-	-
PLECOPTERA	nymphs	12	14	21	15	13	3	4	6	7	4
TRICHOPTERA	larvae	19	24	30	25	28	10	10	6	12	16
	pupae	-	-	-	-	-	-	-	-	-	-
DIPTERA											
Tipulidae	larvae	2	-	3	6	3	-	-	-	-	-
	pupae	-	-	-	-	-	-	-	-	-	-
	adults	-	-	-	-	-	-	-	-	-	-
Chironomidae	larvae	131	138	128	127	141	148	158	128	140	127
	pupae	-	1	-	1	-	-	-	1	1	1
	emerging adult	-	-	-	-	-	-	-	-	-	-
Ceratopogonidae	larvae	-	-	-	-	-	-	-	-	-	-
Simuliidae	larvae	2	3	2	2	2	-	-	1	-	1
	pupae	-	-	-	-	-	-	-	-	-	-
Blepharoceridae	larvae	-	-	-	-	-	-	-	-	-	-
	pupae	-	-	-	-	-	-	-	-	-	-
COLEOPTERA											
Elmidae	larvae	10	5	10	11	6	1	5	1	3	1
	adults	-	-	-	1	-	-	-	-	-	-
OLIGOCHAETA											
Naididae		24	31	35	32	33	-	-	-	-	-
Others		-	-	-	-	-	-	-	-	-	-
ACARI		-	-	-	-	-	-	-	-	-	-
OSTRACODA		9	11	10	7	10	-	-	-	-	-
COPEPODA											
Harpacticoida		-	6	3	4	3	2	1	-	1	3
Numbers		339	354	378	375	362	242	278	260	247	258
Weights (mg)		7.55	5.40	5.05	9.25	3.30	3.15	3.00	4.45	2.60	3.35
Mean numbers		361.6					257				
Mean weights (mg)		6.11					3.31				

Date: August 31, 1972  
 Experiment: Grain  
 Duration: 1 month

	Natural gravel			Standard gravel			Gravel + wheat 230 ml			Gravel + wheat 460 ml		
	No.	Group % comp.	% Total	No.	Group % comp.	% Total	No.	Group % comp.	% Total	No.	Group % comp.	% Total
COLLEMBOLA												
Isotomidae	-	-	-	-	-	-	-	-	-	-	-	-
EPHEMEROPTERA												
<u>Baetis parvus</u>	10	8.1	2.8	58	55.2	22.7	39	34.8	11.7	37	30.6	10.4
<u>Baetis parvus</u> (A)	-	-	-	-	-	-	-	-	-	-	-	-
<u>Baetis</u> sp.2	14	11.4	3.9	3	2.9	1.2	23	20.5	6.7	14	11.6	3.9
<u>Ephemerella tibialis</u>	-	-	-	-	-	-	1	0.9	0.3	1*	0.8	0.3
<u>Ephemerella inermis</u>	2	1.6	0.6	2	1.9	0.8	2	1.8	0.6	1	0.8	0.3
<u>Ephemerella grandis</u>	-	-	-	-	-	-	-	-	-	-	-	-
<u>Ameletus</u> sp.	-	-	-	-	-	-	-	-	-	-	-	-
<u>Paraleptophlebia</u> sp.1	41	33.3	11.3	19	18.1	7.5	33	29.5	9.6	41	33.9	11.5
<u>Rhithrogena</u> sp.	8	6.5	2.2	6	5.7	2.4	7	6.3	2.0	9	7.4	2.5
<u>Cinygmula</u> sp.	48	39.0	13.3	12	11.4	4.7	7	6.3	2.0	17	14.0	4.8
<u>Cinygma</u> sp.	-	-	-	-	-	-	-	-	-	-	-	-
<u>Iron</u> sp.	-	-	-	-	-	-	-	-	-	-	-	-
<u>Ironodes</u> sp.	-	-	-	-	-	-	-	-	-	1*	0.8	0.3
<u>Stenonema</u> sp.	-	-	-	-	-	-	-	-	-	-	-	-
Heptageniinae (EI)	-	-	-	5	4.8	2.0	-	-	-	-	-	-
Subtotals	123	100	34.1	105	100	41.3	112	100	32.9	121	100	34.0
No. species	6			6			7			8		
PLECOPTERA												
<u>Alloperla</u> sp.	3	23.1	0.8	1	25.0	0.4	2	11.8	0.6	1	14.3	0.3
<u>Hastaperla</u> sp.	-	-	-	-	-	-	-	-	-	-	-	-
<u>Isoperla</u> sp.	1	7.7	0.3	-	-	-	-	-	-	1	14.3	0.3

	Natural gravel			Standard gravel			Gravel + wheat 230 ml			Gravel + wheat 460 ml		
	No.	Group % comp.	% Total	No.	Group % comp.	% Total	No.	Group % comp.	% Total	No.	Group % comp.	% Total
Date: August 31, 1972												
Duration: 1 month												
<i>Nemoura</i> sp.	4	30.8	1.1	3	75.0	1.2	14	82.4	4.1	5	71.4	1.4
<i>Leuctrinae</i>	5	38.4	1.4	-	-	-	1	5.8	0.3	-	-	-
Subtotals	13	100	3.6	4	100	1.6	17	100	5.0	7	100	2.0
TRICHOPTERA												
<i>Lepidostoma</i> sp.	-	-	-	-	-	-	-	-	-	-	-	-
<i>Hydropsyche</i> sp.	28	100	7.7	16	100	6.3	20	95.2	5.8	35	97.2	9.9
<i>Rhyacophila</i> sp.1	-	-	-	-	-	-	-	-	-	-	-	-
<i>Rhyacophila</i> sp.3	-	-	-	-	-	-	-	-	-	-	-	-
<i>Rhyacophila</i> sp.4	-	-	-	-	-	-	-	-	-	-	-	-
<i>Glossosoma</i> sp.	-	-	-	-	-	-	1	4.8	0.3	-	-	-
<i>Glossosoma pyroxum</i> (P)	-	-	-	-	-	-	-	-	-	-	-	-
Limnephilidae sp.3	-	-	-	-	-	-	-	-	-	-	-	-
<i>Polycentropus</i> sp.	-	-	-	-	-	-	-	-	-	1	2.8	0.3
<i>Neophylax</i> sp.	-	-	-	-	-	-	-	-	-	-	-	-
Subtotals	28	100	7.7	16	100	6.3	21	100	6.1	36	100	1.2
COLEOPTERA												
<i>Zaitzevia</i> sp.	6	-	1.7	1	-	0.4	4	-	1.2	6	85.7	1.7
<i>Zaitzevia</i> sp. (A)	-	-	-	-	-	-	-	-	-	1	14.3	0.3
<i>Narpus</i> sp.	-	-	-	-	-	-	-	-	-	-	-	-
Subtotals	6	100	1.7	1	100	0.4	4	100	1.2	7	100	2.0
DIPTERA												
Chironomidae												
<i>Pentaneura</i> sp.1	-	-	-	10	7.8	3.9	3	2.7	0.9	2	1.1	0.6
" sp.3	5	3.5	1.4	6	4.7	2.4	19	10.4	5.5	3	1.7	0.8
" sp.4	-	-	-	-	-	-	-	-	-	-	-	-
" sp.5	1	0.7	0.3	5	3.9	2.0	-	-	-	1	0.6	0.3
" sp.7	-	-	-	-	-	-	1	0.5	0.3	3	1.7	0.8

	Natural gravel			Standard gravel			Gravel + wheat 230 ml			Gravel + wheat 460 ml		
	No.	Group % comp.	% Total	No.	Group % comp.	% Total	No.	Group % comp.	% Total	No.	Group % comp.	% Total
Date: August 31, 1972												
Duration: 1 month												
<i>Diamesinae</i>	-	-	-	-	-	-	-	-	-	-	-	-
<i>Corynoneura</i> sp.1	16	11.3	4.4	7	5.5	2.7	28	15.4	8.2	28	15.6	7.9
<i>Corynoneura</i> sp.2	-	-	-	9	7.1	3.5	17	9.3	5.0	9	5.0	2.5
<i>Thienemanniella</i> sp.1	-	-	-	-	-	-	4	2.2	1.2	-	-	-
<i>Orthocladiinae</i> sp.1	-	-	-	-	-	-	1	0.5	0.2	-	-	-
" sp.2	-	-	-	-	-	-	-	-	-	-	-	-
" sp.3	18	12.8	5.0	-	-	-	-	-	-	-	-	-
" sp.5	-	-	-	-	-	-	-	-	-	-	-	-
" sp.6	4	2.8	1.1	-	-	-	-	-	-	-	-	-
" sp.7a	7	5.0	1.9	6	4.7	2.4	7	3.8	2.0	2	1.1	0.6
" sp.8	2	1.4	0.6	3	2.4	1.2	-	-	-	2	1.1	0.6
" sp.9	2	1.4	0.6	2	1.9	0.8	4	2.2	1.2	-	-	-
" sp.19	-	-	-	-	-	-	-	-	-	-	-	-
<i>Orthocladiinae</i> (EI)	-	-	-	-	-	-	-	-	-	-	-	-
<i>Brillia</i> sp.1	-	-	-	-	-	-	7	3.8	2.0	1	0.6	0.3
<i>Brillia</i> sp.1(A)	-	-	-	-	-	-	-	-	-	-	-	-
<i>Brillia</i> sp.2	-	-	-	-	-	-	-	-	-	1	0.6	0.3
<i>Brillia</i> sp.3	-	-	-	-	-	-	-	-	-	-	-	-
<i>Micropsectra</i> sp.	23	16.3	6.4	-	-	-	-	-	-	-	-	-
<i>Rhectanytarsus</i> sp.1	4	2.8	1.1	1	0.8	0.4	4	2.2	1.2	3	1.7	0.8
<i>Rhectanytarsus</i> sp.lb	-	-	-	-	-	-	-	-	-	-	-	-
<i>Cladotanytarsus?</i> sp.3	-	-	-	-	-	-	-	-	-	-	-	-
<i>Chironomini</i> sp.1	51	36.2	14.1	18	14.2	7.1	7	3.8	2.0	25	13.9	7.0
<i>Chironomini</i> sp.lb	-	-	-	-	-	-	79*	43.4	23.0	94*	52.2	26.5
<i>Chironomini</i> spp.(EI)	-	-	-	57	44.9	22.4	-	-	-	-	-	-
<i>Chironomini</i> sp.lc	-	-	-	-	-	-	2	1.1	0.6	4	2.2	1.1
<i>Chironomini</i> sp.3	-	-	-	-	-	-	-	-	-	-	-	-
<i>Microtendipes</i> sp.4	6	4.3	1.7	3	2.4	1.2	1	0.5	0.3	2	1.1	0.6
<i>Zavrelia</i> sp.6	2	1.4	0.6	-	-	-	-	-	-	-	-	-
<i>Polypedilum</i> sp.2	-	-	-	-	-	-	-	-	-	-	-	-
Subtotal	141	100	39.2	127	100	49.9	182	100	53.2	180	100	50.7
No. species	13			11			15			15		

Date: August 31, 1972 Duration: 1 month	Natural gravel			Standard gravel			Gravel + wheat 230 ml			Gravel + wheat 460 ml		
	No.	Group % comp.	% Total	No.	Group % comp.	% Total	No.	Group % comp.	% Total	No.	Group % comp.	% Total
Chironomidae pupae												
sp.3	-	-	-	1	-	0.4	-	-	-	-	-	-
sp.7b	-	-	-	-	-	-	-	-	-	-	-	-
sp.10	-	-	-	-	-	-	1	-	0.3	-	-	-
sp.12	-	-	-	-	-	-	-	-	-	-	-	-
sp.14	-	-	-	-	-	-	-	-	-	-	-	-
sp.16	-	-	-	-	-	-	-	-	-	-	-	-
<u>Corynoneura</u> sp.2	-	-	-	-	-	-	-	-	-	-	-	-
<u>Corynoneura</u> sp.3	-	-	-	-	-	-	3	-	0.9	2	-	0.6
<u>Brillia</u> sp.1	-	-	-	-	-	-	-	-	-	-	-	-
<u>Brillia</u> sp.2	-	-	-	-	-	-	-	-	-	-	-	-
<u>Stempellina</u> sp.1	-	-	-	-	-	-	-	-	-	-	-	-
<u>Zavrelia</u> sp.15	-	-	-	-	-	-	-	-	-	-	-	-
Chironomini sp.1b	-	-	-	-	-	-	-	-	-	-	-	-
Tipulidae												
<u>Hexatoma</u> sp.	-	-	-	-	-	-	-	-	-	-	-	-
<u>Antocha</u> sp.	-	-	-	-	-	-	-	-	-	-	-	-
<u>Pedicia/Dicranota</u> spp.	-	-	-	-	-	-	-	-	-	-	-	-
<u>Pedicia/Dicranota</u> (P)	-	-	-	-	-	-	-	-	-	-	-	-
<u>Limnophila</u> sp.	3	-	0.8	-	-	-	-	-	-	-	-	-
Blepharoceridae	-	-	-	-	-	-	-	-	-	-	-	-
Blepharoceridae (P)	-	-	-	-	-	-	-	-	-	-	-	-
Ceratopogonidae	-	-	-	-	-	-	-	-	-	-	-	-
Simuliidae												
<u>Simulium</u> sp.1	2	-	0.6	1	-	0.4	1	-	0.3	2	-	0.6
<u>Simulium</u> sp.4	-	-	-	-	-	-	-	-	-	-	-	-
<u>Simulium</u> sp.4(P)	-	-	-	-	-	-	-	-	-	-	-	-
<u>Simulium arcticum</u>	-	-	-	-	-	-	-	-	-	-	-	-
<u>Simulium arcticum</u> (P)	-	-	-	-	-	-	-	-	-	-	-	-
<u>Prosimulium dicum</u>	-	-	-	-	-	-	-	-	-	-	-	-
<u>Prosimulium dicum</u> (P)	-	-	-	-	-	-	-	-	-	-	-	-
Empididae	-	-	-	-	-	-	-	-	-	-	-	-

	Natural gravel			Standard gravel			Gravel + wheat 230 ml			Gravel + wheat 460 ml		
	No.	Group % comp.	% Total	No.	Group % comp.	% Total	No.	Group % comp.	% Total	No.	Group % comp.	% Total
Date: August 31, 1972												
Duration: 1 month												
OLIGOCHAETA												
<u>Nais</u> sp.	33	-	9.1	-	-	-	1	-	0.3	-	-	-
Lumbriculidae	-	-	-	-	-	-	-	-	-	-	-	-
<u>Stylodrilus</u> sp.	-	-	-	-	-	-	-	-	-	-	-	-
ACARI	-	-	-	-	-	-	-	-	-	-	-	-
OSTRACODA												
<u>Cyclocypris</u> <u>washingtonensis</u>	10	-	2.8	-	-	-	-	-	-	-	-	-
COPEPODA												
Harpacticoida	3	-	0.8	3	-	1.2	1	-	0.3	-	-	-
Total	362		100	258		100	343		100	355		100
Species total	30			23			31			30		



Experiment:		Natural gravel					Standard gravel				
September 26, 1972 1 month duration		Tube 1	Tube 2	Tube 3	Tube 4	Tube 5	Tube 1	Tube 2	Tube 3	Tube 4	Tube 5
COLLEMBOLA		-	-	-	-	-	-	-	-	-	-
EPHEMEROPTERA	nymphs	65	67	79	65	72	146	143	120	108	118
	sub-imago	-	-	-	-	-	-	-	-	-	-
PLECOPTERA	nymphs	6	5	6	13	4	-	-	1	-	-
TRICHOPTERA	larvae	16	13	15	12	13	12	11	14	5	9
	pupae	-	-	-	-	-	-	-	-	-	-
DIPTERA											
Tipulidae	larvae	2	1	-	-	1	-	-	-	-	-
	pupae	-	-	-	-	-	-	-	-	-	-
	adults	-	-	-	-	-	-	-	-	-	-
Chironomidae	larvae	40	51	47	57	63	52	67	80	96	108
	pupae	1	-	-	-	-	-	-	-	1	-
	emerging adult	-	-	-	-	-	-	-	-	-	-
Ceratopogonidae	larvae	-	-	-	-	-	-	-	-	-	-
Simuliidae	larvae	6	10	9	4	3	4	6	5	8	6
	pupae	-	-	-	-	-	-	-	-	-	-
Blepharoceridae	larvae	-	-	-	-	-	-	-	-	-	-
	pupae	-	-	-	-	-	-	-	-	-	-
COLEOPTERA											
Elmidae	larvae	5	5	11	-	4	-	-	-	-	-
	adults	-	1	-	-	-	-	1	-	1	-
OLIGOCHAETA											
Naididae		-	-	-	-	-	-	-	-	-	-
Others		-	-	-	-	-	-	-	-	-	-
ACARI		-	-	-	-	-	-	-	-	-	-
OSTRACODA		-	-	-	-	-	-	-	-	-	-
COPEPODA											
Harpacticoida		3	14	11	9	15	-	-	-	-	1
Numbers		144	167	178	160	175	214	228	220	219	242
Weights (mg)		7.75	5.00	4.30	3.35	4.60	10.50	9.15	10.65	10.00	9.25
Mean numbers		164.8					224.6				
Mean weights (mg)		5.00					9.91				

Experiment:		Gravel + wheat 230 ml					Gravel + wheat 460 ml				
September 26, 1972 1 month duration		Tube 1	Tube 2	Tube 3	Tube 4	Tube 5	Tube 1	Tube 2	Tube 3	Tube 4	Tube 5
COLLEMBOLA		-	-	-	-	-	-	-	-	-	-
EPHEMEROPTERA	nymphs	156	166	115	124	151	219	224	184	231	243
	sub-imago	-	-	-	-	-	-	-	-	-	-
PLECOPTERA	nymphs	7	3	1	6	6	8	12	16	7	15
TRICHOPTERA	larvae	11	3	10	7	9	11	15	16	24	23
	pupae	-	-	-	-	-	-	-	-	-	1
DIPTERA											
	Tipulidae										
	larvae	-	-	-	-	-	-	-	-	-	-
	pupae	-	-	-	-	-	-	-	-	-	-
	adults	-	-	-	-	-	-	-	-	-	-
Chironomidae	larvae	89	114	103	106	126	253	248	281	327	291
	pupae	2	-	2	-	1	8	10	8	11	12
	emerging adult	-	-	-	-	-	-	-	-	-	-
	Ceratopogonidae	-	-	-	-	-	-	-	-	-	-
	larvae	-	-	-	-	-	-	-	-	-	-
	Simuliidae	1	3	1	2	3	2	8	8	14	3
	pupae	-	-	-	-	-	-	1	-	-	-
	Blepharoceridae	-	-	-	-	-	-	-	-	-	-
	pupae	-	-	-	-	-	-	-	-	-	-
COLEOPTERA											
	Elmidae	1	1	1	2	-	-	1	2	-	-
	adults	-	-	-	-	-	-	-	-	-	-
OLIGOCHAETA											
	Naididae	-	1	-	-	-	-	-	-	-	-
	Others	-	-	-	-	-	-	-	-	-	-
ACARI		-	-	-	-	-	-	-	-	-	-
OSTRACODA		-	-	-	-	-	-	-	-	-	-
COPEPODA											
	Harpacticoida	2	3	1	1	-	2	4	2	1	-
Numbers		269	294	234	248	296	503	523	517	615	588
Weights (mg)		11.90	14.00	9.95	12.10	13.15	20.85	29.50	23.70	18.95	21.65
Mean numbers		268.2					549.2				
Mean weights (mg)		12.14					22.93				

Date: September 26, 1972  
 Experiment: Grain  
 Duration: 1 month

	Natural gravel			Standard gravel			Gravel + wheat 230 ml			Gravel + wheat 460 ml		
	No.	Group % comp.	% Total	No.	Group % comp.	% Total	No.	Group % comp.	% Total	No.	Group % comp.	% Total
COLLEMBOLA												
Isotomidae	-	-	-	-	-	-	-	-	-	-	-	-
EPHEMEROPTERA												
<u>Baetis parvus</u>	7	9.7	4.0	32	27.8	13.4	41	27.2	13.9	59	26.0	10.2
<u>Baetis parvus</u> (A)	-	-	-	-	-	-	-	-	-	-	-	-
<u>Baetis</u> sp.2	9	12.5	5.1	12	10.4	5.0	3	2.0	1.0	-	-	-
<u>Ephemerella tibialis</u>	-	-	-	-	-	-	-	-	-	-	-	-
<u>Ephemerella inermis</u>	2	2.8	1.1	3	2.6	1.3	3	2.0	1.0	5	2.2	0.9
<u>Ephemerella grandis</u>	-	-	-	-	-	-	-	-	-	-	-	-
<u>Ameletus</u> sp.	-	-	-	-	-	-	-	-	-	2	0.9	0.3
<u>Paraleptophlebia</u> sp.1	9	12.5	5.1	25	21.7	10.5	68	45.0	23.0	76	33.5	13.2
<u>Rhithrogena</u> sp.	3	4.2	1.7	12	10.4	5.0	12	7.9	4.1	27	11.9	4.7
<u>Cinygmula</u> sp.	42	58.3	24.0	31	26.9	13.0	24	15.9	8.1	58	25.6	10.1
<u>Cinygma</u> sp.	-	-	-	-	-	-	-	-	-	-	-	-
<u>Iron</u> sp.	-	-	-	-	-	-	-	-	-	-	-	-
<u>Ironodes</u> sp.	-	-	-	-	-	-	-	-	-	-	-	-
<u>Stenonema</u> sp.	-	-	-	-	-	-	-	-	-	-	-	-
Heptageniinae (EI)	-	-	-	-	-	-	-	-	-	-	-	-
Subtotals	72	100	41.1	115	100	48.1	151	100	51.0	277	100	39.4
No. species	6			6			6			6		
PLECOPTERA												
<u>Alloperla</u> sp.	2	50.0	1.1	-	-	-	2	33.3	0.7	3	20.0	0.5
<u>Hastaperla</u> sp.	-	-	-	-	-	-	-	-	-	-	-	-
<u>Isoperla</u> sp.	-	-	-	-	-	-	-	-	-	-	-	-

Date: September 26, 1972 Duration: 1 month	Natural gravel			Standard gravel			Gravel + wheat 230 ml			Gravel + wheat 460 ml		
	No.	Group % comp.	% Total	No.	Group % comp.	% Total	No.	Group % comp.	% Total	No.	Group % comp.	% Total
<u>Nemoura</u> sp.	1	25.0	0.6	-	-	-	4	66.7	1.4	8	53.3	1.4
<u>Leuctrinae</u>	1	25.0	0.6	-	-	-	-	-	-	4	26.7	1.2
Subtotals	4	100	2.3	-	-	-	6	100	2.1	15	100	3.1
TRICHOPTERA												
<u>Lepidostoma</u> sp.	-	-	-	-	-	-	-	-	-	1	4.0	0.2
<u>Hydropsyche</u> sp.	13	100	7.4	9	100	3.8	8	88.9	2.7	23	92.0	4.0
<u>Rhyacophila</u> sp.1	-	-	-	-	-	-	1	11.1	0.3	-	-	-
<u>Rhyacophila</u> sp.3	-	-	-	-	-	-	-	-	-	-	-	-
<u>Rhyacophila</u> sp.4	-	-	-	-	-	-	-	-	-	-	-	-
<u>Glossosoma</u> sp.	-	-	-	-	-	-	-	-	-	-	-	-
<u>Glossosoma pyroxum</u> (P)	-	-	-	-	-	-	-	-	-	1	-	0.2
<u>Limnephilidae</u> sp.3	-	-	-	-	-	-	-	-	-	-	-	-
<u>Polycentropus</u> sp.	-	-	-	-	-	-	-	-	-	1	4.0	0.2
<u>Neophylax</u> sp.	-	-	-	-	-	-	-	-	-	-	-	-
Subtotals	13	100	7.4	9	100	3.8	9	100	3.0	25	100	4.4
COLEOPTERA												
<u>Zaitzevia</u> sp.	4	100	2.3	1	100	0.4	-	-	-	3	100	0.5
<u>Zaitzevia</u> sp. (A)	-	-	-	-	-	-	-	-	-	-	-	-
<u>Narpus</u> sp.	-	-	-	-	-	-	-	-	-	-	-	-
Subtotals	4	100	2.3	1	100	0.4	-	-	-	3	100	0.5
DIPTERA												
Chironomidae												
<u>Pentaneura</u> sp.1	-	-	-	-	-	-	-	-	-	-	-	-
" sp.3	4	6.3	2.3	8	7.4	3.3	-	-	-	3	1.0	0.5
" sp.4	-	-	-	-	-	-	-	-	-	1	0.3	0.2
" sp.5	-	-	-	-	-	-	-	-	-	-	-	-
" sp.7	1	1.6	0.6	5	4.3	2.1	3	2.4	1.0	-	-	-

Date: September 26, 1972 Duration: 1 month	Natural gravel			Standard gravel			Gravel + wheat 230 ml			Gravel + wheat 460 ml		
	No.	Group % comp.	% Total	No.	Group % comp.	% Total	No.	Group % comp.	% Total	No.	Group % comp.	% Total
<u>Diamesinae</u>	-	-	-	-	-	-	-	-	-	-	-	-
<u>Corynoneura</u> sp.1	2	3.2	1.1	6	5.6	2.5	12	9.6	4.1	68	23.4	11.8
<u>Corynoneura</u> sp.2	1	1.6	0.6	12	11.1	5.0	23	18.4	7.8	7	2.4	1.2
<u>Thienemanniella</u> sp.1	3	4.8	1.7	-	-	-	3	2.4	1.0	3	1.0	0.5
<u>Orthocladiinae</u> sp.1	-	-	-	-	-	-	-	-	-	-	-	-
" sp.2	-	-	-	-	-	-	-	-	-	-	-	-
" sp.3	14	22.2	8.0	-	-	-	-	-	-	-	-	-
" sp.5	-	-	-	-	-	-	-	-	-	-	-	-
" sp.6	2	3.2	1.1	1	0.9	0.4	2	1.6	0.7	-	-	-
" sp.7a	2	3.2	1.1	1	0.9	0.4	12	9.6	4.1	-	-	-
" sp.8	-	-	-	-	-	-	-	-	-	-	-	-
" sp.9	3	4.8	1.7	2	1.9	0.8	1	0.8	0.3	2	0.7	0.3
" sp.19	1	1.6	0.6	-	-	-	-	-	-	-	-	-
<u>Orthocladiinae</u> (EI)	3	4.8	1.7	8	7.4	3.3	-	-	-	20	6.9	3.5
<u>Brillia</u> sp.1	-	-	-	-	-	-	3	2.4	1.0	6	2.1	1.0
<u>Brillia</u> sp.1(A)	-	-	-	-	-	-	-	-	-	-	-	-
<u>Brillia</u> sp.2	-	-	-	-	-	-	-	-	-	-	-	-
<u>Brillia</u> sp.3	-	-	-	-	-	-	-	-	-	-	-	-
<u>Microspectra</u> sp.	1	1.6	0.6	3	2.8	1.3	-	-	-	-	-	-
<u>Rheotanytarsus</u> sp.1	5	7.9	2.9	16	14.8	6.7	3	2.4	1.0	5	1.7	0.9
<u>Rheotanytarsus</u> sp.1b	-	-	-	-	-	-	-	-	-	-	-	-
<u>Cladotanytarsus?</u> sp.3	-	-	-	-	-	-	-	-	-	-	-	-
<u>Chironomini</u> sp.1	17	27.0	9.7	32	29.6	13.4	44	35.2	14.9	106	36.4	18.4
<u>Chironomini</u> sp.1b	1	1.6	0.6	3	2.8	1.3	16	12.8	5.4	61	21.0	10.6
<u>Chironomini</u> spp. (EI)	-	-	-	-	-	-	-	-	-	-	-	-
<u>Chironomini</u> sp.1c	-	-	-	-	-	-	-	-	-	-	-	-
<u>Chironomini</u> sp.3	-	-	-	-	-	-	-	-	-	-	-	-
<u>Microtendipes</u> sp.4	3	4.8	1.7	8	7.4	3.3	3	2.4	1.0	7	2.4	1.2
<u>Zavrelia</u> sp.6	-	-	-	3	2.8	1.3	-	-	-	2	0.7	0.3
<u>Polypedilum</u> sp.2	-	-	-	-	-	-	-	-	-	-	-	-
Subtotal	63	100	36.0	108	100	45.2	125	100	42.2	291	100	50.4
No. species	16			13			12			12		

Date: September 26, 1972 Duration: 1 month	Natural gravel			Standard gravel			Gravel + wheat 230 ml			Gravel + wheat 460 ml		
	No.	Group % comp.	% Total	No.	Group % comp.	% Total	No.	Group % comp.	% Total	No.	Group % comp.	% Total
Chironomidae pupae												
sp.3	-	-	-	-	-	-	-	-	-	-	-	-
sp.7b	-	-	-	-	-	-	-	-	-	-	-	-
sp.10	-	-	-	-	-	-	-	-	-	-	-	-
sp.12	-	-	-	-	-	-	-	-	-	-	-	-
sp.14	-	-	-	-	-	-	-	-	-	-	-	-
sp.16	-	-	-	-	-	-	-	-	-	-	-	-
<u>Corynoneura</u> sp.2	-	-	-	-	-	-	-	-	-	2	-	0.3
<u>Corynoneura</u> sp.3	-	-	-	-	-	-	-	-	-	9	-	1.7
<u>Brillia</u> sp.1	-	-	-	-	-	-	-	-	-	-	-	-
<u>Brillia</u> sp.2	-	-	-	-	-	-	-	-	-	-	-	-
<u>Stempellina</u> sp.1	-	-	-	-	-	-	-	-	-	-	-	-
<u>Zavrelia</u> sp.15	-	-	-	-	-	-	-	-	-	-	-	-
Chironomini sp.1b	-	-	-	-	-	-	1	-	0.3	1	-	0.2
Tipulidae												
<u>Hexatoma</u> sp.	-	-	-	-	-	-	-	-	-	-	-	-
<u>Antocha</u> sp.	-	-	-	-	-	-	-	-	-	-	-	-
<u>Pedicia/Dicranota</u> spp.	1	-	0.6	-	-	-	-	-	-	-	-	-
<u>Pedicia/Dicranota</u> (P)	-	-	-	-	-	-	-	-	-	-	-	-
<u>Limnophila</u> sp.	-	-	-	-	-	-	-	-	-	-	-	-
Blepharoceridae	-	-	-	-	-	-	-	-	-	-	-	-
Blepharoceridae (P)	-	-	-	-	-	-	-	-	-	-	-	-
Ceratopogonidae	-	-	-	-	-	-	-	-	-	-	-	-
Simuliidae												
<u>Simulium</u> sp.1	3	-	1.7	6	-	2.5	3	-	1.0	3	-	0.5
<u>Simulium</u> sp.4	-	-	-	-	-	-	-	-	-	-	-	-
<u>Simulium</u> sp.4(P)	-	-	-	-	-	-	-	-	-	-	-	-
<u>Simulium arcticum</u>	-	-	-	-	-	-	-	-	-	-	-	-
<u>Simulium arcticum</u> (P)	-	-	-	-	-	-	-	-	-	-	-	-
<u>Prosimulium dicum</u>	-	-	-	-	-	-	-	-	-	-	-	-
<u>Prosimulium dicum</u> (P)	-	-	-	-	-	-	-	-	-	-	-	-
Empididae	-	-	-	-	-	-	1	-	0.3	-	-	-

Date: September 26, 1972 Duration: 1 month	Natural gravel			Standard gravel			Gravel + wheat 230 ml			Gravel + wheat 460 ml		
	No.	Group % comp.	% Total	No.	Group % comp.	% Total	No.	Group % comp.	% Total	No.	Group % comp.	% Total
OLIGOCHAETA												
<u>Nais</u> sp.	-	-	-	-	-	-	-	-	-	-	-	-
Lumbriculidae	-	-	-	-	-	-	-	-	-	-	-	-
<u>Stylodrilus</u> sp.	-	-	-	-	-	-	-	-	-	-	-	-
ACARI	-	-	-	-	-	-	-	-	-	-	-	-
OSTRACODA												
<u>Cyclocypris</u> <u>washingtonensis</u>	-	-	-	-	-	-	-	-	-	-	-	-
COPEPODA												
Harpacticoida	15	-	8.6	-	-	-	-	-	-	-	-	-
Total	175		100	239		100	296		100	577		100
Species total	30			22			24			27		

Experiment:		Standard gravel					Gravel + wheat 230 ml				
September 26, 1972 2 month's duration		Tube 1	Tube 2	Tube 3	Tube 4	Tube 5	Tube 1	Tube 2	Tube 3	Tube 4	Tube 5
COLLEMBOLA		-	-	-	-	-	-	-	-	-	-
EPHEMEROPTERA	nymphs	84	75	87	85	94	106	112	116	123	101
	sub-imago	-	-	1	-	-	-	-	-	-	-
PLECOPTERA	nymphs	6	3	5	4	3	10	5	6	8	10
TRICHOPTERA	larvae	9	5	8	8	12	16	22	18	29	26
	pupae	-	-	-	-	-	-	-	-	-	-
DIPTERA											
Tipulidae	larvae	-	-	-	-	-	-	-	-	-	-
	pupae	-	-	-	-	-	-	-	-	-	-
	adults	-	-	-	-	-	-	-	-	-	-
Chironomidae	larvae	173	196	164	167	177	133	151	131	143	147
	pupae	-	1	1	1	1	4	3	2	6	-
	emerging adult	-	-	-	-	-	-	-	-	-	-
Ceratopogonidae	larvae	-	-	-	-	-	-	-	-	-	-
Simuliidae	larvae	2	12	4	1	7	3	3	4	4	7
	pupae	-	-	-	-	-	-	-	-	-	-
Blepharoceridae	larvae	-	-	-	-	-	-	-	-	-	-
	pupae	-	-	-	-	-	-	-	-	-	-
COLEOPTERA											
Elmidae	larvae	1	1	1	3	4	-	3	1	1	-
	adults	-	-	-	-	-	-	-	-	-	-
OLIGOCHAETA											
Naididae		-	-	2	-	-	-	1	-	-	-
Others		-	-	-	-	-	-	-	-	-	-
ACARI		-	-	-	-	-	-	-	-	-	-
OSTRACODA		-	-	-	-	-	-	-	-	-	-
COPEPODA											
Harpacticoida		-	2	1	4	3	4	1	3	2	1
Numbers		275	295	274	273	301	276	301	281	316	292
Weights (mg)		5.30	4.05	5.05	4.40	5.00	17.05	14.25	17.35	24.35	13.70
Mean numbers		283.6					293.2				
Mean weights (mg)		4.76					17.34				



Experiment:		Gravel + wheat 460 ml									
September 26, 1972 2 month's duration		Tube 1	Tube 2	Tube 3	Tube 4	Tube 5	Tube 1	Tube 2	Tube 3	Tube 4	Tube 5
COLLEMBOLA		-	-	-	-	-					
EPHEMEROPTERA	nymphs	120	123	132	117	122					
	sub-imago	-	-	-	-	-					
PLECOPTERA	nymphs	18	15	14	9	12					
TRICHOPTERA	larvae	17	17	13	14	16					
	pupae	-	-	-	-	-					
DIPTERA											
Tipulidae	larvae	-	-	1	-	-					
	pupae	-	-	-	-	-					
	adults	-	-	-	-	-					
Chironomidae	larvae	188	206	176	197	189					
	pupae	5	9	3	11	4					
	emerging adult	-	-	-	1	-					
Ceratopogonidae	larvae	-	-	-	-	-					
Simuliidae	larvae	1	2	3	2	1					
	pupae	-	-	-	-	-					
Blepharoceridae	larvae	-	-	-	-	-					
	pupae	-	-	-	-	-					
COLEOPTERA											
Elmidae	larvae	4	3	4	4	2					
	adults	1	-	-	1	-					
OLIGOCHAETA											
Naididae		-	-	-	-	-					
Others		-	-	-	-	-					
ACARI		-	-	-	-	-					
OSTRACODA		-	-	-	-	-					
COPEPODA											
Harpacticoida		-	1	1	2	-					
Numbers		354	376	347	358	346					
Weights (mg)		32.80	28.90	21.30	23.85	21.00					
Mean numbers		356.2									
Mean weights (mg)		25.57									

Date: September 26, 1972

Experiment: Grain

Duration: 2 months

	Standard gravel			Gravel + wheat 230 ml			Gravel + wheat 460 ml			No.	Group % comp.	% Total
	No.	Group % comp.	% Total	No.	Group % comp.	% Total	No.	Group % comp.	% Total			
COLLEMBOLA												
Isotomidae	-	-	-	-	-	-	-	-	-			
EPHEMEROPTERA												
<u>Baetis parvus</u>	33	35.1	11.0	25	20.3	7.9	43	36.8	12.0			
<u>Baetis parvus</u> (A)	-	-	-	-	-	-	-	-	-			
<u>Baetis sp.2</u>	7	7.4	2.3	4	3.3	1.3	5	4.3	1.4			
<u>Ephemerella tibialis</u>	-	-	-	-	-	-	-	-	-			
<u>Ephemerella inermis</u>	-	-	-	8	6.5	2.5	2	1.7	0.6			
<u>Ephemerella grandis</u>	-	-	-	-	-	-	-	-	-			
<u>Ameletus sp.</u>	-	-	-	-	-	-	-	-	-			
<u>Paraleptophlebia sp.1</u>	19	20.2	6.3	50	40.7	15.8	41	35.0	11.5			
<u>Rhithrogena sp.</u>	14	14.9	4.7	20	16.3	6.3	8	6.8	2.2			
<u>Cinygmula sp.</u>	21	22.3	7.0	16	13.0	5.1	14	12.0	3.9			
<u>Cinygma sp.</u>	-	-	-	-	-	-	-	-	-			
<u>Iron sp.</u>	-	-	-	-	-	-	3	2.6	0.8			
<u>Ironodes sp.</u>	-	-	-	-	-	-	1	0.9	0.3			
<u>Stenonema sp.</u>	-	-	-	-	-	-	-	-	-			
Heptageniinae (EI)	-	-	-	-	-	-	-	-	-			
Subtotals	94	100	31.3	123	100	38.9	117	100	32.7			
No. species	5			6			8					
PLECOPTERA												
<u>Alloperla sp.</u>	-	-	-	-	-	-	1	11.1	0.3			
<u>Hastaperla sp.</u>	-	-	-	-	-	-	-	-	-			
<u>Isoperla sp.</u>	-	-	-	-	-	-	1	11.1	0.3			

	Standard gravel			Gravel + wheat 230 ml			Gravel + wheat 460 ml			No.	Group % comp.	% Total
	No.	Group % comp.	% Total	No.	Group % comp.	% Total	No.	Group % comp.	% Total			
Date: September 26, 1972												
Duration: 2 months												
<u>Nemoura</u> sp.	3	-	1.0	7	87.5	2.2	7	77.8	2.0			
<u>Leuctrinae</u>	-	-	-	1	12.5	0.3	-	-	-			
Subtotals	3	100	1.0	8	100	2.5	9	100	2.6			
TRICHOPTERA												
<u>Lepidostoma</u> sp.	-	-	-	-	-	-	2	13.3	0.6			
<u>Hydropsyche</u> sp.	12	100	4.0	28	96.6	8.9	11	73.3	3.1			
<u>Rhyacophila</u> sp.1	-	-	-	-	-	-	-	-	-			
<u>Rhyacophila</u> sp.3	-	-	-	-	-	-	-	-	-			
<u>Rhyacophila</u> sp.4	-	-	-	-	-	-	-	-	-			
<u>Glossosoma</u> sp.	-	-	-	-	-	-	-	-	-			
<u>Glossosoma pyroxum</u> (P)	-	-	-	-	-	-	-	-	-			
<u>Limnephilidae</u> sp.3	-	-	-	1	3.4	0.3	1	6.7	0.3			
<u>Polycentropus</u> sp.	-	-	-	-	-	-	1	6.7	0.3			
<u>Neophylax</u> sp.	-	-	-	-	-	-	-	-	-			
Subtotals	12	100	4.0	29	100	9.2	15	100	4.3			
COLEOPTERA												
<u>Zaitzevia</u> sp.	4	-	1.3	1	-	0.3	4	80.0	1.1			
<u>Zaitzevia</u> sp. (A)	-	-	-	-	-	-	1	20.0	0.3			
<u>Narpus</u> sp.	-	-	-	-	-	-	-	-	-			
Subtotals	4	100	1.3	1	100	0.3	5	100	1.4			
DIPTERA												
Chironomidae												
<u>Pentaneura</u> sp.1	-	-	-	1	0.7	0.3	-	-	-			
" sp.3	32	18.1	10.6	19	13.3	6.0	29	14.7	8.1			
" sp.4	-	-	-	-	-	-	-	-	-			
" sp.5	1	0.6	0.3	-	-	-	-	-	-			
" sp.7	2	1.1	0.7	-	-	-	1	0.5	0.3			

Date: September 26, 1972 Duration: 2 months	Standard gravel			Gravel + wheat 230 ml			Gravel + wheat 460 ml			No.	Group % comp.	% Total
	No.	Group % comp.	% Total	No.	Group % comp.	% Total	No.	Group % comp.	% Total			
Diamesinae	-	-	-	-	-	-	-	-	-			
<u>Corynoneura</u> sp.1	19	10.7	6.3	13	9.1	4.1	11	5.6	3.1			
<u>Corynoneura</u> sp.2	7	3.9	2.1	2	1.4	0.6	3	1.5	0.8			
<u>Thienemanniella</u> sp.1	-	-	-	-	-	-	-	-	-			
Orthocladiinae sp.1	-	-	-	-	-	-	-	-	-			
" sp.2	-	-	-	-	-	-	-	-	-			
" sp.3	-	-	-	-	-	-	-	-	-			
" sp.5	-	-	-	-	-	-	-	-	-			
" sp.6	3	1.7	1.0	1	0.7	0.3	-	-	-			
" sp.7a	5	2.8	1.7	8	5.6	2.5	2	1.0	0.6			
" sp.8	-	-	-	-	-	-	-	-	-			
" sp.9	10	5.6	3.3	3	2.1	0.9	2	1.0	0.6			
" sp.19	-	-	-	-	-	-	-	-	-			
Orthocladiinae (EI)	-	-	-	-	-	-	-	-	-			
<u>Brillia</u> sp.1	-	-	-	-	-	-	-	-	-			
<u>Brillia</u> sp.1(A)	-	-	-	-	-	-	-	-	-			
<u>Brillia</u> sp.2	-	-	-	-	-	-	-	-	-			
<u>Brillia</u> sp.3	-	-	-	-	-	-	-	-	-			
<u>Micropsectra</u> sp.	6	3.4	2.0	2	1.4	0.6	-	-	-			
<u>Rheotanytarsus</u> sp.1	17	9.6	5.6	6	4.2	1.9	5	2.5	1.4			
<u>Rheotanytarsus</u> sp.lb	6	3.4	2.0	-	-	-	-	-	-			
<u>Cladotanytarsus?</u> sp.3	-	-	-	-	-	-	-	-	-			
Chironomini sp.1	63	35.6	20.9	10	7.0	3.2	42	21.3	11.7			
Chironomini sp.lb	-	-	-	18*	12.6	5.7	34*	17.3	9.5			
Chironomini spp.(EI)	-	-	-	53	37.1	16.8	61	30.8	17.0			
Chironomini sp.lc	-	-	-	-	-	-	1	0.5	0.3			
Chironomini sp.3	-	-	-	-	-	-	-	-	-			
<u>Microtendipes</u> sp.4	6	3.4	2.0	7	4.9	2.2	6	3.0	1.7			
<u>Zavrelia</u> sp.6	-	-	-	-	-	-	-	-	-			
<u>Polypedilum</u> sp.2	-	-	-	-	-	-	-	-	-			
Subtotal	177	100	58.5	143	100	45.3	197	100	55.1			
No. species	13			12			11					

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	No.	Group % comp.	% Total	No.	Group % comp.	% Total	No.	Group % comp.	% Total			
Chironomidae pupae												
sp.3	-	-	-	-	-	-	-	-	-	-	-	-
sp.7b	-	-	-	-	-	-	1	-	-	0.3	-	-
sp.10	1	0.3	-	-	-	-	-	-	-	-	-	-
sp.12	-	-	-	-	-	-	-	-	-	-	-	-
sp.14	-	-	-	-	-	-	-	-	-	-	-	-
sp.16	-	-	-	-	-	-	-	-	-	-	-	-
<u>Corynoneura</u> sp.2	-	-	-	-	-	-	-	-	-	-	-	-
<u>Corynoneura</u> sp.3	-	-	-	-	-	-	1	-	-	0.3	-	-
<u>Brillia</u> sp.1	-	-	-	-	-	-	-	-	-	-	-	-
<u>Brillia</u> sp.2	-	-	-	-	-	-	-	-	-	-	-	-
<u>Stempellina</u> sp.1	-	-	-	-	-	-	-	-	-	-	-	-
<u>Zavrelia</u> sp.15	-	-	-	-	-	-	-	-	-	-	-	-
Chironomini sp.1b	-	-	-	6*	-	1.9	9*	-	-	2.5	-	-
Tipulidae												
<u>Hexatoma</u> sp.	-	-	-	-	-	-	-	-	-	-	-	-
<u>Antocha</u> sp.	-	-	-	-	-	-	-	-	-	-	-	-
<u>Pedicia/Dicranota</u> spp.	-	-	-	-	-	-	-	-	-	-	-	-
<u>Pedicia/Dicranota</u> (P)	-	-	-	-	-	-	-	-	-	-	-	-
<u>Limnophila</u> sp.	-	-	-	-	-	-	-	-	-	-	-	-
Blepharoceridae	-	-	-	-	-	-	-	-	-	-	-	-
Blepharoceridae (P)	-	-	-	-	-	-	-	-	-	-	-	-
Ceratopogonidae	-	-	-	-	-	-	-	-	-	-	-	-
Simuliidae												
<u>Simulium</u> sp.1	7	-	2.3	4	-	1.3	2	-	-	0.6	-	-
<u>Simulium</u> sp.4	-	-	-	-	-	-	-	-	-	-	-	-
<u>Simulium</u> sp.4(P)	-	-	-	-	-	-	-	-	-	-	-	-
<u>Simulium arcticum</u>	-	-	-	-	-	-	-	-	-	-	-	-
<u>Simulium arcticum</u> (P)	-	-	-	-	-	-	-	-	-	-	-	-
<u>Prosimulium dicum</u>	-	-	-	-	-	-	-	-	-	-	-	-
<u>Prosimulium dicum</u> (P)	-	-	-	-	-	-	-	-	-	-	-	-
Epididae	-	-	-	-	-	-	-	-	-	-	-	-

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	No.	Group % comp.	% Total	No.	Group % comp.	% Total	No.	Group % comp.	% Total			
OLIGOCHAETA												
<u>Nais</u> sp.	-	-	-	-	-	-	-	-	-			
Lumbriculidae	-	-	-	-	-	-	-	-	-			
<u>Stylodrilus</u> sp.	-	-	-	-	-	-	-	-	-			
ACARI	-	-	-	-	-	-	-	-	-			
OSTRACODA												
<u>Cyclocypris</u> <u>washingtonensis</u>	-	-	-	-	-	-	-	-	-			
COPEPODA												
Harpacticoida	3	-	1.0	2	-	0.6	-	-	-			
Total	301		100	316		100	358		100			
Species total	23			25			28					