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# INVERTEBRATE FAUNA AND ECOLOGICAL VALUE OF OHUTU STREAM, RUAHINE RANGES

by

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**CONTENTS PAGE**



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## SUMMARY

The aquatic invertebrate fauna and ecological value of Ohutu Stream, Ruahine Ranges, North Island, are described. Altogether we collected 61 invertebrate taxa, and a further 9 have been taken from Ohutu Stream by other workers. The most abundant taxa were the caddisflies *Helicopsyche* and *Confluens,* the mayflies *Deleatidium* and *Coloburiscus,* and the two-winged flies Chironomidae. The stream was considered of high ecological value because of its rich invertebrate fauna, the presence of Blue Duck, the apparent absence of fish, the high and broad altitudinal range, the presence of limestone and the undeveloped nature of the catchment.

## 1. INTRODUCTION

The ecological value of streams and rivers is often assessed by the status of the fishery, and little consideration is given to other components of the aquatic fauna or to intrinsic attributes of a stream and its catchment. On this basis, the value of undisturbed streams and rivers without fishes (particularly introduced salmonids) are frequently not recognised, even though this situation can confer high ecological significance to some aquatic habitats.

Ohutu Stream in the Ruahine Ranges, North Island, cascades down a large (35 m high) waterfall in its lower reaches. Electric fishing has indicated that no fish are present above the waterfall but that rainbow trout and long finned eels occur below it (Brady *et al.* 1988). In April 1990, we visited Ohutu Stream at the request of the Wanganui Conservancy, Department of Conservation, to provide information on the aquatic invertebrate fauna, and to assess the ecological value of this site. Information obtained from this work was presented as evidence at a Town and Country Planning Hearing of a proposal to selectively log native forest in the area.

## 2. STUDY AREA

The area around Ohutu Stream is underlain by consolidated sandstone and siltstone which is capped in places with limestone. Soils are predominantly derived from andesitic ash, although on some escarpments they are of marine origin. The land is covered with native forest whose composition changes with altitude. Below about 700 m asl, matai and kahikatea predominate, but above this and up to about 900 m the forest is largely black beech with occasional rimu, miro, Hall's totara and broadleaf species. At higher elevations, the forest is mainly mountain beech and kaikawaka above an understory of mountain toatoa, pink pine and broadleaf.

Ohutu Stream drains the southern flanks of Mt Aorangi and the northern side of Ohutu Ridge. The headwaters arise at elevations of about 1200 m asl, and the stream descends for approximately 8 km to 450 m asl where it enters Whakaurekou River, a tributary of Rangitikei River. We visited Ohutu Stream above Ohutu Hut (NZMS260 U21 737699) which lies at an elevation of about 680 m.

An initial appraisal of the streambed near Ohutu Hut indicated that there were three distinct types of substrate:

1. Bedrock that ran the entire width of the channel in some places and in other places was restricted to the channel edge. Bedrock was often colonised by mosses and liverworts;
2. Cobbles that aggregated in hollows in the bedrock or in side channels and runs;
3. Fine sediment that accumulated mainly in pools and also in some runs.

## 3. METHODS

We sampled each type of substrate at three equidistant sites along a 300 m stretch of the stream above Ohutu Hut. Invertebrates colonising bedrock were collected by brushing the substrate for one minute with a stiff nylon brush into a 0.25 mm mesh, triangular net. After this sample had been collected and preserved, cobbles upstream of the net were turned over and brushed by hand for one minute to dislodge invertebrates. Samples of fine sediment were collected by scooping sediments into a 250 ml tub. All samples were labelled and preserved in 5% formalin.

In the laboratory, each sample from bedrock and cobbles was passed through 1mm and 0.25 mm mesh sieves. Material retained by the 1 mm mesh sieve was picked through by eye and invertebrates were removed. Material retained by the 0.25 mm mesh sieve was sorted under a binocular microscope at 10x magnification and invertebrates were removed. Invertebrates were separated from fine sediments by swirling subsamples in a beaker with water and decanting the floating material (very fine sediments and invertebrates) into a fine mesh seive. This was repeated until the whole sample had been done, and then invertebrates were picked from the decanted material under a binocular microscope. The heavier material was picked through by eye and any invertebrates removed. Invertebrates were identified at 10-40x magnification using the key of Winterbourn and Gregson (1989).

## 4. RESULTS

### 4.1 Invertebrate fauna

Altogether, 61 invertebrate taxa were recognised in the samples we collected from Ohutu Stream, and most of these occurred on bedrock or cobbles (Table 1). The most abundant taxa in Ohutu Stream were larvae of the caddisflies *Heliopsyche* and *Confluens,* the mayflies *Deleatidium* and *Coloburiscus,* and the two-winged flies Chironomidae which collectively comprised 61% of the total fauna (all samples combined, see Table 1). Samples containing an additional 9 invertebrate taxa were collected from cobbles in Ohutu Stream by Ian Henderson, Massey University, in March 1989 (Table 2). Species of *Costachorema* and *Pycnocetrodes* (Trichoptera) listed in Table 1 probably include *C. callistum, C. hecton, P. aeris and P. aureola* (I. Henderson, Massey University, personal communication).

The mayfly *Austroclima sepia,* and the caddisflies *Aoteapsyche raruraru, Zelolessica cheira, Alloecentrella magnicornis, Confluens hamiltoni* and *Conuxia gunni* are commonly found associated with liverworts and mosses (Cowley 1978, Towns and Peters 1979). Mayflies were relatively much more abundant on cobbles (70% of the total cobble fauna) than on bedrock (8% of the total bedrock fauna). In contrast, caddisfly and dipteran larvae occurred in higher proportions on bedrock (65% and 19% of the total bedrock fauna, respectively) than on cobbles (15% and 4%, respectively).

### 4.2 Ecological value of Ohutu Stream

Ohutu Stream above the waterfall has several features which, in combination, make it unrepresentative of small streams in general, and therefore of considerable ecological value. These features are:

1. It covers a high and broad range.
2. The catchment is undisturbed native forest.
3. Much of the bedrock is limestone.
4. Fish appear to be absent.
5. Blue Duck are present.
6. The aquatic invertebrate fauna is rich.

## 5. DISCUSSION

Ohutu Stream is likely to be the only stream in the North Island with this combination of features. A physically similar site (Kopouapounamu Stream) may occur in Urewera National Park, but the status of fish, Blue Duck and aquatic invertebrate populations are not known for this stream. (I. Millar, Department of Conservancy, Nelson/Marlborough Conservancy, personal communication). Limestone bedrock at similar altitudes also occurs in areas around Gisborne and southern Hawkes Bay, but catchments in these areas are highly modified. In the South Island, limestone streams in Paparoa National Park and northwest Nelson are at much lower altitudes, although similar sites may occur in the Chalk Range region of Marlborough (I. Millar, personal communication). The limestone geology of much of the Ohutu catchment causes the stream to flow underground in some reaches.

At least three Blue Duck are known to inhabit Ohutu Stream, and these form part of a larger population of 23 birds in the Whakaurekou catchment (Brady *et al.* 1988). In March 1989, staff and students from Massey University collected samples of Blue Duck faeces from Ohutu Stream as part of a study into Blue Duck diet. This work (Williams 1989) indicated that at least 23 of the invertebrate taxa we found in Ohutu Stream were consumed by Blue Duck (see Table 1). These taxa made up 76% of the invertebrate fauna in the samples we collected (Table 1). Mayflies (mainly and species) were the main component (72%) of Blue Duck diet, followed by caddisfly larvae (about 14%) (Williams 1989). The fact that scientific research has been carried out on Ohutu Stream adds to its conservation values.

The collection of aquatic invertebrates belonging to 61 taxa from a small section of Ohutu Stream on one date indicate that the benthic invertebrate fauna is particularly rich. However, it is difficult to make comparisons with other studies because of differences in the techniques used. Winterbourn and Collier (1987) and Collier *et al.*

(1989) collected samples containing a maximum of 36 and 43 taxa, respectively, from streams sampled on two dates using triangular nets. In contrast, Quinn & Hickey (in press) took samples with a maximum of 25 taxa from seven Surber samples of 88 New Zealand rivers on one date.

The absence of introduced trout from Ohutu stream is also highly significant because it means that the composition of the aquatic invertebrate fauna and the ecological processes operating in the stream reflect those that were likely to exist before the arrival of humans in New Zealand. The maintenance of small, headwater streams such as the Ohutu in their natural state is of particular importance to science and conservation as such examples of pristine stream ecosystems are rapidly diminishing in New Zealand.

## 6. ACKNOWLEDGEMENTS

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Table 1: Taxonomic list of aquatic invertebrates collected from Ohutu Stream on 18 April 1990, and the type of substrate that each taxon was associated with (+ = present, -= not present). * indicates taxa that were found in faeces of Blue Duck from Ohutu Stream and another North Island site (Williams 1989). The proportion of the total fauna that each taxon represents (all samples combined) is given as total percent on the right.

| Taxon | Substrate Type Bedrock | Cobbles | Sand | Total percent |
|---|---|---|---|---|
| Phylum Arthropoda | | | | |
| Class Insecta | | | | |
| Order Megaloptera (dobsonflies) | | | | |
| *Archichauliodes diversus* * | - | + | - | 0.5 |
| Order Ephemeroptera (mayflies) | | | | |
| *Coloburiscus humeralis* * | + | + | - | 5.2 |
| *Nesameletus* sp. * | + | + | - | 1.7 |
| *Deleatidium myzobranchia*-group * | + | + | - | 14.7 |
| *Austroclima sepia* * | + | + | - | 1.9 |
| *Zephlebia* aff. *borealis* | + | + | - | <0.1 |
| *Siphlaenigma janae* | + | - | - | <0.1 |
| Small mayflies | - | + | - | 1.0 |
| Order Plecoptera (stoneflies) | | | | |
| *Stenoperla prasina* | - | + | - | <0.1 |
| *Austroperla cyrene* | - | + | - | 0.6 |
| *Megaleptoperla grandis* * | - | + | - | <0.1 |
| *Zelandoperla fenestrata* * | + | + | - | 3.3 |
| *Zelandoperla decorata* * | + | + | - | <0.1 |
| *Zelandobius confusus* | + | + | - | <0.1 |
| *Zelandobius furcillatus* | + | + | - | <0.1 |
| *Acroperla spiniger* | + | - | - | 0.3 |
| *Acroperla trivacuata* | + | + | - | 0.1 |
| Small stoneflies | + | + | - | 0.3 |
| Order Trichoptera (caddisflies) | | | | |
| *Aoteapsyche raruraru* * | + | + | - | 0.5 |
| *Orthopsyche fimbriata* | + | - | - | <0.1 |
| *Orthopsyche* af. *thomasi* | + | + | - | 0.8 |
| *Oxyethira albiceps* | + | - | - | <0.1 |
| *Psilochorema* sp. | - | + | - | 0.2 |
| *Costachorema* spp. | + | + | - | <0.1 |
| *Hydrobiosis* aff. *callistum* * | - | + | - | <0.1 |
| *Hydrobiosis* aff. *umbripennis* * | - | + | - | <0.1 |
| *Hydrobiosis parumbripennis* * | + | + | - | <0.1 |
| *Neurochorema confusum* | + | - | - | <0.1 |
| *Neurochorema* sp. | + | - | - | <0.1 |
| *Hydrobiosella mixta* | + | + | - | <0.1 |
| *Helicopsyche* af. *poutini* * | + | + | - | 21.5 |
| *Hudsonema aliena* | + | - | - | <0.1 |
| sp. aff. *Triplectides* | + | + | - | 0.1 |

| Taxon | Substrate Type Bedrock | Cobbles | Sand | Total percent |
|---|---|---|---|---|
| *Zelolessica cheira* | + | + | - | 2.8 |
| *Alloecentrella magnicornis* | + | - | - | <0.1 |
| *Pycnocentrodes* spp. * | + | + | - | 3.1 |
| *Beraeoptera roria* * | + | + | - | 0.2 |
| *Confluens hamiltoni* * | + | + | - | 6.0 |
| *Conuxia gunni* | + | - | - | <0.1 |
| *Pycnocentria funerea* * | + | + | - | 2.5 |
| *Pycnocentria* sp. * | + | - | - | <0.1 |
| *Olinga feredayi* * | - | + | - | <0.1 |
| *Oeconesus maori* | - | - | + | <0.1 |
| Small caddisflies | + | + | + | 12.9 |
| Order Coleoptera (beetles) | | | | |
| Elmidae * | + | + | - | 0.9 |
| *Orchymontia* sp.A | + | + | - | <0.1 |
| *Orchymontia* sp.B | - | + | - | 0.5 |
| *Podaena* sp.A | + | - | - | <0.1 |
| *Podaena* sp.B | + | - | - | <0.1 |
| *Homalaena* sp. | - | + | - | <0.1 |
| Order Diptera (2-winged flies) | | | | |
| Chironomidae * | + | + | + | 13.5 |
| Ceratopogoninae | + | - | - | <0.1 |
| Psychodidae | + | + | - | <0.1 |
| Empididae sp.A | + | + | - | 0.4 |
| Empididae sp.B | + | + | - | 0.2 |
| Muscidae (*Limnophora*) * | + | - | - | <0.1 |
| *Aphrophila neozelandica* * | + | + | - | 0.5 |
| Eriopterini sp.A | - | + | + | <0.1 |
| Eriopterini sp.B | - | + | - | <0.1 |
| sp. aff. *Peritheates turrifer* | + | - | - | <0.1 |
| Class Arachnida | | | | |
| Acarina (mites) | + | + | - | <0.1 |
| Phylum Mollusca | | | | |
| Class Gastropoda (snails) | | | | |
| *Potamopyrgus antipodarum* | + | + | + | 0.3 |
| Phylum Annelida | | | | |
| Class Oligochaeta (worms) | | | | |
| Naididae | + | + | + | 0.6 |
| Phylum Platyhelminthes (flatworms) | | | | |
| *Neppia montana* | + | + | + | 1.1 |
| Total no. of taxa[1] | 48 | 45 | 6 | 61 |

[1]. excluding small mayflies, stoneflies and caddisflies

**Table 2:** List of aquatic invertebrate taxa not given in Table 1 that were taken from cobbles in Ohutu Stream by Ian Henderson, Massey University, in March 1989.

| |
|---|
| Phylum Arthropoda |
| Class Insecta |
| Order Ephemeroptera (mayflies) |
| *Atalophlebioides cromwelli* |
| Order Plecoptera (stoneflies) |
| *Megaleptoperla diminuta* |
| Order Trichoptera (caddisflies) |
| *Aoteapsyche colonica* |
| *Polyplectropus* aff. *altera* |
| sp. aff. *Tiphobiosis* |
| Order Coleoptera (beetles) |
| Ptilodactylidae |
| Order Diptera (two-winged flies) |
| *Austrosimulium* sp. |
| Class Crustacea |
| Order Amphipoda (amphipods) |
| unidentified species |
| Phylum Nematomorpha |
| Gordiidae (horse hair worms) |