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CONSERVATION OF BOTANICAL AND WILDLIFE VALUES OF NGAMATEA SWAMP, WAIOURU

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SUMMARY

Ngamatea Swamp, Waiouru, has been severely modified by fire, grazing, drain excavation and other factors. A survey of the wetland's vegetation and wildlife in September 1988 showed that parts of the area still have important natural features which it would be possible to retain, or even enhance, with appropriate management.

An environmental impact assessment made in 1978, before drains were excavated, did not identify the significant vegetation types and plant species which are still present. Instead it made assumptions, based on incorrect plant identifications, about natural values of the land, and recommended farm development.

Ngamatea is almost entirely a low-fertility bog, dominated by native plant species. Notable vegetation types include patches of *Olearia virgata* scrub, monoao-umbrella fern-wire rush shrubland, and *Baumea* sedgeland which contains the local species, *B. buttonii.* Ngamatea is probably the southern limit in the North Island for this last-named sedge, and the only site for it in the Moawhango Ecological District.

Recommendations are made to block existing drains, exclude livestock, prevent fire, and remove wilding pines.

1. INTRODUCTION

Ngamatea Swamp lies immediately south of Waiouru township, and east of State Highway 1 (NZMS 260, sheet T21). It occupies a shallow depression behind a low ridge which separates it from the Hautapu River to the south, and was originally drained to the east and west by three streams which eventually joined that river. Ellis *et al.* (1978), the field inspection team from Department of Lands and Survey, note that the flow of one of these, "Hardings Stream", was reversed by the Army prior to 1950, to "Robinson's Pond" to the south-east of Ngamatea.

Various plans have been devised for alternative uses of Ngamatea Swamp. An environmental impact assessment was prepared in 1978 by the Department of Lands and Survey (Ellis *et al.* 1978) in which farm development was seen as the logical use. Large drains were cut across the swamp and around the northern and eastern margins, much of the area was burnt, some was over-sown and top-dressed. Stock still have access to the entire area. Despite these disturbances, most of the wetland is still dominated by native plants.

Changes in the economics of farming have meant that the proposed farm development was not completed, and the Defence Department is considering other options for Ngamatea. These include the options: do nothing; attempt to restore original wetland values (in as far as these can be deduced); or change the character of the wetland to improve it for other uses such as waterfowl hunting and military exercises.

The Department of Conservation was invited to inspect the area in September 1988, and to make recommendations on these or other options for the future use of Ngamatea Swamp.

2. SOIL

Before drains were dug, water may have run into the swamp from surrounding higher ground. In the northern two-thirds of the swamp there is a slight fall from north-east to south-west (Wilson 1977), but it seems likely that run-off from the eastern high ground would have flowed around the swamp edges rather than across the swamp. The southern thud of the swamp has a domed profile, and water inputs from run-off are certainly confined to the edges here.

The soil of the wetland was recorded by Ellis *et al.* (1978) as "40cm black peaty loam topsoil over 25 cm fine pumice gravel", but it is not known how many samples formed the basis of this information, nor the location(s) of sampling. Deeper peat is anticipated in at least thesouthern third of the swamp. We did not take soil samples, but it is likely that the domed profile of the swamp results from the accumulation of greater depths of peat than were recorded earlier (loc. cit.)

3. THE 1988 SURVEY

Six staff from the Rangitikei District and Wanganui Regional offices of the Department of Conservation made a survey of vegetation and wildlife at Ngamatea on 15 September 1988. Because time was limited, the survey focused on the least-modified parts of the wetland, the area which lies south of the main east-west drain. We covered about one third of the wetland.

Vegetation patterns were identified on a large-scale, half-tone, 1978 aerial photograph of Ngamatea, and we attempted to recognise these from vantage points around the swamp. The various vegetation types were examined on foot, and the dominant plants of each were recorded. The accompanying vegetation map, is the result. A list was made of all native and adventive vascular plants found (Appendix 1).

The survey also recorded the birds present in all habitat types, and casual sightings of frogs, water snails, and fish. Intensive searches were made for fernbird and spotless crake, because there seemed to be suitable habitat for these elusive swamp birds.

4. RESULTS

4.1 Vegetation

Despite a rather uniform appearance of the vegetation, there are a number of distinct wetland plant communities. In some cases these have sharp boundaries between adjacent types, such as those resulting from the limits of past fires. More often, the change from one type to another was quite gradual, resulting from subtle changes in factors such as height of the water table or differences in soil fertility. In the latter circumstances, mapping boundaries between types can be somewhat arbitary – the lines shown in Fig. 1 are approximations of where changes in vegetation types occur.

The broad patterns found are given below; the reasons for these are discussed later.

On surrounding dryland, red tussock is dominant, but the between-tussock flora is dominated by adventive grasses, clovers, and other dicotyledonous herbs, the result of over-sowing, top-dressing and grazing.

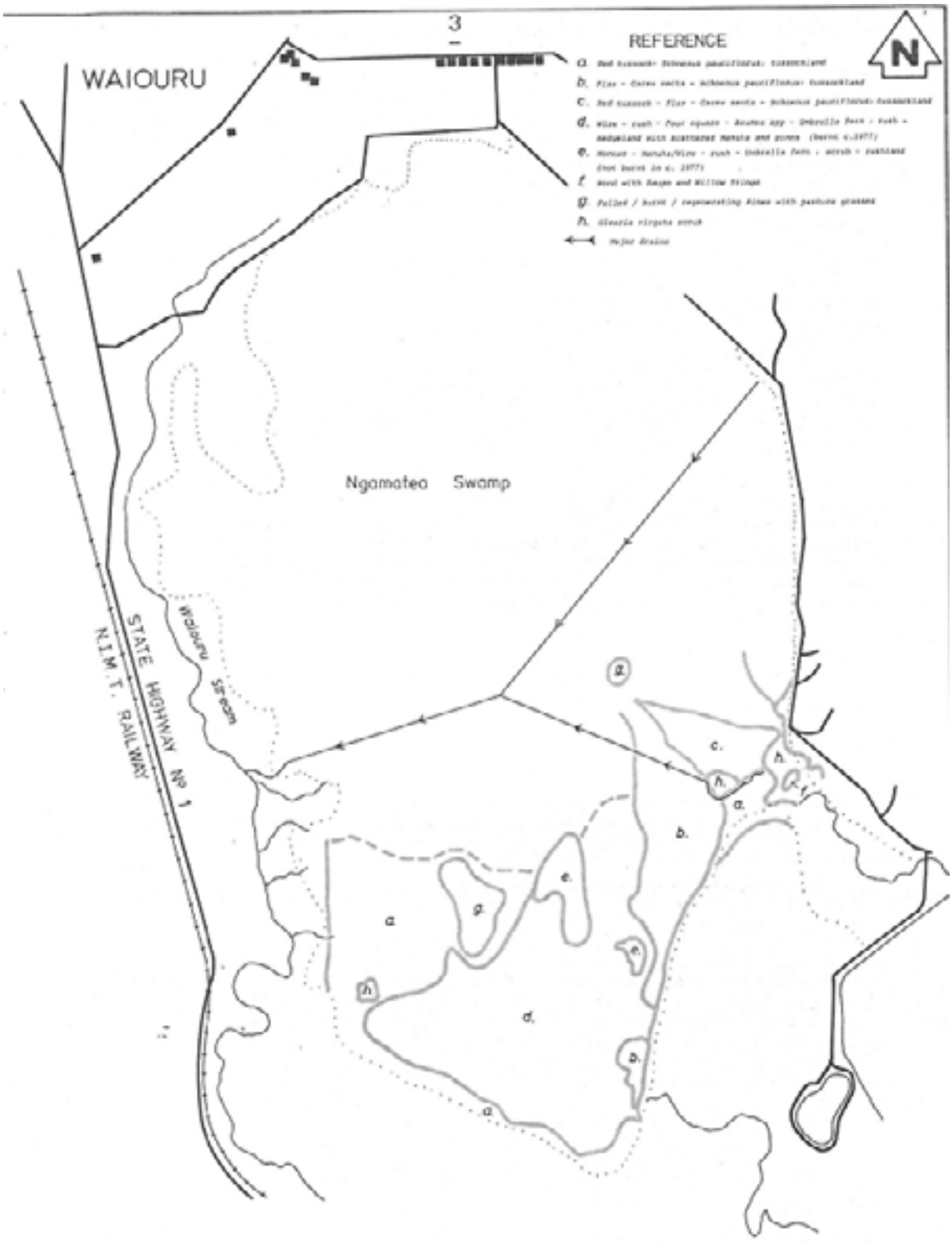

Fig. 1. Generalised vegetation map of southern portion of Ngamatea Swamp, Waiouru. Sept. 1988.

Wetland vegetation around the margins is a mixture of native and adventive plants. In places there are moderately dense stands of the shrub daisy, *Olearia virgata,* up to 3m tall. A number of other native species were found only among this scrub, including the vines *Clematis quadribracteolata* and lawyer (*Rubus schmidelioides),* and prickly shield fern *(Polystichum vestitum).* On other wet edges there is flax, *(Phormium tenax)* often interspersed with the large, tussock-forming cutty-grass, *Carex secta.*

Where there is regular grazing (probably where the substrate is firmer), the vegetation comprises short-stature rushes, sedges, and dicotyledonous herbs. The variety of plant species is greater in the edge communities than in central parts of the wetland, though this reflects, to some degree, a greater number of adventive plants, pasture species which are tolerant of wet soils, such as *Lotus pedunculatus.*

Towards the centre, there are two major vegetation types, both almost completely occupied by native plants. Of relatively small extent are patches of wire-rush, umbrella fern, and the shrubs monoao and manuka, which escaped being burnt in the 1977 fire. Some other native species were found only in these areas, including the scrambling shrub, *Cyathodes empetrifolia.*

Areas which have been burnt are almost all dominated by native sedges in the genera *Baumea* and *Lepidosperma.* These have apparently leafless, rigid stems, and superficially resemble common rushes (wiwi) of wet pastures. These, we believe, had been misidentified by Ellis *et al.* (1978) (see discussion below). Different species of these sedges are more or less common in different parts of the wetland, reflecting local variations in wetness, type of substrate, or other factors. Among the sedges, particularly where they are less dense, are native sun orchids, insectivorous sundews, and a variety of other low-growing herbs.

Although not covered by this survey, the banks of Waiouru Stream are more fertile than Ngamatea Swamp and have a very different flora. The area is grazed by sheep but remains dominated by herbaceous native plant species. One notable occurrence is *Mazus radicans,* which is in only three sites in the North Island.

4.2 Flora

Some of the notable elements of the flora were discussed above. Of those, *Clematis quadribracteolata* is the most local being recorded mostly on the Volcanic Plateau in the North Island, with one outlying recent find west of Te Kuiti; formerly present in Hawkes Bay (Eagle 1986). Its survival in scrub at Ngamatea is threatened by stock grazing.

Dense stands of *Olearia virgata* are becoming uncommon nationally, mainly through agricultural development (fire, grazing, cultivation). The species prefers moderately fertile, damp, alluvial soils, sites which are also preferred for farming.

Selliera microphylla is a mat-forming herb, thinly scattered in montane to sub-alpine bogs and is confined to the Moawhango Ecological District, Kaimanawa Range and Tongariro National Park in the North Island. Several patches were found in central parts of Ngamatea where *Baumea* sedges were sparse. One of the most notable finds during our survey was *Baumea huttonii.* This sedge had not been found in the Moawhango Ecological District before, despite the large amount of recent botanical survey there. The nearest recent record is from Lake Rotopounamu on Mt. Pihanga, and there are scattered records from Taupo, Rotorua and northwards. (Clarkson and Clarkson 1987). *B. huttonii* was formerly known on d'Urville Island, and is scattered in Westland and Southland. Ngamatea may be its southern limit in the North Island. It is locally common in the wettest parts of the *Baumea* sedgeland at Ngamatea, being replaced on slightly drier sites by the sedges *B. rubiginosa, B. tenax,* and four-square. *B. huttonii* has erect, sharp-tipped stems to 60 cm tall, and decurved seedheads which distinguish it from similar related species.

The other species found at Ngamatea occur quite widely in montane wetlands.

4.3 Wildlife

A list of wildlife seen on and close to Ngamatea wetland is attached as Appendix 2. Twelve species were seen on or above the swamp, with a further three species in adjoining tussockland. The majority of birds were seen around the fringes of the swamp.

5. DISCUSSION

5.1 Influence of water quality on vegetation

The source of water to any wetland determines many of a wetland's biotic features. Rain is the only water input to much of Ngamatea, which means that there is a very low natural input of nutrients, and plants present are adapted to low-nutrient (oligotrophic) conditions. An obvious example is the sundew, *Drosera binata,* which obtains extra nutrients by digesting trapped insects. Only around the fringes, where water runs off higher ground, are there higher-nutrient (mesotrophic or eutrophic) conditions. This is where most adventive (non-native) plants occur, species like jointed-leaved rushes, watercress, creeping buttercup, and well as the native sedges.

Raupo thrives in nutrient-rich waters only, and was seen at Ngamatea at one site, around the pond marked as "f' on Figure 1. Ellis *et al.* (1978) recorded raupo as being dominant originally, but this is unlikely to have been the case because the infertile nature of the swamp would have been unsuitable for raupo. They also stated that rush is a dominant plant of the wettest areas. This term is usually used for leafless *Juncus* which grow in fertile wet areas, usually much disturbed sites. Such *Juncus* species are extremely uncommon in the area of the swamp we examined. Instead we found that superficially similar *Baumea* sedges occurred widely as dominant plants (see results, above); such sedges are good indicators of low fertility wet areas.

These patterns, resulting from differences in water fertility, have been interrupted by the system of drains and, probably, by top-dressing with artificial fertilisers. Not only do the drains carry higher nutrient waters through the wetland, but by lowering the water-table, they allow plant materials (including peat) to decay, thus releasing nutrients which favour the growth of different plant species from those there naturally. Manuka does not tolerate the lowest nutrient conditions in waterlogged soils, but soon occupies drain edges. Of shrubs at Ngamatea, monoao *(Dracophyllum subulatum)* is the most tolerant of wet, oligotrophic conditions. Its range in the wetland was severely reduced by the extensive fire in about 1977, but our survey found some areas which escaped that fire.

5.2 Water Table

Restoration of the original water table may be achieved by blocking the artificial drains. This would reverse a tendency for adventive plants to invade the wetland, including *Pinus contorta* which grows poorly on waterlogged substrates.

There has been a proposal to dam the stream in the south-east of the wetland to create more waterfowl habitat. Productive wetlands for waterfowl require shallow water for feeding and a high fertility for lush growth of herbaceous plants and production of invertebrate animals as waterfowl food.

Ngamatea Swamp is naturally and unproductive, apart from its fringes. These features are part of its natural character, which gross disturbances to the area have not totally destroyed. However, low fertility waters are also unproductive for waterfowl. It has been suggested that if holes were "blown" in the swamp with explosives that its value would be improved for waterfowl. Such holes would produce only low-fertility water areas. These might have some value as isolated escape areas for waterfowl but would supply little or no feeding habitat, and plant cover for hunting would be extremely difficult to establish. Widening of parts of the drains would have the advantage of localising damage, but again open water created there would be low in natural fertility and of limited use to waterfowl.

A dam on the south-east exit stream would change the nature of the wetland, and we do not favour its construction. However, if a low dam were constructed so that the area of water impounded did not encroach on low-fertility sites, the potential impacts might be

6. RECOMMENDATIONS

1. Restore previous water levels by blocking all drains.

2. Exclude all stock grazing.

3. Remove wilding pines in and close to the wetland.

4. If proposals to dam the stream in the south-east are actioned, such a dam should pond only a small area of the wetland, primarily fringe vegetation which is already heavily modified by grazing and nutrient-enriched.

5. Proposals to blow holes are not supported for the southern third of the swamp because

    a. the native vegetation would be unacceptably damaged;

    b. the unsuitability of resulting water for waterfowl, except as escape habitat.

6. If holes are blown in the swamp, they should adjoin existing drains.

7. Wet areas adjoining Waiouru Stream require systematic botanical survey, but already known values indicate that this is a distinctive and important habitat for native plants.

7. REFERENCES

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APPENDIX 1:Vascular Plants of Ngamatea Swamp, Waiouru

List resulting from Department of Conservation survey of southern half of swamp, 15 September 1988.

Compiled by C.C Ogle, Department of Conservation, Wanganui.

* indicates adventive species

Abundance indicated as follows -

a -abundant and occurring over extensive areas
c -common and widespread
o -occasional (may be confined to one major vegetation type)
u -uncommon (very few plants seen, or, if locally common, confined to small area)

Trees, Shrubs and Lianes

Cassinia vauvilliersii (o) golden cassinia
Clematis quadribracteolata (u)
Coprosma cheesemanii (u)
C. rugosa
C. sp [unnamed, included in *C. parvifolia* by Allan (1961): "*C. taylorae"*](u)
Cordyline australis (u) cabbage tree
* *Cytisus scoparius* (u) European broom
Dracophyllum subulatum (o) monoao
Hebe stricta var. *stricta* (o) koromiko
Leptospermum scoparium (c) manuka
Olearia virgata var [small-leaved form of volcanic plateau] (c) shrub daisy
* *Pinus contorta* (o) lodgepole pine
Rubus schmidelioides var *schmidelioides* (u) bush lawyer
* *Salix cinerea* (u) grey pussy willow

Ferns and fern allies

Blechnum minus (c) swamp kiokio
B. penna-marina (o)
Gleichenia dicarpa (a) umbrella fern
Lycopodium australianum (o)
Polystichum vestitum (u) prickly shield fern

Grasses

* *Agrostis capillaris* (u) browntop
* *Anthoxanthum odoratum* (u) sweet vernal
Chionochloa rubra (c) red tussock
Cortaderia fulvida (o) toetoe
* *Cynosurus dactylon* (u) crested dog's tail
* *Festuca arundinacea* (c) tall fescue
* *Glyceria* sp. (u) floating sweetgrass
Hierochloe redolens (o) holy grass
* *Holcus lanatus* (o) Yorkshire fog
Poa anceps ssp. *anceps* (u)
Rytidosperma sp. *(R. gracile?)* (u) danthonia

Rushes

Empodisma minus (a) wire brush
* *Juncus articulatus* (c) jointed rush
* *J. canadensis* (o) tail-seeded rush
* *J. effuses* (u) soft rush
J. gregiflorus (o)

Sedges

Baumea huttonii (o)
B. rubiginosa (c)
B. tenax (o)
Carex coriacea (o)
C. echinata (u) star sedge
C. maorica (u)
C. secta s.s. (c)
Carpha alpina (o)
Eleocharis acuta (u) sharp spike sedge
E. gracilis (c) slender spike sedge
Isolepis [Scirpus] fluitans (u)
I. subtilissima (u)
Lepidosperma australe (a) four-square
Oreobolus pectinatus (u) comb sedge
Schoenus pauciflorus (a)

Monocot herbs other than grasses, rushes and sedges

Centrolepis ciliate (o)
Herpolirion novae-zelandiae (u)
Lemna sp. [*L. minor auct* NZ] (o) duckweed
Phormium tenax (a) NZ flax
Potamogeton suboblongus (u) pondweed
Prasophyllum colensoi (u)
Thelymitra sp *(T. cyanea?)* (o) sun orchid
Typha muelleri (u) raupo

Dicot herbs

Acaena anserinifolia (u) bidibidi
Aciphylla sp [cf *A squarrosa*] (u) speargrass
* *Cardamine pratensis* (u) lady's smock
C. sp (*C. debilis* agg) (u) bittercress Celmisia
Celmisia setacea (o)
* *Cerastium glomeratum* (o) mouse eared chickweed
* *Cirsium vulgare* (u) scotch thistle
Craspedia sp [unnamed bog sp] (o) woolly-head
Dichondra sp [*D brevifolia* agg] (u)
Drosera binata (u) sundew
Epilobium pallidiflorum (u) willow herb
E. sp [*E. chionanthum*?] (u) willow herb
* *Galium palustre* (o) marsh bedstraw
Geranium microphyllum (u)
Gnaphalium limosum (u) cudweed
Gonocarpus aggregatus (u)

G. micranthus
* *Hypochoeris radicata* (o) cat's ear
* *Leontodon taraxacoides* (o) hawk's beard
* *Linum catharticum* (o) purging flax
* *Lotus pedunculatus* (c) lotus
Montia fontana
* *Myosotis laxa* (u) water forgetmenot
* *Nasturtium* sp (o) watercress
Nertera ciliata (u)
Prunella vulgaris (u) self heal
* *Ranunculus flammula* (a: locally)
R. reflexus [*R. hirtus* auct. NZ) (u) bush buttercup
* *R. repens* (o) creeping buttercup
R. sp [*R. arnphitricha* or *R. glabrifolius*] (o)
* *Rumex crispus* (u) curled dock
Selliera microphylla (u) alpine halfstar
Stellaria sp (u) marsh chickweed
* *Taraxacum officinale* (u) dandelion
* *Trifolium repens* (o) white clover

Totals :	native species	= 66
	adventive species	= 28
		94

APPENDIX 2: Wildlife of Ngamatea Swamp

1. Avifauna

Species list compiled on 15 September 1988.

1. NZ Pipit -several seen, on periphery of the wetland only.
2. Australasian Harrier -several seen flying over the wetland -a possibility the wetland is used for nesting.
3. Paradise Shelduck -moderate numbers, seen on surrounding farm land.
4. Southern Black-backed Gull - low numbers.
5. Australasian Bittern - only one seen, noted on a small semi-open pond.
6. Black Swan - only one seen.
7. Welcome Swallow -several birds seen over the open water areas of the drains.
8. Spur-winged plover - several seen and heard, almost all on grazed pasture adjacent to the wetland.
9. Starling -low numbers.
10. Yellowhammer - common, particularly around the peripheral areas.
11. Skylark -high numbers.
12. Black-backed Magpie -moderate numbers, seen on periphery of wetland.
13. Mallard Duck - low numbers, one brood observed. Apparently this species occurs in high numbers (D. Gettins, pers. comm.)
14. Song Thrush -several heard. Associated with the taller vegetation on the eastern side of the wetland.
15. Unidentified finches - common, seen in large flocks on the drier areas of the wetland.

A crake recording was played through the areas along the south-eastern margin of the wetland : no response was heard.

No sightings of fernbird were made.

2. Aquatic life

Water within the artificial drains appeared to be of good quality.

Several large frogs were noted in these drains. These were not positively identified but known distribution patterns would suggest this species to be golden bell frog *(Litoria raniformis).*

Large quantities of an introduced water snail, *Limnaea stagnalis* were observed in the drainage ditches. *Limnaea* is a large, common freshwater snail introduced to New Zealand as a food source for trout.

Because of the apparently good quality of the water and its volume and connection with the Waiouru Stream, it is probable that the drainage ditches contain trout. Several observations were made of what appeared to be fish in the deeper pools. No positive identifications were made.