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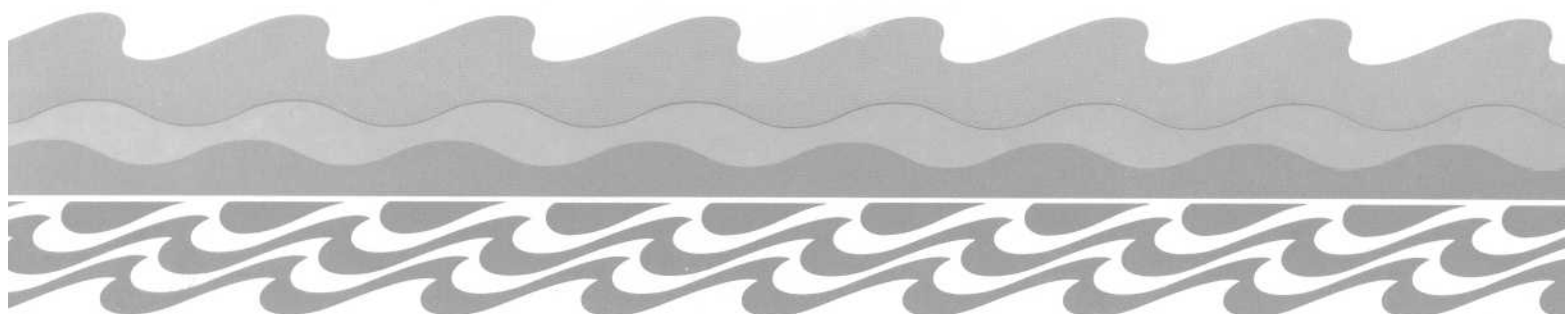
No. 78

AQUATIC INSECTS RECORDED FROM WESTLAND NATIONAL PARK

(Short Answers in Conservation Science)

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Aquatic insects recorded from Westland National Park

D. Eward¹, R. Putz², & I. D. McLellan³

^{1&2} Institute fur Zoologie, Freiburg University,
Albertstrasse 21a, 7800 Freiburg, Germany.

³ Research Associate, Landcare Research Institute, Private Box 95, Westport.

ABSTRACT

This report provides a list of aquatic insects found in Westland National Park, with a brief comment on their ecology. The list was compiled from the authors' collections, the literature and communications with other workers, in order to fill in gaps in the knowledge of aquatic insects in Westland National Park. It is also a plea for more taxonomic work to be carried out on New Zealand's invertebrate fauna.

1. INTRODUCTION

This list arose out of frustration experienced by I.D. McLellan, when discussions about management plans and additions to Westland National Park revealed that although the botanical resources (through the dedicated work of Peter Wardle) and introduced mammal and bird fauna were well known, the invertebrate fauna had been ignored. The opportunity to remedy this occurred when D. Eward and R. Putz were referred to I. D. McLellan in order to complete a University semester of practical work in New Zealand. Part of the semester was spent collecting aquatic insects in the park, determining the material and compiling a preliminary list of aquatic insects. The determinations were then checked by workers more conversant with our fauna.

Other records were obtained from specialist workers and reference lists. The result is a list with uneven coverage, with more records in the recently added lowland areas than in the alpine region.

This list contains only records of those insects found in or just outside the boundaries of the park. They are a fraction of the recorded aquatic insects of Westland. For instance only 2 named hydraenid beetles are recorded from the park but 10 species are found in Westland. It is highly likely that more of those 10 species exist in the park. Hopefully this initial effort will stimulate others to add to the list.

Collector effort in many orders of insects is spasmodic, and is dependent upon whether or not there are specialists working in New Zealand. For example this is evident in the Chironomidae (Diptera), where intensive collecting by the Swedish dipterist Brundin (1966) resulted in a relatively comprehensive indication of the chironomid fauna of Westland National Park. On the other hand, the widespread and numerous Empididae (Diptera) were last worked on in any depth in the 1930's. There is no current New Zealand specialist resident here.

2. AQUATIC INSECTS RECORDED FROM WESTLAND NATIONAL PARK

The names of species are provided within their order and family. Where possible the common and Maori names are also given. The location where they were found is represented by a number, e.g. 5 = Lake Wahapo, and the source is represented by a letter,

e.g. q = Jellyman and Flain (1990). A key (Section 3) and map (Figure 1) is provided. A brief comment has been provided on the ecology of these species, where known, to make this list accessible and useful to managers who may be unfamiliar with these insects.

ORDER ODONATA

Suborder Zygoptera [Damselflies]

Austrolestes colenisonis (White) [Blue damselfly or Kekewai] : 39.

Xanthocnemis zealandica (McLachlan) [Red damselfly or Kihitara]: 5q, 21g.

Suborder Anisoptera [Dragonflies]

Uropetala carovei carovei (White) [Giant dragonfly or Kapokapowai]: 7e,n.

Procordulia grayi (de Selys Longchamps): 5q

Procordulia smithii (White): 21g.

All Odonata are predators. The nymphs of *Uropetala* live in tunnels in seepages but the nymphs of the other species live in ponds, lakes or slow moving streams.

ORDER EPHEMEROPTERA [Mayflies]

Family Leptophlebiidae

Deleatidium spp.: 1d, 2g,3d, 4d, 9g, 11d,g, 23g, 24g, 25g.

Mauilulus luma (Townsend & Peters) 11d, 12d.

Family Oligoneuriidae

Coloburiscus humeralis (Walker) [Spiny gilled mayfly]: 11 d, 24.

Family Siphonuridae

Nesameletus spp.: 9g, 11d, 12d, 24g.

Ameletopsis perscitus (Eaton): 1d, 2d.

Ameletopsis nymphs are predatory and the nymph of *Coloburiscus* is a filter feeder, using long hairs on its front legs to net detritus, whereas most of the other species are collector/browsers. All species recorded in this list live in stony streams and rivers and the adults are short-lived.

ORDER PLECOPTERA [Stoneflies]

Family Eustheniidae [Large Green Stoneflies]

Stenoperla maclellani (Zwick): 1d, 9g.

Stenoperla prasina (Newman): 3d, 4d, 9d, 11 d, 12, 22c, 23g.

Stenoperla nymphs inhabit stony streams and have water-repellent skins. They are carnivores feeding on a variety of aquatic insects (mainly mayfly nymphs).

Family Austroperlidae [Black stoneflies]

Austroperla cyrene (Newman) [Three-gilled black Stonefly]: 1d, 3g, 11d, 12d, 23g.

The nymphs of this common species live in stony streams in leaf packets and on wood. They are collector/browsers and shredders, devouring the softer material of decaying leaves and discarding the skeletons. They also eat decaying wood. The fungi growing in and on both materials is also utilised as a food source.

Family Gripopterygidae [Anal gilled stoneflies]

Acroperla trivacuata (Tillyard): 14e.

Acroperla spiniger (Tillyard): 11d.

Holcoperla n.sp.: 40j.

Megaleptoperla grandis (Hudson): 9g.

Nesoperla fulvescens (Hare): 2d, 3d.

Vesicaperla townsendi (McLellan): 10i, 20g.

Zelandobius confusus (Hare): 1d, 2d, 3d, 4d, 11d, 12d, 23g, 25g.

Zelandobius furcillatus (Tillyard): 3d, 8h.

Zelandobius unicolor (Tillyard) [Yellow winged stonefly]: 11 d.

Zelandoperla agnetis (McLellan): 9g, 11 d.

Zelandoperla denticulata (McLellan): 3d, 12d.

Zelandoperla fenestrata (Tillyard): 24g.

Almost all of the nymphs in this family have a rosette of gill filaments surrounding the anus. Most of the members of this family are collector/browsers, living in stony streams and rivers. However the two *Acroperla* species and *Nesoperla fulvescens* have semi-terrestrial nymphs which spend the cooler months of the year under stones in the flood zones of stream beds, where they feed on decaying vegetation. *Vesicaperla* nymphs are fully terrestrial and live in the cool humid microclimates beneath alpine vegetation but the species here has also been collected in the roadside vegetation on the Franz Josef Glacier road. They feed by stripping the outer layers of snow tussock and other plants which have fungi and algae growing in and on them. *Holcoperla* nymphs are also terrestrial but live under stones in alpine areas, feeding in a similar way to *Vesicaperla* nymphs. Both of the terrestrial genera have wingless adults. The nymph of the new species collected by Mr A. B. Millar on a window of the Pioneer Hut (2438m asl.) is an altitude record for stoneflies in New Zealand.

Family Notonemouridae

Cristaperla fimbria (Winterbourn): 11 d, 12d.

Halticoperla viridens (McLellan & Winterbourn) [Green leaping stonefly]: 11 d, 12d.

Spaniocerca longicauda (McLellan): 1d, 9g, 1ld, 12d, 24g.

Spaniocerca minor (Kimmins): 21g.

Spaniocercoides cowleyi (Winterbourn): 1d, 3d.

Nymphs of this family live in a variety of running water habitats. *Cristaperla* nymphs are found in deposits of fine sediment in forest streams. *Halticoperla* nymphs live in seepages and swift shallow water less than 1cm deep, and under damp stones. *S. longicauda* inhabits steep stony streams usually within forest. *S. minor* is a water film dweller in alpine seepages and waterfalls. *S. cowleyi* nymphs live deep in underwater gravels of streams. As far as can be ascertained most nymphs are collector/browsers.

ORDER TRICHOPTERA [Caddisflies]

Family Hydrobiosidae

Costachorema callistum (McFarlane): 5q, 23g, 38h.

Costachorema psaroptera (McFarlane): 8h.

Costachorema spp.: 1ld, 12d, 24g, 26h.

Hydrobiosis charadraea (McFarlane): 20h, 26h, 36h, 38h.

Hydrobiosis harpidiosa (McFarlane): 20h, 38h.

Hydrobiosis parumbripennis (McFarlane): 36h.

Hydrobiosis sylvicola (McFarlane): 23g.

Hydrobiosis spp.: 3d, 1ld, 12d, 23g.

Edpercivalia fusca (McFarlane): 8h.

Edpercivalia maxima (McFarlane): 9g, 1ld, 12d, 23g, 24g.

Edpercivalia spaini (McFarlane): 8g.

Hydrochorema tenuicaudatum (Tillyard): 1ld, 12d.

Psilochorema embersoni(?) (Wise): 10g.

Psilochorema macroharpax (McFarlane): 14h 38h.

Psilochorema tautoru (McFarlane): 14h.

Psilochorema spp.: 1d, 2d, 3d, 1ld, 25g.

Tiphobiosis intermedia (Mosely): 14h, 17h, 23g, 38h.

Tiphobiosis montana (Tillyard): 18h.

Synchorema spp.: 36h, 38h.

The larvae of this family do not build cases and are predators on a variety of aquatic insects. Most inhabit stony streams.

Family Hydroptilidae [Microcaddis]

Oxyethira albiceps (McLachlan) [Axe-head caddis]: 1d, 3d, 1ld.

Paroxyethira spp. (eatonii complex) 3d, 5q, 12d.

Paroxyethira hendersoni (Mosely) [Purse caddis]: 5q.

The case building larvae of these species are found on leaves of lake and pond plants

or in streams where filamentous algae grows. They feed by piercing plants and sucking the sap.

Family Philopotamidae [Net caddis]

Hydrobiosella stenocerca (Tillyard): 4d, 23g.

Hydrobiosella tonela (Mosely): 17h, 35h.

Hydrobiosella mixta (Cowley): 8h.

Hydrobiosella spp.: 11d, 12d.

The larvae of these species are found in stony streams and rivers. They do not build cases and filter feed by constructing nets to collect detritus.

Family Hydropsychidae [Net caddis]

Aoteapsyche tipua (McFarlane): 23g, 25g.

Aoteapsyche spp.: 11d.

Aoteapsyche spp.: 5q.

Aoteapsyche larvae inhabit stony streams, have no cases and build nets to collect detritus.

Family Polycentropodidae [Net caddis]

Plectronemia maclachlani (Mosely): 23g.

Polyplectropus aurifusca (McFarlane): 10g.

Polyplectropus puerilis (McLachlan): 8h, 14h, 25g, 31h, 36h.

Both genera have caseless larvae which are omnivorous. Those of *Polyplectropus* build nets and galleries in quietly flowing parts of streams and rivers and on rocky lake shores. *Plectronemia* also build nets and galleries but in faster of rivers and streams.

Family Ecnomidae

Ecnomina sp?: 3d, 11d.

Family Oeconesidae

Pseudoeconesus stramineus (McLachlan): 25g.

Oeconesus sp.: 11d, 12d.

The larvae of both genera build cases of leaf fragments or stones and are shredders of plant material.

Family Conoesucidae

Conuxia gunni (McFarlane): 3d, 12d.

Olinga feredayi (McLachlan) [Horny case caddis]: 9g, 10g, 11d, 12d, 25g.

Pycnocentroides aureola (McLachlan) [Stony case caddis]: 38h.

All have cases and are collector/browsers.

Family Helicophidae

Alloecentrella magnicomis Wise: 3d.

Alloecentrella n. sp.: 4g, 25g.

Zelolessica cheira (McFarlane): 4dg, 24g, 25g, 35h.

Zelolessica sp.: 1d, 3d.

Helicophid larvae are associated with mosses and liverworts in rocky streams and their cases are built of that material.

Family Philorheithridae

Philorheithrus agilis (Hudson): 11d, 12d.

Philorheithrus lacustris (Tillyard): 10g.

Both species are predators with stony cases. *P. lacustris* is found in seepages and small streams. *P. agilis* are common in mountain streams and rivers, and their cases are particularly heavy to resist water currents.

Family Helicopsyichidae [Snail caddis]

Helicopsyche zelandica (Hudson): 11d, 12d, 35h.

Rakiura vemale (McFarlane): 3d, 4dg, 25g, 35h.

Family Leptoceridae

Triplectides cephalotes (Walker): 31h.

Triplectides dolichos (McFarlane) [Stick caddis]: 10g, 35h.

Triplectides obsoleta (McLachlan) [Stick caddis]: 14h.

Triplectides sp.: 3d, 11d.

Triplectidina areolimnetes (Tillyard): 35f.

T. cephalotes build a case of plant fragments. They live in lakes and still waters, and are shredders. The case of *T. dolichos* and *T. obsoleta* is made of hollow sticks and fragments of leaf, twigs and bark. They live in streams and rivers (*T. obsoleta* can also be found in slightly brackish water), and feed by shredding plant material. *T. areolimnetes* builds a case of sand grains or small plant fragments. They live in small

pools and tams.

Hudsonemia aliena (McLachlan): 14h.

Hudsonemia amabilis (McLachlan): 5q.

H. aliena live in rivers and streams containing vegetation. They build a case of plant fragments. *H. amabilis* live in rivers, streams and lakes, and build a case of sand grains. They are omnivorous.

Oecetis unicolor (McLachlan): 31h.

These live in lakes and the sandy substrate of rivers.

ORDER LEPIDOPTERA

Family Crambidae

Hygraula nitens (Butler) [Pond moth]: 5q.

Found on water plants in ponds and lakes. Has a case of plant fragments and unlike most other aquatic insects feeds on living plant tissue.

ORDER MEGALOPTERA [Dobsonflies]

Archichauliodes diversus (Walker) [Dobsonfly, creeper or toebiter]: 1d, 3d, 25g.

A predator found in stony streams and rivers.

ORDER COLEOPTERA [Beetles]

Family Hydraenidae [Cascade beetles]

Podaena kuscheli (Ordish): 24g.

Podaena maclellani (Zwick): 24g.

Podaena sp.: 1h, 3h, 11h, 12d.

Adults and larvae are found in fast flowing streams.

Family Hydrophilidae [Water scavenger beetles]

Berosus pallidipennis (Sharp): 33k.

Laccobius arrowi (d'Orchymont): 37o (as *L. mineralis* nov. syn.).

Hydrophilidae spp.: 3d, 11d.

Family Elmidae

Hydora spp.: 1d, 2d, 3d, 4dg, 11d, 12d, 24g, 25g.

Family Scirtidae (= Helodidae) spp.: 1d, 3d, 1ld.

Family Ptilodactylidae spp.: 1ld, 12d.

Family Dytiscidae [Water beetles]

Leodessus plicatus (Sharp): 21g.

Rhantus pulverosus (Stephens): 21g.

Found in ponds and tarns. Carnivorous, feeding on small crustacea and insects.

ORDER HEMIPTERA [Water bugs]

Family Corixidae [Waterboatmen]

Sigara (Tropocorixa) arguta (White): 15p.

Sigara (T.) uruana (Young): 15p.

Sigara sp.: 5q.

The *Sigara* species live in ponds and lakes and feed by sucking out the contents of the cells of filamentous algae and other small plants.

Family Notonectidae [Backswimmers]

Anisops assimilis (White): 15p.

Anisops wakefieldi (White): 15p.

Found in ponds pools and lakes. Predatory on a variety of small invertebrates, sucking out their body contents.

ORDER DIPTERA [Two-winged flies]

Family Chironomidae [Non-biting midges]

Most are collector/browsers.

Subfamily Chironominae

Chironomus zealandicus (Hudson) [Bloodworm]: 5q.

Chironomus sp. A: 5q.

Found in the beds of lakes and streams

Xenochironomus canterburyensis (Freeman): 5q.

An obligate commensal of the freshwater mussel (*Hyridella menziesi*) in lakes.

Subfamily Podominae

Zelandochlus latipalpis (Brundin) [Ice midge]: 19f, 30b.

Larvae live in meltwater pools on Franz Josef and Fox Glaciers.

Parachlus conjugens (Brundin): 28b.

Parachlus aotearoae (Brundin): 34b.

Parachlus spinosus (Brundin): 28b.

Parachlus maori (Brundin): 16b, 28b, 30b.

Parachlus carinatus (Brundin): 34b.

Parachlus pauperatus (Brundin): 28b, 34b.

Parachlus novaezelandiae (Brundin): 16b, 28b, 34b.

Parachlus longicomis (Brundin): 16b, 28b, 34b.

Parachlus glacialis (Brundin): 16b, 30b.

Parachlus sp.: 5q.

Podonomus parachloides (Brundin): 28b.

Podonomus waikukupae (Brundin): 28b.

Podonomus pygmeus (Brundin): 28b.

Podonomus spp. "Waikukupua" (A-D Brundin): 28b.

Podochlus grandis (Brundin): 16b, 28b.

Podochlus stouti (Brundin): 34b.

Podochlus cockaynei (Brundin): 28b, 34b.

Podochlus knoxi (Brundin): 34b.

Subfamily Diamesinae

Maoridiamesa glacialis (Brundin): 30b.

Maoridiamesa harrisi (Brundin): 28b, 30b, 34b.

Maoridiamesa intermedia (Brundin): 28b.

Maoridiamesa stouti (Brundin): 30b, 34b.

Maoridiamesa sp.: 5q.

Subfamily Tanypodinae

Gressittius antarcticus (Hudson): 21g.

Tanypodid sp.: 5q.

The *Parachlus*, *Podonomus*, *Podochlus*, *Maoridiamesa* and *Gressittius* species are found in mountain streams and rivers.

Family Dixidae [Dixid midges]

Notodixa campbelli (Alexander): 14a.

Larvae inhabit quiet pools and backwaters of very small steep streams.

Notodixa otagoensis (Alexander): 14a
Paradixa fuscinervis (Tonnoir): 6a, 14a.
Paradixa neozelandica (Tonnoir): 6a.

Larvae inhabit seepages, streams, pools, ponds, lakes and swamps in lowlands and mountains.

Subfamily Culicidae [Mosquitoes or Waeroa]

Culex pervigilans (Bergroth): 13a.

Most common species inhabiting pools, containers and stream margins.

Culiseta tonnoiri (Edwards): 7a, 14a, 32a, 36a, 39f, 41a.

Inhabits forest ground pools.

Austromansonia tenuipalpis (Edwards): 39f.

Inhabits permanent ground pools or swamps with aquatic plants.

Opifex fuscus (Hutton) [Blue mosquito]: 39f.

On rocky coasts, above the tidal influence, it inhabits brackish or saline rock pools formed from wave splash and rainwater.

Maorigoeldia argyropus (Walker): 01.

Found in tree holes, tanks and containers.

Aedes antipodeus (Edwards): 39f.

In freshwater ground pools.

Coquillettidia iracunda (Walker): 7a, 14a.

In permanent ground pools and swamps.

Family Chaoboridae [Phantom midges]

Corethrella (Notocorethrella) novaezelandiae (Tonnoir): 7a, 14a.

Larvae are predaceous, and are found in lakes and ponds, probably around plants. The larvae are almost transparent.

Family Ceratopognidae spp.: 1d, 3a, 5q, 11 d, 12d, 25e.

Found in streams.

Family Simuliidae [Blackflies, Sandflies or Namu]

Austrosimulium laticome (Tonnoir): 14m.

Austrosimulium multicomme (Tonnoir): 14m.

Austrosimulium tillyardianum (Tonnoir): 24g.

Austrosimulium unguatum (Tonnoir): 14m, 42i.

Larvae are filter feeders in running water. Females require a blood meal for egg development. *A. laticome* are found on stones of open lowland streams and rivers. *A. multicomme* are found in cold streams on stones and leaves. *A. tillyardianum* inhabit open lowland streams and larger rivers, and are found on stones. *A. unguatum* are found on stones and leaves in fast currents of smaller forest streams.

Family Thaumaleidae [Droop-wing midges]

Austrothaumalea appendiculata (Tonnoir): 14m.

Austrothaumalea neozelandica (Tonnoir): 14m.

The larvae of *A. appendiculata* are collector/browsers found in thin water films which have formed below boulders and stones in splash zones of steep streams. The collector/browser larvae of *A. neozelandica* are found in water films on the edges of steep seepages, and are usually not associated with streams.

Family Blephariceridae [Net-wing midges]

Neocurupira hudsoni (Lamb): 28c, 33c.

Neocurupira tonnoiri (Dumbleton): 14c, 15c, 22g, 23g.

The collector/browser larvae of *N. hudsoni* are found in open stable streams and rivers to 1500m. *N. tonnoiri* are also collector/browsers and inhabit steep forest streams and deep swift open rivers.

Family Psychodidae spp. [mothflies]: 11 d, 12d.

Larvae at stream margins in mud and decaying leaves.

Family Tipulidae [Craneflies]

Hexatomini sp. A (sensu d): 1d, 3d, 11d, 12d.

Hexatomini sp. B (sensu d): 3d, 11 d, 12d.

Found in stony streams.

Eriopterini, *Rabdomastix* (?) sp.: 24g.

Inhabit fast flowing, stony streams.

Eriopterini sp.: 3d, 11d, 12d.

Aphrophila sp.: 12d.

Paralimnophila skusei (Hutton): 11 d.

Limonia sp.: Ild, 12d.

Inhabit stony streams.

Zelandotipula sp.: Id.

Larvae are collector/browsers, and are found in seepages.

Family Muscidae spp.: Id, 3d, Ild, 12d, 25g.

Inhabit stony streams.

Family Stratiomyidae [Soldier flies] sp.: 11 d.

Family Empididae [Dance flies]

Hilara fossalis (Miller): 25gi.

Undetermined empidid spp.: Id, 3d, 11 d, 12d.

3. KEY LETTERS TO SOURCES AND ABBREVIATIONS

Letter	Source
a	J. N. Belkin (1968)
b	L. Brundin (1966)
c	D. A. Craig (1969)
d	K. J. Collier & M. J. Winterbourn (1987)
e	W. J. Crumpton (1977)
f	L. J. Dumbleton (1973a, b)
g	D. Eward & R. Putz (this study)
h	I. M. Henderson (pers. comm.)
i	I. D. McLellan (1977, 1988, 1991, 1993)
j	A. B. Millar (pers. comm.)
k	R. G. Ordish (1984, pers. comm.)
l	J. S. Pillai (1966)
m	A. L. Tonnoir (1925, 1927)
n	W. J. Winstanley (1980)
o	M. J. Winterbourn (1973)
p	E. C. Young (1962)
q	D. J. Jellyman & M. Flain (1990)

4. LOCALITIES

Locality records are sometimes very general, e.g. Franz Josef could mean the township, the glacier or the area including the township, the Waiho Valley and the land in the vicinity of both. Waiho, the Maori name for the locality, would be the same.

Only brief descriptions of some localities are given, but many are well documented in the

literature. A few localities are just outside the park boundaries, but are in habitats typical of those within the park. The localities are listed roughly from North to South.

- 0 Okarito Lagoon
- 1 Suspect Ck. Small stony brown-water stream in manuka (*Leptospermum scoparium*), off Forks-Okarito Rd. < 150 m asl.
- 2 Small fast brown-water creek overhung with bush, off Forks-Okarito Rd. < 150 m asl.
- 3 Steep Ck., a small brown-water stream through Podocarp-Kamahi (*Weinmannia racemosa*), off Forks-Okarito Rd. < 150 m asl.
- 4 Deep Ck., a brown-water stream with moss on rocks, off Forks-Okarito Rd. < 150 m asl.
- 5 Lake Wahapo. < 100 m asl.
- 6 Pool 1km S of Waitangi-taona River. < 150 m asl.
- 7 Lake Mapourika. 84 m asl.
- 8 Tatara Track.
- 9 Arthur's Ck, Callery Valley. Large boulders and fast water. 210 m asl.
- 10 Start of Lake Wombat Track. Light trapping at night. Same locality as Franz Josef Glacier Road at start of Alex Knob Track. 150 m asl.
- 11 Toilet Stream, towards end of Franz Josef Glacier Road. Clear-water stream through Wineberry (*Aristotelia serrata*), Tutu (*Coriaria arborea*) and Pate (*Schefflera digitata*). 270 m asl.
- 12 Hidden Creek, near Toilet Ck. Spring fed with the same streamside vegetation as Toilet Ck. 270 m asl.
- 13 Waiho, pool in pasture. General locality not numbered on map. 100-150 m asl.
- 14 Franz Josef, Waiho. General locality not numbered on map.
- 15 Waiho River, Waiho Gorge. 180-300 m asl.
- 16 Franz Josef, stream below glacier. 300 m asl.
- 17 Franz Josef, Robert's Point Track. 180-900 m asl.
- 18 Franz Josef, NE side of glacier.
- 19 Franz Josef, meltwater pools on glacier.
- 20 Alex Knob. 1295 m asl.
- 21 Alex Knob Tarns. 1250 m asl.
- 22 Docherty Ck. Tributary of Waiho River.
- 23 Omoeroa Saddle, Kiwi Jack's Ck. 200 m asl.
- 24 Omoeroa Saddle, headwater tributaries of Kiwi Jack's Ck. 400 m asl.
- 25 Omoeroa Saddle, small brown-water stream from swamp. 450 m asl.
- 26 Omoeroa Saddle.
- 27 Omoeroa River at State Highway 6.
- 28 Waikukupa River. 250 m asl.
- 29 Fox Glacier. General locality not marked on map.
- 30 Fox River, not far below glacier. 250 m asl.
- 31 Skiffington Swamp/Lake Gault. 400 m asl.
- 32 Lake Matheson. 150 m asl.
- 33 Clearwater River, tributary of Cook River.
- 34 Bullock Ck., tributary of Cook River. 150 m asl.
- 35 Copeland Valley.
- 36 Copeland Valley, Welcome Flat. 460 m asl.
- 37 Copeland Valley, Welcome Flat Hot Springs. 460 m asl.
- 38 Copeland Valley, Douglas Rock Hut. 760 m asl.

- 39 Westland National Park, in distribution maps and general records. Not numbered on map.
- 40 Pioneer Hut, Fox Glacier. 2438 m asl.
- 41 Karangarua Valley.
- 42 Galway Point. 5 m asl.

5. ACKNOWLEDGMENTS

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6. REFERENCES

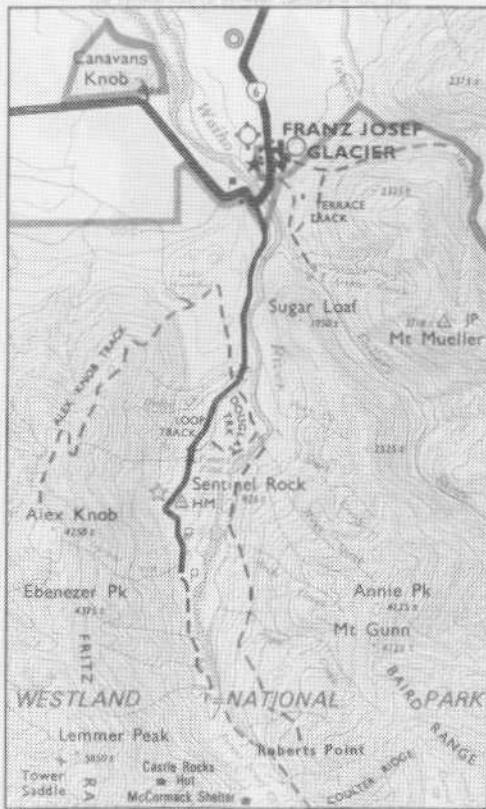
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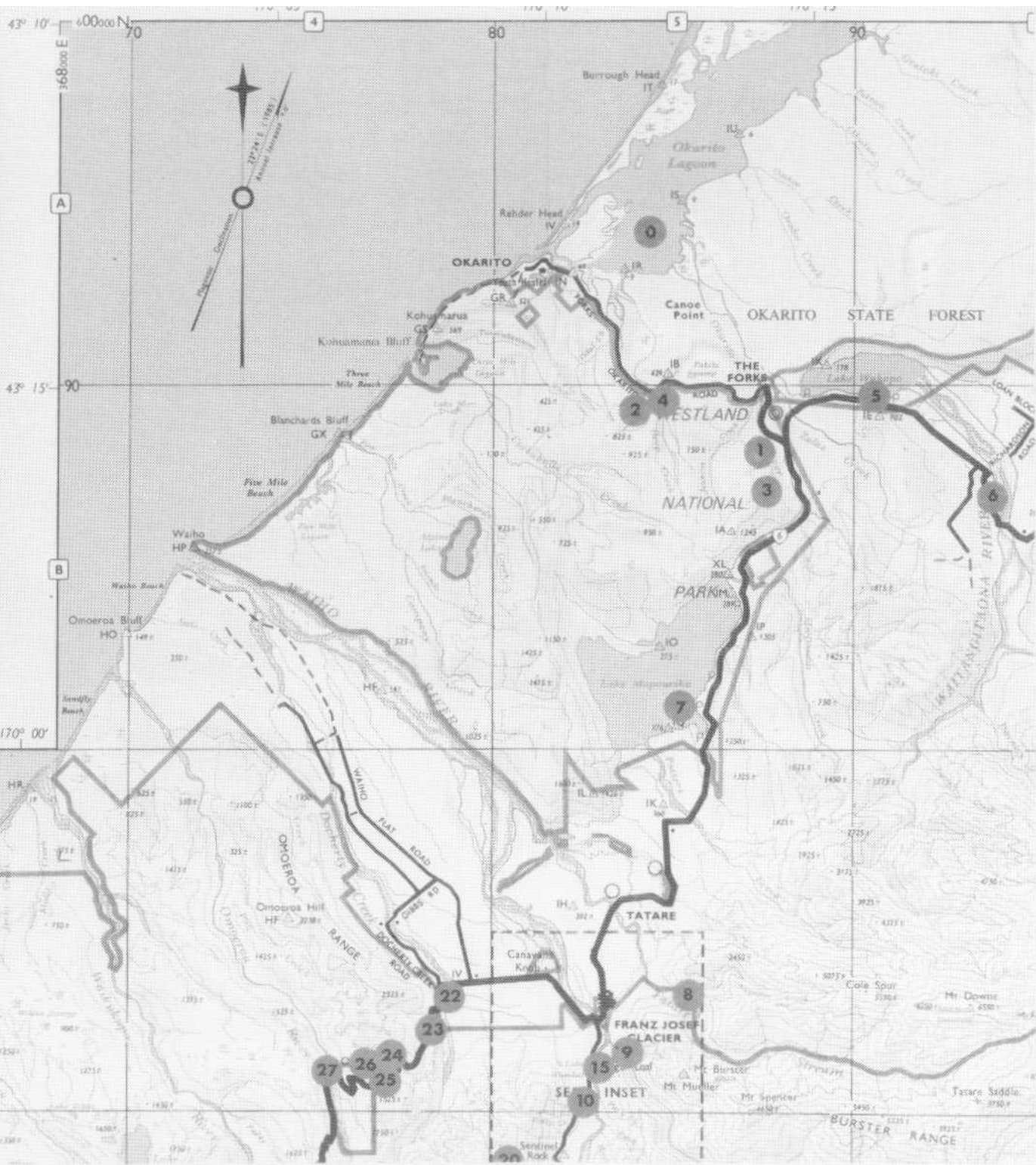
Figure 1 a,b. Westland National Park. The numbers in circles indicate the collection localities referred to in the text.



ACIER



FRANZ JOSEF GLACIER



Abbreviations

MCRP	Mr Cook National Park
WNP	Westland National Park
NZFS	NZ Forest Service
NZAC	NZ Alpine Club
NZSA	NZ Skiwalkers Association
CMC	Centenary Mountaineering Club
LS	Lobby Station
GPS	Golfer Peak Station
THC	Tourist Hotel Corporation
MCS	Mixed Cook Station

The representation on this map of a road or track does not necessarily indicate a public right of way.

