

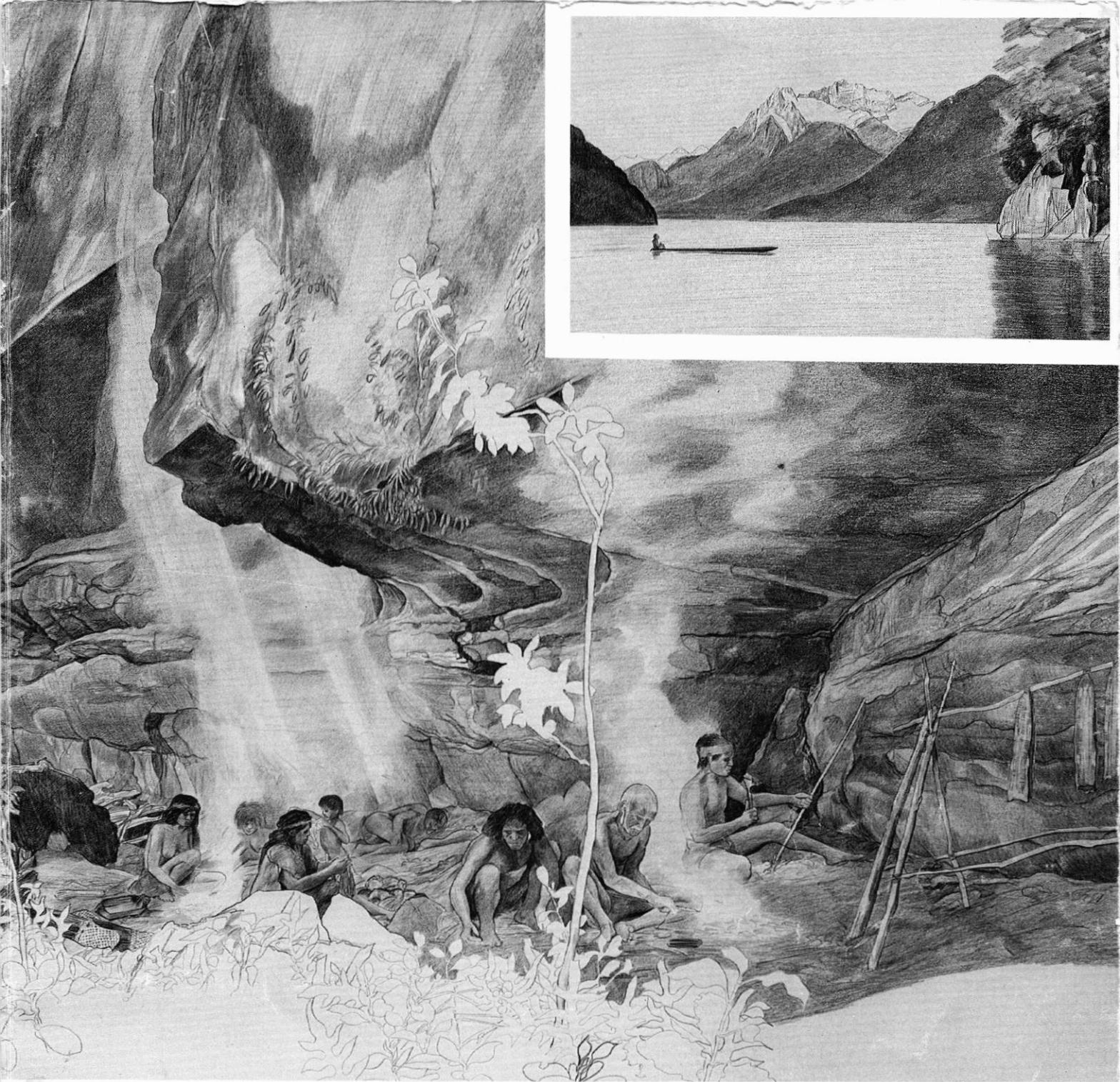


**NEW ZEALAND ARCHAEOLOGICAL ASSOCIATION MONOGRAPH 18:
Atholl Anderson and Richard McGovern-Wilson (eds), *Beech Forest
Hunters***



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Beech Forest Hunters

Edited by
Atholl Anderson and Richard McGovern-Wilson

New Zealand Archaeological Association Monograph 18

LEE ISLAND AND ITS ENVIRONMENT

Kim Morrison and Atholl Anderson

At 61 km long and 344 km² in area, Lake Te Anau is the second-longest (to Wakatipu) and second-largest (to Taupo) lake in New Zealand. It lies on the eastern margin of Fiordland in a basin of Tertiary sedimentary rocks situated between ranges of Ordovician gneisses to the west and mountains of Permian greywackes and basalts to the east. The main body of the lake lies almost north-south and Lee Island, in its northern extension, creates the narrowest point (Fig. 1.1). The island is about 600 m long by 200 m wide, with its long axis approximately north-south, and it rises to 60 m above Lake Te Anau which, in turn, has a mean height of about 202 m above sea level (Figs. 1.2 and 1.3).

Lee Island is composed of freshwater sedimentary rocks of Paleocene-Eocene series in which gritty sandstones predominate. These are bedded with a steep dip to the north-east and have been eroded to

form a series of parallel ridges running diagonally north-west - south-east across the island. The tendency of the ridges to overhang facing the south-west is accentuated on the steep western face of the island. Here six rockshelters, each with floors sloping up from the waterline, have been located. Cultural remains existed in four of them. The sandstone in the shelters is continually exfoliating and large blocks have also fallen, mostly along the dripline in each case.

Lee Island is exposed to strong winds from all directions although the prevailing wind is from the north-west. Rainfall is frequent and heavy and it amounts to about 2800 mm of precipitation per year. Sunshine hours are correspondingly reduced to about 1600 per year. The mean annual temperature is about 10 degrees Celsius with a maximum seasonal variation of plus and minus four degrees in mean monthly temperatures.

In this cool, cloudy and humid environment southern beech (*Nothofagus* sp.) forest is the predominant vegetation type (Fig. 1.4). The shoreline forests of Lake Te Anau have been described by Mark et al (1972) and Meurk (1973) and that on Lee Island fits within the mountain beech - mixed-podocarp type.

Surveys by Morrison in May 1983 disclosed the vegetation described below. Scientific names for all species are given in Table 1.1.

VEGETATION ON LEE ISLAND

At the northern end a narrow beach of cobbles and sand holds a 5 m high manuka, *Coprosma propinqua* shrubs and occasional *Gaultheria antipoda*, mountain cottonwood and mountain flax plants. A single straggly 8 m high rimu occurs here, the only one seen on the island. Scattered patches of *Lepidosperma australe* and *Schoenus pauciflorus* grow in damp gravel and the rush *Leptocarpus similis* is present in shallow water. Wind-shorn shrubs and piled logs on the northern boulder beach are evidence of prevailing winds. A small eastern bay has a bouldery shore and a tiny sand beach, with manuka, *Coprosma propinqua*, two leaning kowhai and single plants of tree tutu and marbleleaf. Shore rock slabs have shrubs 2 - 3 m high of *Coprosma propinqua*, manuka, mountain cottonwood, akeake and *Gaultheria rupestris*. On the western shore, rata and broadleaf lean out from vertical rock which often supports perching moss, *Pyrrosia serpens*, hound's tongue fern and *Earina autumnalis*.

The lower forest to 20 m above lake level is dominated by mountain beech, its canopy 15 m

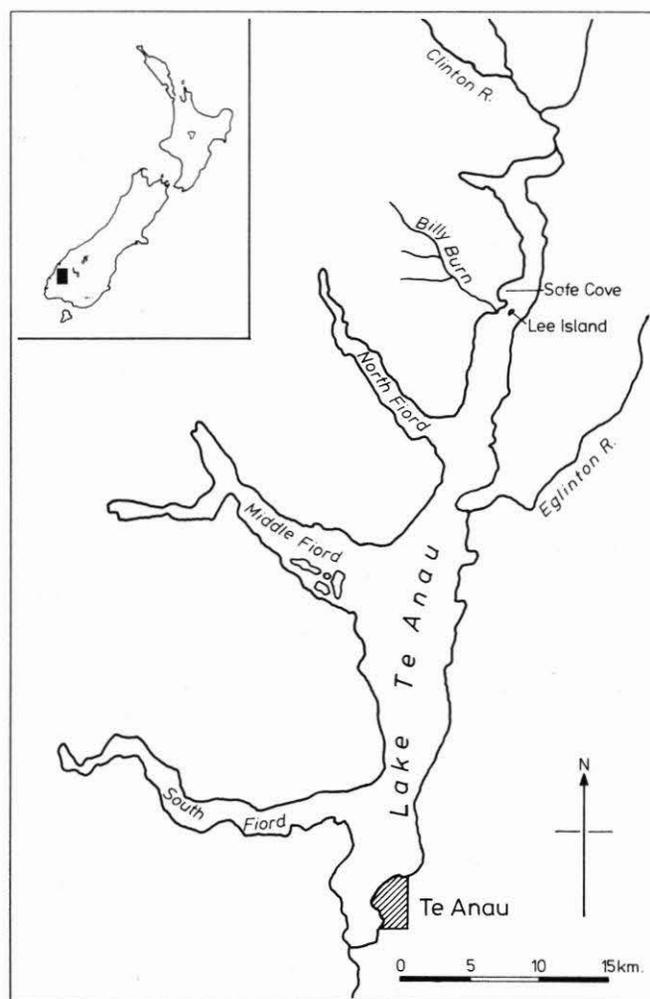


Figure 1.1. Lake Te Anau, showing the positions of Lee Island and Safe Cove.



Figure 1.2. Lee Island (centre) from the north.



Figure 1.3. North arm of Lake Te Anau with Lee Island shown to the left.

high, with kamahi common and few rata. The lower tier to 6 m high holds juvenile kamahi, abundant shining karamu, lancewood, broadleaf and mapou, a few three finger and seedling mountain beech and miro. At the northern point a 10 m high rata-kamahi canopy covers a dense tier of young mountain beech, kamahi, mingimingi, lancewood and bracken 1.5 m high. Behind the eastern bay is a narrow neck with 18 m high mountain beech well broken up by north-west winds. Tall ground ferns, *Blechnum discolor* and *Blechnum capense*, are locally common on the shaded banks behind the eastern bay.

Between 20 and 40 m above lake level mountain beech still dominates the broken canopy with some young spindly kamahi in the lower canopy. Shining karamu and lancewood are abundant in the lower tier, and also three finger, mingimingi, mapou, young rata and seedling beech. Filmy ferns (*Hymenophyllum* sp.) occur on shady rock ledges and *Asplenium* ferns, including *Asplenium flaccidum*, are common on rock banks. The ridge running towards the south point has shady depressions and rock hummocks with thick moss carpets. Rata is common especially on rocky ground. A single 4 m high Hall's totara was seen here. Common ground plants are the ferns, hound's tongue fern, *Grammitis billardieri*, *Hymenophyllum multifidum* and the orchid, *Earina autumnalis*. Mountain beech and kamahi are abundant on the shady eastern slope with a more open lower storey

of broadleaf, lancewood, shining karamu and three finger. Rapid regeneration of these species as well as mountain beech and bracken has occurred where windfalls have created large gaps in the canopy.

The upper forest (40 - 60 m above lake level) has an open canopy 15 - 18 m high of co-dominant mountain beech and rata with kamahi common in the lower canopy. The summit crest is narrow, well-lit, with a dense lower storey 2 m high of young mountain beech and kamahi mixed with lancewood, mingimingi and some *Gaultheria antipoda*. Hound's tongue fern is abundant on the mossy floor which is strewn with windfalls.

The vegetation on Lee Island can be compared with that on the mainland nearby, at Safe Cove, where there is a delta at the mouth of the Billy Burn. The mainland forest has a greater abundance of mature podocarps, including some very large Hall's totara which were searched, fruitlessly, for signs of bark removal.

ANIMALS AT LEE ISLAND

Lake Te Anau contains eels (*Anguilla* sp.) and species of native trout or kokopu (*Galaxias* sp.), amongst a suite of smaller freshwater fishes. The native grayling (*Prototroctes oxyrhynchus*), now regarded as extinct, was caught in local streams by Henry (1884:83). The freshwater mussel (*Hyridella menziesi*) occurs in some places around the shores of the lake and was probably found in the shallows at Safe Cove, about 800 m from Lee Island. Remains

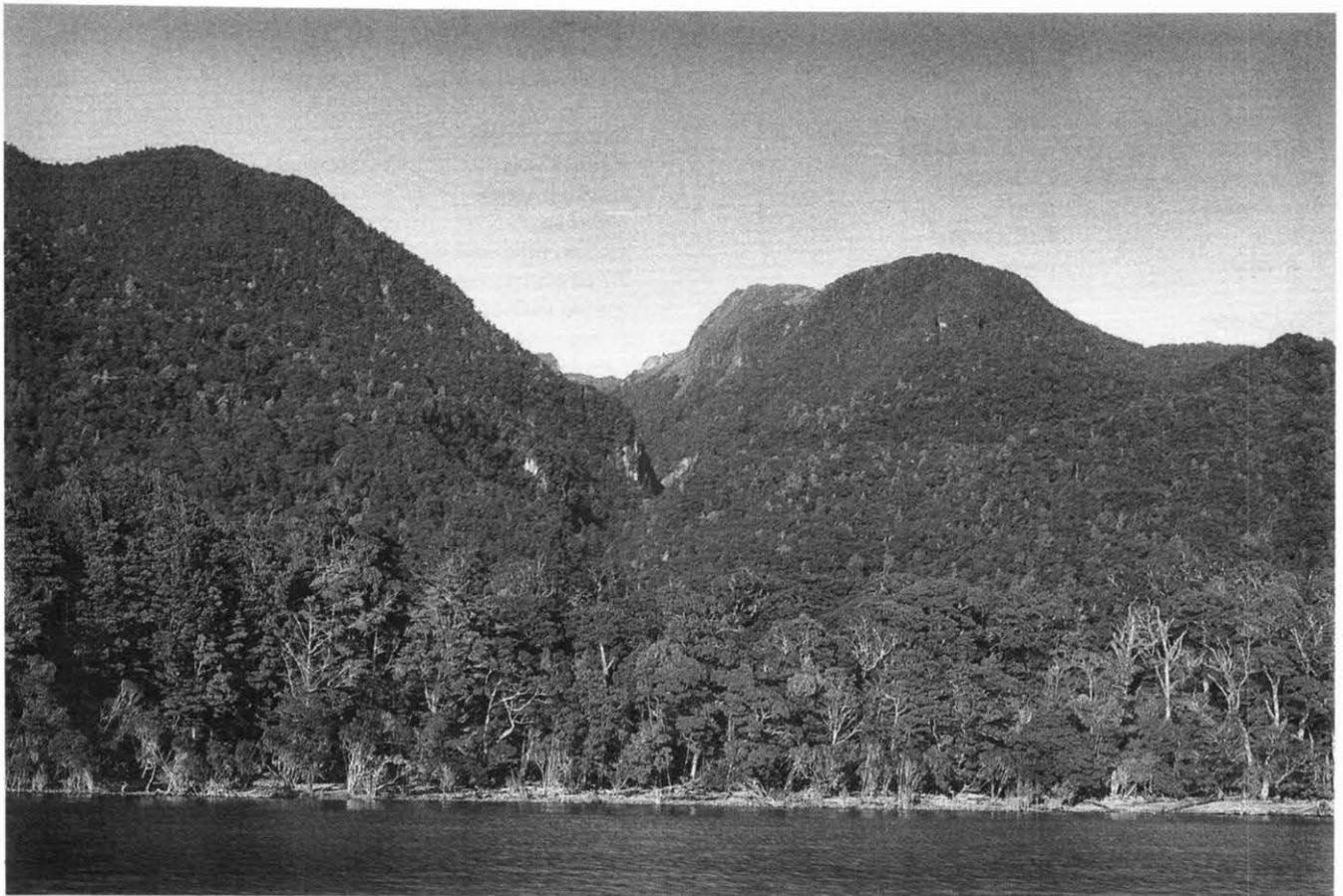


Figure 1.4. Beech and rata forest in north arm, Lake Te Anau.

Table 1.1. List of plants from Lee Island and Safe Cove, Lake Te Anau.

Notes: nomenclature follows Allan (1961) for pteridophytes, gymnosperms and dicotyledons, Moore and Edgar (1970) and Wilson (1982) for monocotyledons, and Wilson (1982) for Pseudopanax.

Key: (after Morrison 1983) - = absent; r = rare; o = occasional; f = frequent; a = abundant; va = very abundant.

Scientific name	Common name	Lee Is.	Safe Cove
Pteridophytes			
<i>Asplenium bulbiferum</i>	hen and chicken fern	-	f
<i>A. flabellifolium</i>		r	-
<i>A. flaccidum</i>		a	c
<i>Blechnum capense</i>	kiokio	o	-
<i>B. colensoi</i>		-	o
<i>B. discolor</i>	crown fern	o	va
<i>B. fluviatile</i>		-	c
<i>B. minus</i>		-	a
<i>B. penna-marina</i>		r	a
<i>Ctenopteris heterophylla</i>		a	a
<i>Cyathea smithii</i>	soft tree fern	-	f
<i>Grammitis billardieri</i>		a	a
<i>Histiopteris incisa</i>	water fern	r	o
<i>Hymenophyllum demissum</i>		-	a
<i>H. dilatatum</i>		o	f
<i>H. flabellatum</i>		o	-
<i>H. multifidum</i>		va	-
<i>H. rarum</i>		o	-
<i>H. scabrum</i>		-	f
<i>Phymatodes diversifolius</i>	hound's tongue fern	va	a
<i>Pteridium aquilinum</i> var. <i>esculentum</i>	bracken	a	o
<i>Pyrosia serpens</i>		va	f
<i>Thelypteris pennigera</i>		-	f
<i>Tmesipteris tannensis</i>		r	-
Gymnosperms			
<i>Dacrydium cupressinum</i>	rimu	r	a
<i>Phyllocladus alpinus</i>	mountain toatoa	-	o
<i>Podocarpus dacrydioides</i>	kahikatea	-	f
<i>P. ferrugineus</i>	miro	f	a
<i>P. hallii</i>	Hall's totara	r	a
<i>P. spicatus</i>	matai	-	f
Dicotyledons			
<i>Aristotelia serrata</i>	wineberry	r	o
<i>Carmichaelia</i> sp.	N.Z. broom	r	f
<i>Carpodetus serratus</i>	marbleleaf	r	o
<i>Cassinia vauvilliersii</i>	mountain cottonwood	o	-
<i>Clematis paniculata</i>		r	o
<i>Coprosma foetidissima</i>	stinkwood	f	a
<i>C. lucida</i>	karamu	va	f
<i>C. parviflora</i>		-	a

<i>C. propinqua</i> var. <i>propinqua</i>		o	a
<i>C. rotundifolia</i>		-	a
<i>C. rugosa</i>		o	-
<i>Coriaria arborea</i>	tree tutu	r	o
<i>Cyathodes fraseri</i>		o	r
<i>C. juniperina</i>	mingimingi	a	a
<i>Elaeocarpus hookerianus</i>		-	f
<i>Elytranthe flavida</i>	yellow mistletoe	o	o
<i>Fuchsia excorticata</i>	fuchsia	-	o
<i>Gaultheria antipoda</i>		o	-
<i>G. rupestris</i>		o	-
<i>Griselinia littoralis</i>	broadleaf	a	a
<i>Gunnera monoica</i>		-	o
<i>Leptospermum scoparium</i>	manuka	f	a
<i>Lophomyrtus obcordata</i>		-	o
<i>Loranthus micranthus</i>	mistletoe	-	o
<i>Melicytus ramiflorus</i>	mahoe	f	o
<i>Metrosideros diffusa</i>		-	o
<i>M. umbellata</i>	rata	va	a
<i>Muehlenbeckia axillaris</i>		-	o
<i>Myrsine australis</i>	mapou	a	a
<i>M. divaricata</i>		-	a
<i>Neomyrtus pedunculata</i>	rohutu	-	va
<i>Nertera dichondraefolia</i>		-	a
<i>Nothofagus menziesii</i>	silver beech	-	a
<i>N. solandri</i> var. <i>cliffortioides</i>	mountain beech	va	a
<i>Olearia arborescens</i>		o	o
<i>O. avicenniaefolia</i>	akeake	o	-
<i>Pitiosporum colensoi</i>		f	a
<i>Pseudopanax colensoi</i>	three finger	a	f
<i>P. crassifolius</i>	lancewood	a	f
<i>P. edgerleyi</i>		-	o
<i>P. simplex</i>		-	o
<i>Pseudowintera colorata</i>	bush lawyer	-	r
<i>R. schmidelioides</i>		-	o
<i>Schefflera digitata</i>	pate	-	o
<i>Sophora microphylla</i>	kowhai	o	o
<i>Weinmannia racemosa</i>	kamahi	a	a

Monocotyledons			
<i>Agrostis tenuis</i>	browntop	-	r
<i>Astelia fragrans</i>		-	o
<i>Carex</i> sp.		r	r
<i>Chionochloa conspicua</i>		-	r
<i>Dendrobium cunninghamii</i>		a	-
<i>Earina autumnalis</i>		va	o
<i>E. mucronata</i>		a	o
<i>Lepidosperma australe</i>		o	-
<i>Leptocarpus similis</i>		o	-
<i>Microlaena avenacea</i>	bush rice grass	-	o
<i>Phormium cookianum</i>	mountain flax	r	-
<i>P. tenax</i>	N.Z. flax	-	o
<i>Ripogonum scandens</i>	supplejack	-	f
<i>Schoenus pauciflorus</i>		o	-

of native frogs (*Leiopelma* sp.) and lizards (*Leiopisma* sp. and *Hoplodactylus* sp.) occur on Lee Island.

Lists of birds and mammals recorded by Morrison on Lee Island, at Safe Cove and in the Worsley valley at the head of Lake Te Anau, are shown in Table 1.2. The following native species have been recorded additionally between 1969 and 1983 by Wapiti hunters in the Billy Burn watershed southern crested grebe (*Podiceps cristatus australis*), blue

duck (*Hymenolaimus malacorhynchos*), New Zealand kingfisher (*Halcyon sancta*), rifleman (*Acanthisitta chloris*), rock wren (*Xenicus gilviventris*), New Zealand pipit (*Anthus novaeseelandiae*), brown creeper (*Finschia novaeseelandiae*), and yellowhead (*Mohoua ochrocephala*).

One species of bird which once existed in the Te Anau district in large numbers, but is now locally extinct, was the large, flightless parrot - kakapo

Table 1.2. Animals at Lee Island, Safe Cove and Worsley Valley.

Notes: 1. visited 3-13 March 1983, 4 May 1983; 2. visited 10 May 1983; 3. visited 3-13 March 1983, 4-5 May 1983; 4. identification of sloughed skin, B.W. Thomas (pers.comm.); 5. nomenclature as in Falla et al. (1978); 6. abundance: x = present, s = sign, - = absent.

Scientific name	Common name	Lee Is.	Safe Cove	Worsley Valley
		(1)	(2)	(3)
Reptiles				
<i>Hoplodactylus pacificus</i>	common gecko (4)	s	-	-
Mammals				
<i>Mus musculus</i>	house mouse	x	-	-
<i>Trichosurus vulpecula</i>	opossum	s	-	-
<i>Cervus elaphus</i>	red deer	s	x	x
Birds (5)				
<i>Apteryx a. australis</i>	Sth Id brown kiwi	-	-	x
<i>Phalacrocorax carbo</i>	black shag	-	-	x
<i>P. melanoleucos</i>	little shag	x	x	x
<i>Ardea novaehollandiae</i>	white-faced heron	x	-	x
<i>Tadorna variegata</i>	paradise shelduck	-	x	x
<i>Anas superciliosa</i>	grey duck	-	-	x
<i>Aythya novaeseelandiae</i>	N.Z. scaup	-	-	x
<i>Falco novaeseelandiae</i>	N.Z. falcon	-	x	x
<i>Gallirallus a. australis</i>	western weka	-	-	x
<i>Larus dominicanus</i>	black-backed gull	x	-	-
<i>Hemiphaga novaeseelandiae</i>	N.Z. pigeon	x	x	x
<i>Nestor m. meridionalis</i>	Sth Id kaka	-	-	x
<i>N. notabilis</i>	kea	-	x	x
<i>Cyanoramphus auriceps</i>	yellow-crowned parakeet	x	x	x
<i>Ninox novaeseelandiae</i>	morepork	-	-	x
<i>Prunella modularis</i>	hedgesparrow	-	x	x
<i>Gerygone igata</i>	grey warbler	x	x	x
<i>Rhipidura f. fuliginosa</i>	Sth Id fantail	x	x	x
<i>Petroica m. macrocephala</i>	yellow-breasted tit	x	x	x
<i>P. a. australis</i>	Sth Id robin	-	-	x
<i>Turdus merula</i>	blackbird	-	-	x
<i>Zosterops lateralis</i>	silveryeye	x	x	x
<i>Anthornis melanura</i>	bellbird	x	x	x
<i>Prothemadera novaeseelandiae</i>	tui	-	x	x
<i>Fringilla coelebs</i>	chaffinch	x	x	x
<i>Carduelis carduelis</i>	goldfinch	x	-	-
<i>C. flammea</i>	redpoll	x	-	x

(*Strigops habroptilus*). Richard Henry (1884:82) found them quite plentiful in the area, as were kiwis, and Melland (1889:299) remarked that on the north-west shore of the lake, "...I would undertake to catch at least half-a-dozen drumming kakapos any night next December. This is the sunny side of the mountains, and still has, I believe, far more kakapos to the square mile than any other part of the West Coast." Another species which was probably more common in the past than today, but which was very rare about Lake Te Anau even in the 19th century, was the takahe (*Notornis mantelli*).

Other birds which occurred in the area during the 19th century and are scarce or locally extinct today include the laughing owl (*Sceloglaux albifacies*), New Zealand thrush (*Turnagra capensis*), and dabchick (*Podiceps rufopectus*), kokako

(*Callaeas cinerea*) and saddleback (*Philesturnus carunculatus*).

The only cursorial mammals to live in the area, indeed in New Zealand as a whole prior to the arrival of Europeans, were people, the domestic dog (*Canis familiaris*), and the Polynesian rat (*Rattus exulans*), or kiore. Probably only the last was wild. It has been reported from various localities near Lake Te Anau recently (Hollyford Valley, Takahe Valley), and was no doubt a common resident of the beech forest in former times. Kiore irruptions were known to occur after years of particularly heavy *Nothofagus* seedfall (King 1984:45-46).

DISCUSSION

The southern beech forests, which occur in similar latitudes in southern Australia and South America as well, and at high altitudes in New Guinea and New Caledonia, are slow-growing, low in diversity and exhibit weak seasonality (Ovington 1983; Wardle 1984). They do not present a particularly attractive environment for human settlement in general, and this was especially the case in New Zealand where indigenous cursorial mammals were entirely absent, and introduced species few.

The birds which did occur were also relatively few. Of large species, only the kakapo and perhaps the small moa, *Megalapteryx didinus*, in earlier times were habitual residents of beech forest. Brockie (pers.comm.) estimated the avian biomass for *Nothofagus* forest at about 124 g per ha, which may be compared with figures ranging from 300 to 4000 g per ha for other types of native forest in New Zealand (see also Anderson 1988).

We may presume that settlement at Lee Island was thus attracted by either unusual circumstances of resource abundance, or simply the convenience, in a cool and rainy climate, of large shelters located at lake-level in a place which any traffic in the area was bound to pass. Perhaps both factors were important.

REFERENCES

- Allan, H.H. 1961. *Flora of New Zealand*. Vol. 1. Government Printer, Wellington.
- Anderson, A.J. 1988. Prehistoric fowling in the *Nothofagus* forest of southern New Zealand. *Archaeozoologia: Revue Internationale d'Archeologie* II (1/2):201-207.
- Falla, R.A., R.B. Sibson, and E.G. Turbott. 1978. *The New Guide to the Birds of New Zealand*. Collins, Auckland.
- Henry, R. 1884. Notes from Lake Te Anau. *N.Z.J.S.* 2:82-84.
- King, C. 1984. *Immigrant Killers: introduced predators and the conservation of birds in New Zealand*. Oxford University Press, Auckland.

- Mark, A.F., J.R. Crush and C.D. Meurk. 1972. Applied ecological studies of shoreline vegetation at Lakes Manapouri and Te Anau, Fiordland. Part 3: Vegetation of the Lake Te Anau shoreline. *Proceedings of the New Zealand Ecological Society* 19:143-154.
- Melland, E. 1889. Notes on a paper entitled "The Takahe in Western Otago," by Mr. James Park, F.G.S.. *T.N.Z.I.* 22:295-300.
- Meurk, C.D. 1973. Shoreline forests of Lake Te Anau, Fiordland. *Proceedings of the New Zealand Ecological Society* 20:96-102.
- Moore, L.B. and E. Edgar. 1970. *Flora of New Zealand*. Vol. 2. Government Printer, Wellington.
- Ovington, J.D. (Ed.) 1983. *Temperate Broad-Leaved Evergreen Forests*. Ecosystems of the World 10. Elsevier, New York.
- Wardle, J.A. 1984. *The New Zealand Beeches: Ecology, Utilisation and Management*. New Zealand Forest Service, Wellington.
- Wilson, H.D. 1982. *Stewart Island Plants*. Field Guide Publications, Christchurch.