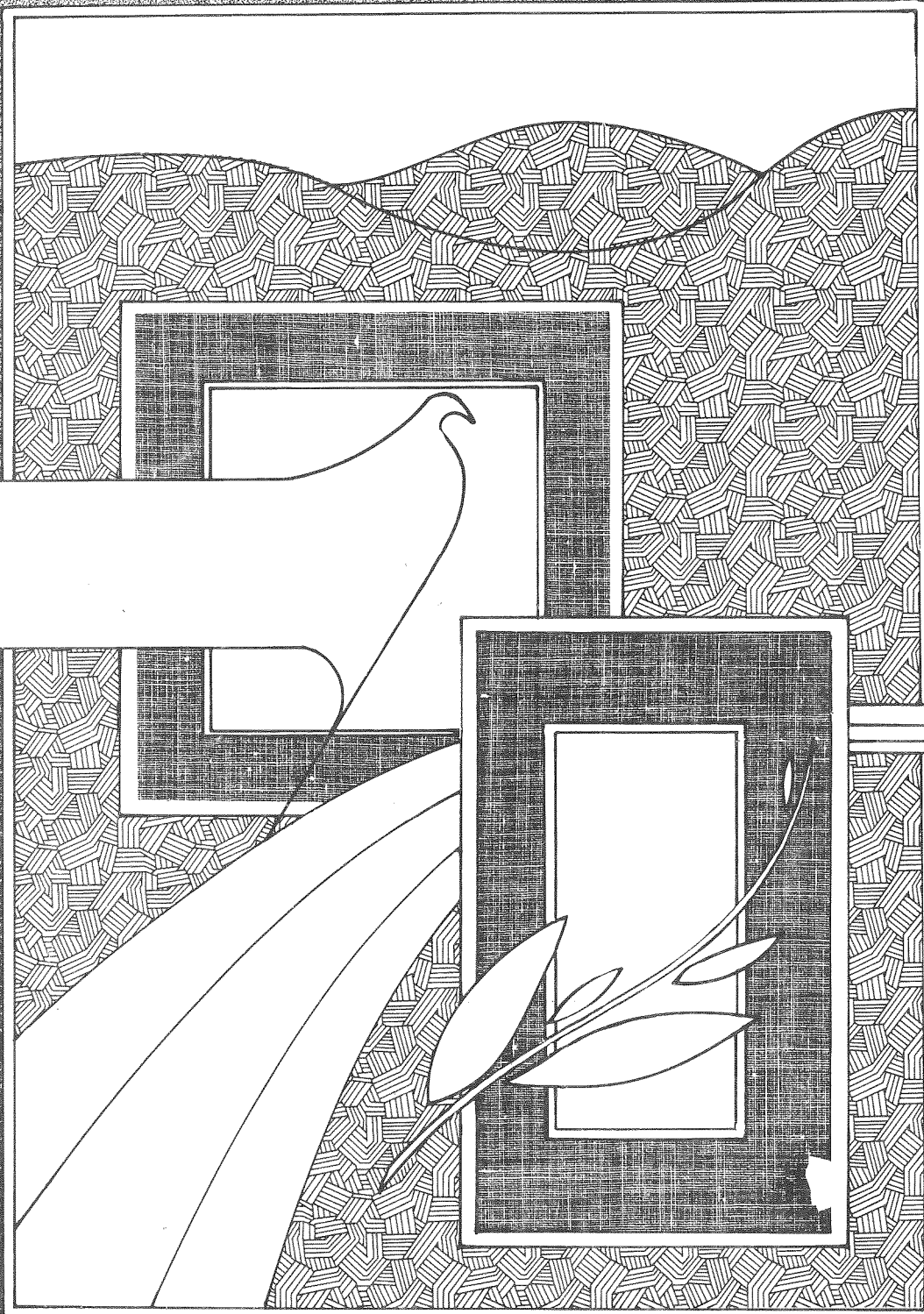


Auckland Conservancy

DEDICATED AREAS REPORT Number 14



Kaihu
Ecological
Area



KAIHU ECOLOGICAL AREA



N.Z. FOREST SERVICE
AUCKLAND CONSERVANCY
C.P.O. BOX 39
AUCKLAND

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KAIHU ECOLOGICAL AREA

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Location (see Figure 1)

Kaihu Ecological Area is situated about 20 km northwest of Dargaville on the west coast of Northland (approximate midpoint at map ref. NZMS 1 N19 305925). The area is a region of indigenous forest in the Tutamoe Ecological District (Simpson, 1982) and forms part of Northland Forest Park. Most of the forest is unmodified and occupies a plateau which constitutes the southern and highest section of the 30 km long Tutamoe Range. This landform is a dominant feature of the Northland landscape. Marlborough Forest, just to the northwest, is also part of this range as is Mataraua Forest further to the north.

The Dargaville Water Supply Reserve (Overlay 1, Figure 2), covering 1277 ha, abuts the proposed Ecological Area in the southwest and is also largely unmodified indigenous forest.

The Kaihu Ecological Area is 2425 ha in size and is one of two scientific reserves in the Tutamoe Ecological District. The other, Waipoua Forest Sanctuary measures 9105 ha.

The most recent aerial photographs are NZ Aerial Mapping Survey No. 3 B's Run No. 19 8A flown on 22nd December 1968. Photographs of the regenerating area southeast of Tutamoe were flown on 29th June 1984 by Flight No. 192, photograph no's 1-10.

Access

The Tutamoe Track (part of the New Zealand Walkway System) starts from the Karaka Tutamoe Road, 10 kilometres from the Tangowahine Valley Road junction. It crosses farmland of 2 kilometres before entering the Ecological Area and ascending to Tutamoe Trig (775 m a.s.l.). This track is the only track developed for public use in the reserve (Overlay 1 of Figure 2).

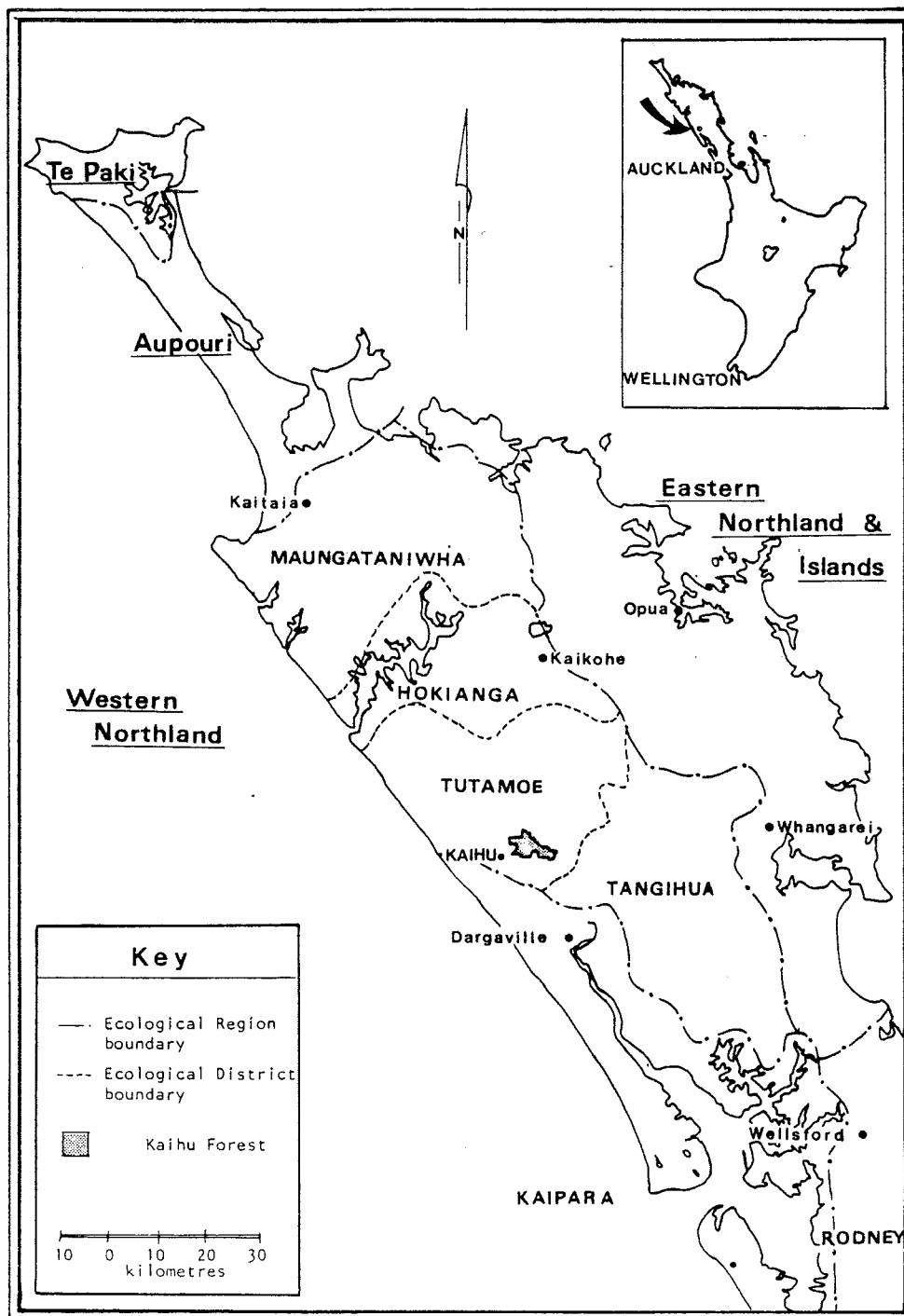
Access to the southwest is gained from the Upper Awakino Valley Road, an unformed grass road off Maropiu Kairara Road. From here the Awakino Stream can be followed up to the plateau area.

New Zealand Forest Products own an extensive area of land abutting Kaihu Forest, in the north and east. A network of tracks and roads, many still under construction, cross their land and provide good access off Massey Road, Opouteke Road and Kaimai Road. Permission is required to cross their land.

History of Reservation

Kaihu Forest was proposed as an ecological area in 1981 by J.L. Nicholls (Forest Research Institute, Rotorua) (file 32/3/1). The proposal was considered and approved in principle by the Scientific Co-ordinating Committee (S.C.C., renamed the State Forest Reserves Scientific Advisory Committee) in July 1981 and was gazetted on the 17th of May 1984 (NZ Gazette Page 1605).

Fig 1 : Location Map of Kaihu Ecological Area Showing Boundaries of Ecological Regions and Districts.



Rationale and Objectives of Designation

Kaihu Ecological Area fulfils many of the criteria for the selection of ecological areas as set down by the S.C.C. (1980). The proposed reserve is large (2425 ha), compact in shape, unroaded and contains a variety of landforms and vegetation types characteristic of the area. These include both regenerating and virgin forest with an altitudinal range between 100 m and 750 m a.s.l. Several undisturbed catchments draining the plateau are incorporated.

The proposal for reserving the area (NZFS file 32/3/1) states:

'the main feature of this proposed reserve is the large virgin area of a unique high - rainfall upland forest type between 600 and 700 m a.s.l. which has been widely modified elsewhere on the Tutamoe Plateau. The forest is generally valuable for wildlife with especially high kiwi numbers reported as present.'

(Nicholls, 1981)

The proposal also states that although indigenous forest on the gradual westerly fall of the plateau is amply reserved in Waipoua Forest Sanctuary, a coastal to plateau-top vegetation sequence is incomplete, since the highest point of the Sanctuary reaches only 600 m a.s.l.

Climate

The climate of Northland is subtropical with an airflow which is predominately from the southwest. Occasionally Northland is affected by tropical cyclonic storms (Town and Country Planning Branch, Ministry of Works, 1964).

On the Kaihu Plateau altitudinal effects will, to some degree, influence the climate therefore meteorological data from nearby stations may not be fully representative. The nearest meteorological stations to Kaihu Forest are at Waipoua Forest 26 km to the northwest and in Dargaville 19 km to the south. Waipoua Forest received a yearly average of 1651 mm of rain during 1928-1980 while Dargaville received a yearly average of 1248 mm during 1943-1980. Over the period 1928-1980 the average daily maximum temperature in Waipoua was 18.8° C and the average daily minimum was 9.4° C with a yearly average of 14.1° C. In Dargaville over the period 1943-1980 the average maximum daily temperature was 19.2° C and the average minimum daily temperature was 10.3° C with a yearly average of 14.7° C.

Topography

Kaihu Forest has gently rolling to steep topography with an altitudinal range from approximately 90 m a.s.l. to nearly 775 m a.s.l. at Mt Tutamoe. This is slightly lower than the highest point in Northland. From Mt Tutamoe the land slopes gently away to the northwest to a large, flat plateau. In places the rim of the plateau is steep, dropping away to private farm land and pine plantations.

The Awakino, Opouteke and Kaihu Rivers drain the Kaihu Plateau. These eventually join the Wairoa River which flows through Dargaville.

Geology

Information on the geology of the Kaihu region was derived from Geological Maps compiled by the Geological Survey Unit for the Department of Lands and Survey (1982).

Kaihu Forest lies on a hard volcanic basement of basalt which forms the Tutamoe Range. This was extruded as massive flows of crystalline basalt and is occasionally thickly interbedded with minor belts of tuff, scoria and breccia.

The lower slopes of Tutamoe as well as the lower regions and slopes west of the Awakino Stream are micaceous sandstone which is calcareous in places. There is also weathered to soft, brown, non-calcareous, silty clay to depths of 10 m.

The eastern slopes of the forest are underlain by grey, brown and green mudstone which is locally silicious and contains small amounts of muddy limestone and greensand. Weathered to soft clay, which reaches depths of 10 m, is also present. It is unstable in places.

In the extreme southeast a region of alluvial mud, sand and gravel just overlaps the forest boundary.

The lower reaches of a tributary of the Opouteke Stream (midpoint at approximately map ref. NZMS 1 N19 278948), and the upper reaches of Awakino Stream (midpoint at approximately map ref. NZMS 1 N19 284927) are characterised by unusual basaltic rock formations. Here, rock has fractured into well defined columnar structures which form canyons and numerous waterfalls.

In the upper reaches of Tangowhine Stream (approximately map ref. NZMS 1 N19 330923) we found a large boulder containing well fossilized marine animals. These probably date from the upper Mesozoic Era (circa. 100 million years ago) (F. Brook, personal communication).

Pedology and Erosion

Information on the pedology of the Kaihu region was derived from Pedological Maps compiled by the Soil Bureau for the Department of Lands and Survey (1980).

Kaihu Forest contains steep land soils and soils of rolling and hilly land.

The soils to the west of Tutamoe Trig are brown granular clay loams and clays, and related steep land soils. The majority of the plateau has Tutamoe friable clay while the rim and lower slopes have Te Kie steep land soils of stony and reddish clay loams.

A much smaller area to the east of Tutamoe Trig has yellow-brown earth and related steep land soils (Omu clay loams and Waimatenui clay loam). Hukerenui silt loam, a podzolized yellow-brown earth and Okaka clay and silty clay are present in the extreme south and southeastern portion of the Forest. (Department of Lands and Survey, 1980)

Steepland soils are moderately fertile with shallow topsoils liable to sheet or slip erosion under pastoral use (Town and Country Planning Branch, Ministry of Works, 1964). Slopes around the rim of the plateau are very steep in some places. Large earth and rock slips were noted, several along the steep slopes to the west of the Awakino Stream and two near the northern forest boundary (approximate map ref. NZMS 1 N19 285950). Several slips were also seen in the broken, scrub covered country southeast of Mt Tutamoe.

Vegetation

A list of plant species recorded using both common and scientific names is provided in Appendix 1.

The method used to describe the vegetation is a modified New Zealand Forest Service recce-type description in which vegetation is recorded in the following five tiers :

Emergents	-	5 m above mean canopy height
Canopy	-	variable height
Subcanopy	-	below canopy to 2 m
Shrub	-	0.5 to 2 m
Groundcover	-	below 0.5 m

Information was gained from 17 days field work (the 21st - 28th of March, 10th - 15th of April, 9th - 10th of June 1984). A study by W.J. Lyford (1982, unpublished New Zealand Forest Service report) on the regenerating forest area southeast of Tutamoe and an F.R.I. survey (1983) was also used.

Vegetation descriptions have been grouped into forest types, where possible, based on Nicholls (1976) typing. The following types were distinguished :

1. plateau vegetation (Nicholls 1976, F1);
2. rimu-rata-tawa-tarairi (Nicholls 1976, E3);
3. rimu-rata-tawa-towai (Nicholls 1976, D8);
4. hardwood forest;
- 5a & 5b kauri-softwood-hardwood (Nicholls 1976, B2); and
6. regenerating forest.

Tables 1A - F give a detailed stand structure and composition for each type. Overlay 2 of figure 2 shows their distribution within Kaihu forest.

Distributions and Descriptions of Each Forest Type

Type 1 : Plateau vegetation (Table 1A)

A swampy plateau occupies the middle of Kaihu Forest. It is covered by a dense forest type which according to Nicholls (1976) occurs between 500 and 600 m a.s.l. on the plateaux of western Northland. This type is also found away from the main Kaihu plateau in areas of the forest that are flat and swampy.

This plateau forest is characterised by a dense canopy without clearly differentiated subcanopy tiers. The occasional large fallen tree has left gaps in the canopy under which a high diversity of species are regenerating. The rotting debris strewn around and the dense tangles of supplejack and kiekie make travelling through this area difficult. Bryophytes abound on the plateau sometimes covering the trees and forming thick spongy mats on the ground.

Large emergent rimu are locally frequent and reach up to 30 m in height. Kahikatea, northern rata and pukatea are also occasional constituents of this tier.

A dense 12-18 m canopy comprises mainly towai with maire tawake. Ogle and Bartlett (1980) found southern rata in Mataraua and Herekino forests confirming earlier unsubstantiated records. Kaihu Forest represents another localised habitat for this species in Northland. Abundant supplejack and kiekie reaches the canopy level.

Kanono and large-leaved mahoe are common in both the subcanopy and shrub layers. In addition the subcanopy comprises a high diversity of species including most of the species found in the canopy. The shrub layer has *Dicksonia lanata* as a co-dominant species.

The ground cover is locally dense with frequent areas of bryophytes. *Hymenophyllum* spp., kidney fern and aka grow abundantly both on the ground and as epiphytes. The ferns *Grammitis billardieri* and *G. pseudociliata* are common epiphytes. Ogle and Bartlett (1980) extended the range of *G. billardieri* which was not previously known from Northland, into several other western Northland forests. *G. billardieri* is common in the plateau vegetation and occasional in other forest types.

Type 2 : Rimu-rata-tawa-taraire (Table 1B)

This forest type is found in unmodified areas in the northeastern section of the forest and also below 450 a.s.l. in the southwestern section. The understorey is open under a dense high canopy which is dominated by tawa and taraire with scattered large emergent rimu and northern rata. The sparse subcanopy and shrub layer comprises mainly wheki and ponga. The ground layer is also sparse with scattered piupiu and *Blechnum fraseri*. A thick layer of leaf litter is present.

Type 3 : Rimu-northern rata-tawa-towai (Table 1C)

This forest type is present on the steep slopes of the plateau rim on the southern side of the forest above Awakino Stream. The vegetation here is dominated by large emergent northern rata and rimu with a dense canopy of towai and tawa with occasional tawari. The shrub tier and ground cover are sparse with scattered kiekie, wheki, piupiu and hen and chicken fern.

Type 4 : Hardwood forest (Table 1D)

Dense hardwood forest extends along the steep slopes of the plateau edge on the northern side of the forest. The canopy is low reaching approximately 13 m and consists mainly of towai, makamaka and tawa.

Southern rata has a scattered distribution throughout this forest type. Generally vegetation in this category is very dense with abundant supplejack and kiekie, numerous fallen logs and rotting debris are strewn around. Damp open areas formed by fallen trees support dense coverings of parataniwha up to 2 m high.

Type 5 : Kauri-softwood-hardwood (Table 1E (I) and (II))

Kauri are found in small isolated groups through the forest, except on the plateau. In the regenerating area southwest of Tutamoe Trig several kauri of about 0.5 m diameter are scattered over an area of approximately 3 ha.

Two other kauri areas are about 1-2 ha in size and have approximately eight trees in them. These trees are up to 1.5 m diameter. Kauri associates such as kauri grass, *Gahnia xanthocarpa*, kawaka and tanekaha also grow here. Tawa is the dominant canopy tree in the area to the east of Tutamoe (Type 5a). In the other area northwest of Tutamoe, tawari and towai are co-dominant (Type 5b). It is probable that this area is the highest stand of kauri (640 m a.s.l.) in Northland (J. Nicholls, personal communication).

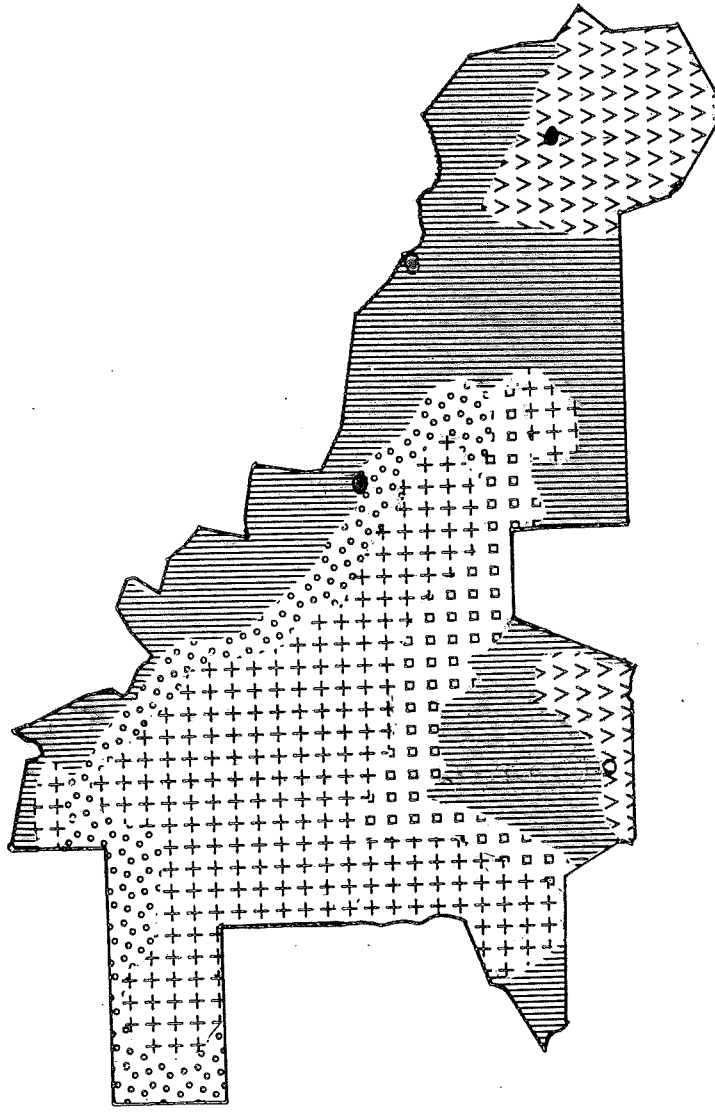
A few scattered kauri trees can be seen on the northern slope of Tutamoe.

Type 6 : Regenerating forest type (Table 1F)

This forest type covers approximately 300 ha in the southeastern section of the forest below Tutamoe, and also the lower river flanks of the Awakino Stream. The area in the southeast was logged for kauri around the turn of the century and has been subsequently burnt several times, however there is no evidence of a fire in the last 20 years (Lyford, 1982). The most abundant species are manuka and kanuka forming a dense canopy under which podocarps are regenerating frequently. Toatoa, a species with a limited distribution, is found in this area. A high diversity of species and associations are present including areas covered with low kiokio and bracken, as well as open grassy areas beside the streams and along the old logging roads. There are many adventive species in this region (see Appendix 1) including a large pine tree, willow-leaved hakea and many grass and herb species.

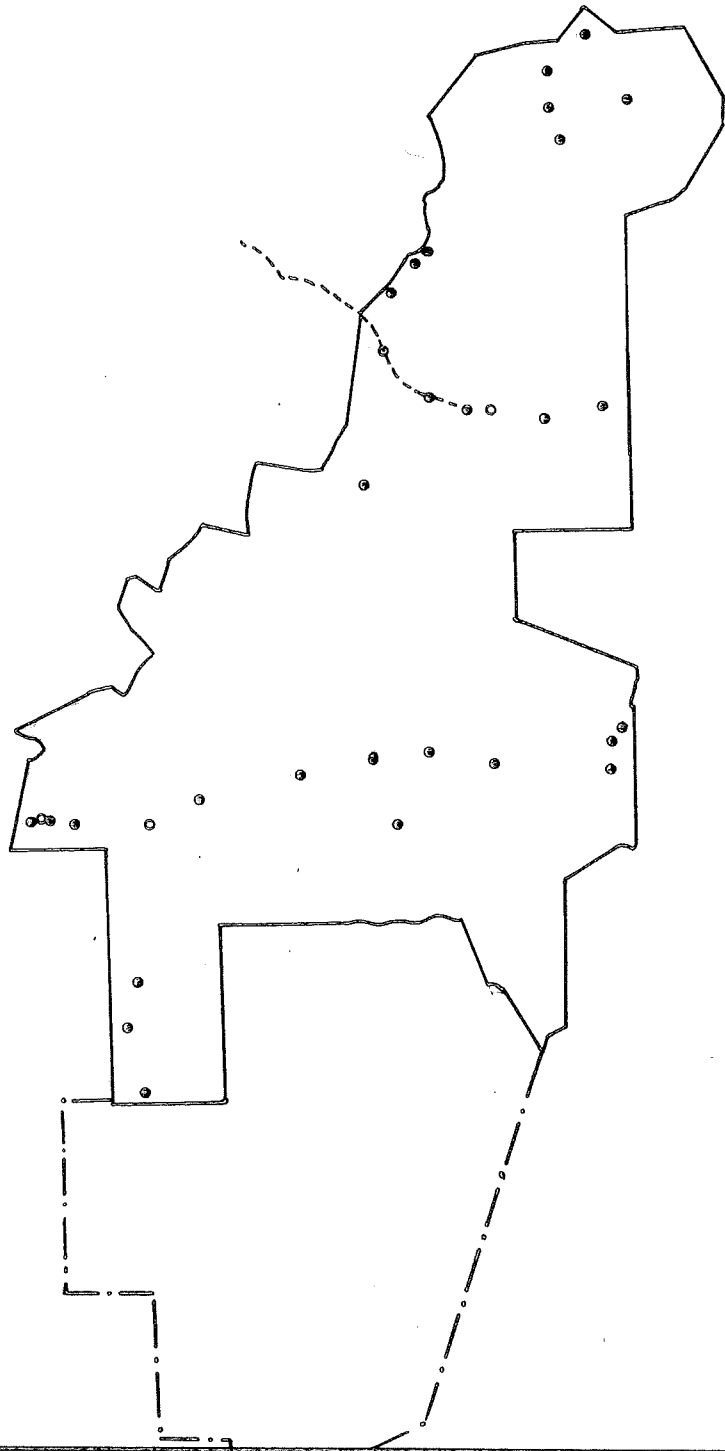
The regenerating area around the lower reaches of the Awakino Stream shows signs of grazing by cattle. It is also flood prone; many of the streamside colonisers are adventives and wash away periodically. There are many totara and regenerating podocarps (miro, rimu and kahikatea) in this region. Blackberry and areas of grass and bracken grow around the forest boundary and on the lower stream banks. A swampy area of approximately 1 ha of sedges and rushes (mainly *Carex* and *Juncus* species) is found beside the lower reaches of the stream.

Of particular floristic interest are the streams draining the plateau eg Opouteke and Awakino Streams. Close to these streams or in the stream beds all the species of Hymenophyllaceae known in Northland were found; of note are *Trichomanes endlicherianum*, *T. strictum*, *Hymenophyllum armstrongii* and *H. flexuosum* but of particular interest is *H. atrovirens*, which is usually rare but in Kaihu grows abundantly in the stream beds. Found commonly on the stream banks is *Viola filicaulis*, a plant of limited distribution in Northland. *Blechnum colensoi* was found growing on the banks in the upper reaches of the Awakino Stream; this is the northernmost record of this fern.



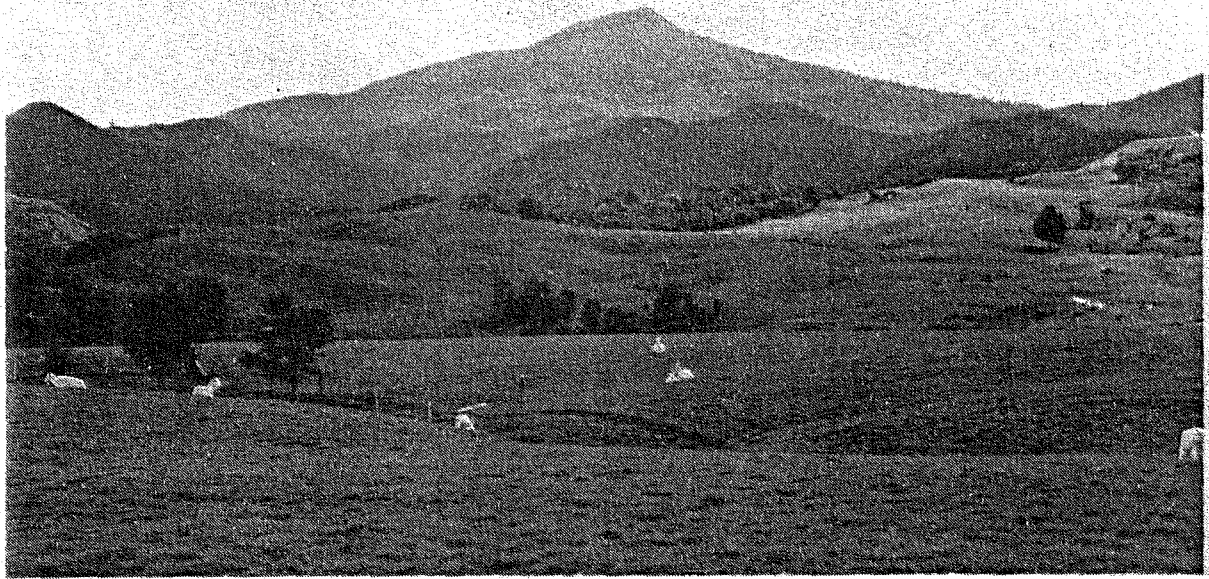
OVERLAY 2

- ++ Plateau vegetation
- +++ Rimu-rata-tawa-tawai
- |||| tairaire
- □ Rimu-rata-tawa-tawai
- □ tawai
- Hardwood forest
- V V Regenerating forest
- Kauri
- Rushes



OVERLAY /

- Forest and proposed reserve boundary
- - - Dargaville Water Supply Reserve
- · - · - NZ Walkway track
- vegetation description 1984
- vegetation description (F.R.I. 1982)



Above : Mt Tutamoe from the south-east,
photograph by Lisa Forester.

Below : A waterfall in the upper
Opouteke Stream. Photograph
by Lisa Forester.

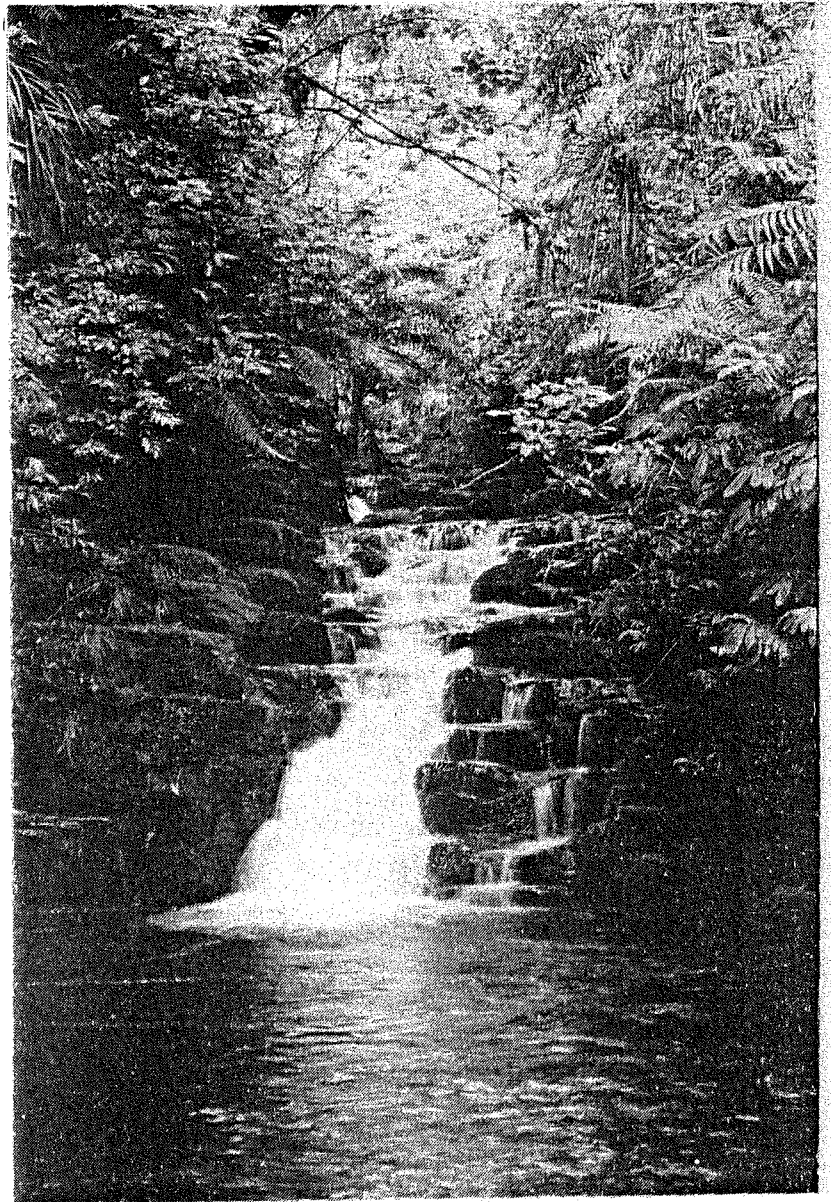


TABLE 1A : GENERALISED STAND STRUCTURE FOR
TYPE 1 PLATEAU VEGETATION

TIER					
	HEIGHT	ABUNDANT	FREQUENT	OCCASIONAL	RARE
EMERGENT	20-30 m		rimu	kahikatea northern rata pukatea	
CANOPY	12-18 m	towai supplejack kiekie	maire tawake	pukatea tawheowheo tawari southern rata	rimu
SUBCANOPY	2-12 m	supplejack kiekie	large-leaved mahoe kanono <i>Griselinia</i> <i>littoralis</i>	pukatea pigeonwood pate tawari towai hangehange	tawa wineberry maire tawake miro Hall's totara putaputaweta
SHRUB	0.5-2 m	supplejack kiekie	<i>Dicksonia</i> <i>lanata</i> kanono <i>G. littoralis</i>	hangehange white maire large-leaved mahoe	lancewood maire tawake nikau putaputaweta rewarewa towai
GROUNDCOVER	0.5 m	<i>Hymenophyllum</i> <i>demissum</i> bryophytes kiekie	hook sedge hen and chicken fern <i>Hymenophyllum</i> <i>dilatatum</i>	aka piupiu <i>Astelia</i> sp. (cf. <i>A. nervosa</i>) bush rice grass kiokio kidney fern	tanekaha miro
EPIPHYTES AND LIANES			<i>Collospermum</i> <i>hastatum</i> kidney fern mangemange <i>H. dilatatum</i> <i>H. revolutum</i> <i>H. demissum</i> <i>H. multifidum</i> <i>Blechnum filiforme</i>	aka hanging spleenwort puka	

Astelia solandri
Grammitis billardieri
G. pseudociliata

TABLE 1B : GENERALISED STAND STRUCTURE FOR
TYPE 2 RIMU-RATA-TAWA-TARAIRE

TIER					
	HEIGHT	ABUNDANT	FREQUENT	OCCASIONAL	RARE
EMERGENT	23-24 m		northern rata rimu		
CANOPY	12-20 m		tawa taraire miro makamaka	towai toru mamaku rewarewa northern rata kohekohe	
SUBCANOPY	2-12 m		miro taraire wheki ponga	nikau pigeonwood supplejack kiekie Smiths tree tawari fern mamaku	rimu makamaka pukatea tawa
SHRUB	0.5-2 m		ponga	supplejack <i>Dicksonia lanata</i> nikau kauri grass kiekie mamaku, miro wheki	makamaka tawari tawa <i>Astelia trinervia</i> taraire white maire rewarewa
GROUNDCOVER	0.5 m		piupiu <i>Blechnum fraseri</i> <i>Hymenophyllum demissum</i>	shining spleenwort hen and chicken fern aka <i>Trichomanes elongatum</i>	hook-sedge common lindsaea supplejack
EPIPHYTES AND LIANES			shining spleenwort mangemange <i>Collospermum hastatum</i> <i>Astelia solandri</i>	<i>Hymenophyllum demissum</i> <i>H. dilatatum</i> <i>Metrosideros diffusa</i> <i>Dendrobium cunninghamii</i> aka hanging spleenwort	<i>Anarthropteris lanceolata</i> kidney fern <i>Griselinia lucida</i> <i>H. sanguinolentum</i> hound's tongue fern

TABLE 1c : GENERALISED STAND STRUCTURE FOR
TYPE 3 RIMU-NORTHERN RATA-TAWA-TOWAI

TIER					
	HEIGHT	ABUNDANT	FREQUENT	OCCASIONAL	RARE
EMERGENT	23 m			northern rata rimu	
CANOPY	12-18 m		tawa towai	tawari northern rata makamaka	
SUBCANOPY	2-12 m		tawa makamaka supplejack kiekie	kanono large-leaved mahoe tawari raukawa toru tawheowheo	miro
SHRUB	0.5-2 m		wheki supplejack kiekie	tawa	
GROUNDCOVER	0.5 m		piupiu hen and chicken fern kiekie	kiokio kidney fern wheki akakura supplejack	<i>Blechnum chambersii</i> <i>B. colensoi</i>
EPIPHYTES AND LIANES			<i>Hymenophyllum dilatatum</i> <i>H. demissum</i>	<i>Asplenium polyodon</i> Easter orchid <i>H. ferrugineum</i> mangemange kidney fern <i>Rumohra adiantiformis</i>	

TABLE 1D : GENERALISED STAND STRUCTURE FOR
TYPE 4 HARDWOOD TYPE

TIER					
	HEIGHT	ABUNDANT	FREQUENT	OCCASIONAL	RARE
EMERGENT					
CANOPY	8-13 m		makamaka tawa	fivefinger wineberry tawheowheo pate hinau maire tawake southern rata	
SUBCANOPY	2-8 m		large-leaved mahoe kanono puka hangehange supplejack	pate pigeonwood whēki wineberry tawari mahoe <i>Griselinia littoralis</i> kiekie	towai makamaka raukawa <i>Pseudopanax</i> <i>anomalous</i>
SHRUB	0.5-2 m		makamaka supplejack	heketara tawheowheo <i>Astelia</i> sp (cf <i>nervosa</i>) wineberry kiekie	kauri grass karapapa towai pate Smith's tree fern
GROUNDCOVER	0.5 m		parataniwha hen and chicken fern kiokio <i>Lastreopsis</i> <i>hispidata</i>	<i>Gahnia</i> <i>setifolia</i> supplejack hook sedge kidney fern	<i>Blechnum</i> spp. <i>Nertera depressa</i>
EPIPHYTES AND LIANES			<i>H. dilatatum</i> <i>H. demissum</i> kidney fern	<i>H. flexuosum</i> <i>Collospermum</i> <i>hastatum</i> <i>Astelia</i> <i>solandri</i> aka	<i>Grammitis</i> <i>pseudociliata</i> mangemange <i>Rubus australis</i> <i>Trichomanes</i> <i>venosum</i>

TABLE 1E(1) : GENERALISED STAND STRUCTURE FOR
TYPE 5A KAURI

TIER					
	HEIGHT	ABUNDANT	FREQUENT	OCCASIONAL	RARE
EMERGENT	22 m		kauri northern rata	tanekaha	kawaka
CANOPY	10-16 m		tawa towai	pigeonwood	
SUBCANOPY	2-10 m		mingimingi	tawari lancewood hinau white maire	
SHRUB	0.5-2 m		mingimingi kauri grass <i>Gahnia</i> <i>xanthocarpa</i> <i>Dicksonia</i> <i>lanata</i>	lancewood towai	mapou tawheowheo
GROUNDCOVER			kauri grass <i>G. xanthocarpa</i>	niupiu <i>D. lanata</i> <i>Gleichenia</i> <i>cunninghamii</i> kiokio <i>Metrosideros</i> <i>perforata</i> shining spleenwort <i>Blechnum</i> <i>fraseri</i> <i>Hymenophyllum</i> <i>demissum</i> kidney fern	common lindsaea
EPIPHYTES AND LIANES			<i>Collespermum</i> <i>hastatum</i> <i>Astelia</i> <i>solandri</i>	hanging spleenwort <i>Metrosideros</i> <i>albiflora</i> Easter orchid <i>Dendrobium</i> <i>cunninghamii</i> supplejack kiekie	

TABLE 1E(II): GENERALISED STAND STRUCTURE FOR
TYPE 5B KAURI

TIER					
	HEIGHT	ABUNDANT	FREQUENT	OCCASIONAL	RARE
EMERGENT	25 m		kauri		
CANOPY	12-16 m		towai tawari rimu	Hall's totara kauri	
SUBCANOPY	2-12 m		towai tawari	kanono white maire tawheowheo <i>Griselinia littoralis</i>	
SHRUB	0.5-2 m		<i>Gahnia xanthocarpa</i> kauri <i>Dicksonia lanata</i>	karapapa kanono towai	
GROUNDCOVER	0.5 m		<i>G. xanthocarpa</i> kauri grass	pigeonwood rimu <i>D. lanata</i> <i>G. littoralis</i> mingimingi supplejack tawari turutu ōrooro	<i>Corybas rivularis</i> miro tawa
EPIPHYTES AND LIANES			<i>Astelia solandri</i> <i>Collospermum hastatum</i>	<i>Metrosideros albiflora</i> <i>Metrosideros fulgens</i> <i>Hymenophyllum sanguinolentum</i> <i>H. multifidum</i> kidney fern Easter orchid <i>H. revolutum</i>	<i>Ctenopteris heterophylla</i> <i>Hymenophyllum armstrongii</i>

TABLE 1F : GENERALISED STAND STRUCTURE FOR
TYPE 6 - REGENERATING FOREST TYPE

TIER					
	HEIGHT	ABUNDANT	FREQUENT	OCCASIONAL	RARE
EMERGENT	14 m			kahikatea rewarewa	
CANOPY	5-8 m	kanuka manuka	towai Hall's totara ponga kahikatea	lancewood mingimingi rewarewa tanekaha putaputaweta mapou	rimu miro
SUBCANOPY	2-5 m		ponga mingimingi wheki	toatoa miro rimu kahikatea	
SHRUB	0.5-2 m		mingimingi	putaputaweta <i>Dicksonia lanata</i> Hall's totara kahikatea miro rimu	large-leaved mahoe mapou hangehange tanekaha
GROUNDCOVER	0.5 m		bracken kiokio turututu pig fern hook sedge <i>Lycopodium volubile</i>	<i>Centella uniflora</i> <i>Juncus</i> spp <i>Carex</i> sp piupiu <i>Lotus pedunculata</i> <i>Corybas rivularis</i>	<i>Gahnia setifolia</i> blackberry kahikatea miro rimu tanekaha
EPIPHYTES AND LIANES			<i>Lycopodium deuterodensum</i> aka <i>Rubus cissoides</i>	kidney fern	

Introduced Animals and Forest Condition

A species list of introduced animals found in Kaihu Forest using common and scientific names is provided in Appendix 2.

Of the 72 circular 4 m² plots examined in the proposed Ecological Area, goat pellets were found in eight (11%). Goats were seen in the Ecological Area on two separate days; on one day a herd was seen near the Awakino Stream and on the other day 30 goats were seen around the slips on the plateau rim on the northeast side of the forest. A small number of the goats seen had collars on; these undoubtedly come from nearby farms.

The lower river flats of Awakino Stream the slip areas and plateau rim on the northeastern side of the forest, the scrub area to the southeast of Tutamoe and the kauri area to the northeast of Tutamoe were moderately to heavily browsed. Light browse was recorded on the plateau.

Species on which browse was most commonly recorded were kanono, Kirk's daisy, *Melicytus macrophyllus*, supplejack, hangehange, kohekohe, makamaka, pate, kiokio, kiekie, pigeonwood and five finger.

Feral cattle damage was evident in the lower regions of Awakino Stream.

Only parts of the forest boundary are fenced and many of those fences are in poor condition leaving the forest open to wandering animals. Much of the forest is surrounded by a large tract of New Zealand Forest Products pine plantations. This will to some degree act as a buffer especially when the pine stands reach maturity.

A small amount of pig rooting was seen on the plateau.

Eight rat traps were set over several nights in the northwestern section of the forest in along a transect line which ran southwest from map reference NZMS 1 N19 287955. One male and one female ship rat were caught. A small amount of possum damage (scratchings, chewed leaves of five finger, fuchsia and tree ferns) and some possum droppings were seen.

Presence of Exotic Plants

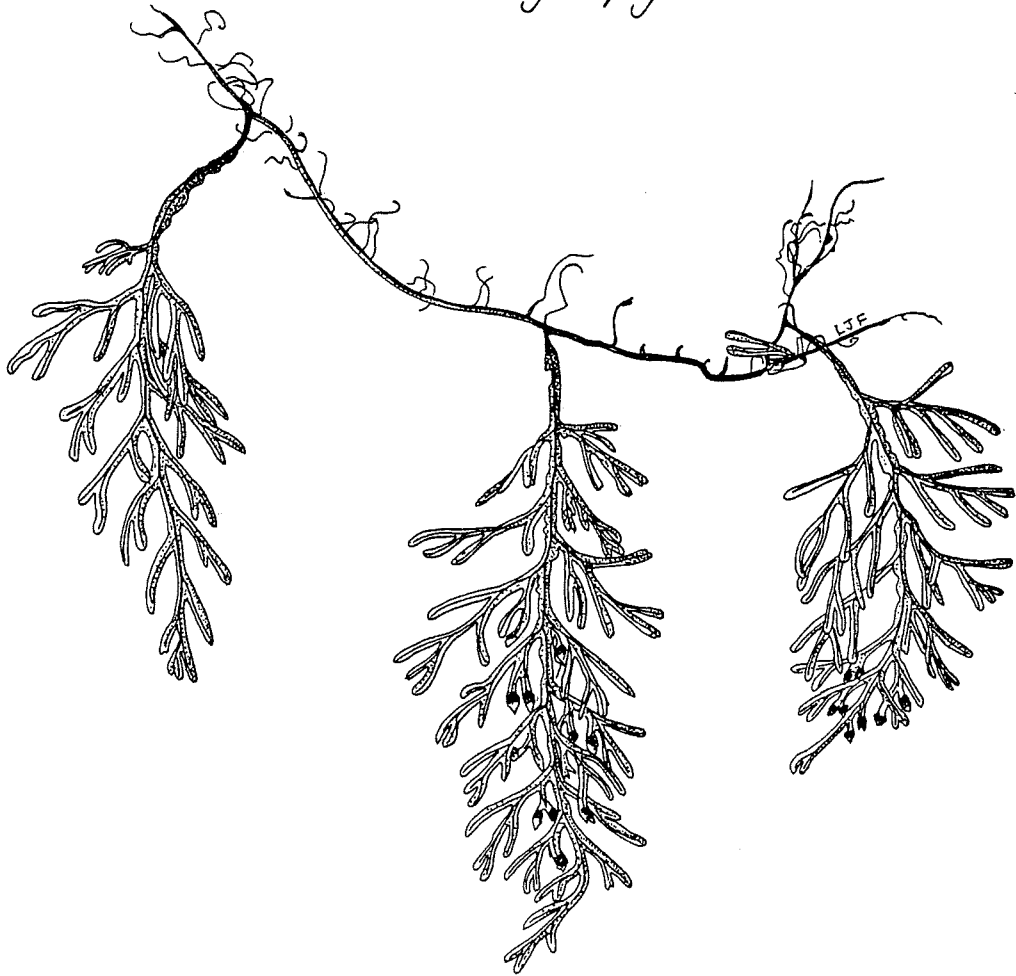
A species list of exotic plants found in Kaihu Forest is provided in Appendix 1. Most occur in the regenerating forest areas. However, the only plant which could be a threat is *Hakea salicifolia* which is present in the area of regeneration in the southwest part of the Ecological Area. A large pine tree is also growing there.

Native Fauna

A list of native fauna recorded in Kaihu Forest, using both scientific and common names, is provided in Appendix 2.

The Wildlife Service has rated Kaihu Forest a high value forested habitat. North Island brown kiwi are present in high numbers (Ogle, 1982). Pied tit and kauri snail were frequently seen. In scrub and grassy areas fernbirds were heard. Old records (Forest Service Working Plan Control Report, 1965) refer to there having been plenty of bird life in the forest; kokako

Hymenophyllum atrovirens



(*Callaeas cinerea wilsoni*) were recorded and the numbers of kaka (*Nestor meridionalis*) were described as declining while the record of bellbird (*Anthornis melanura*) is probably erroneous. None of these species were recorded in this study.

The fauna of Kaihu Forest has not been thoroughly surveyed therefore no lizard, frog or invertebrate lists are available. The status of *Leiolopisma gracilicorpus* is given as 'indeterminate' in the Red Data Book of New Zealand (Williams and Given, 1981). It is possible that this species could be equated with a recording of a large, apparently amphibious lizard on the Mataraua Plateau (Ogle, 1982) and it should be searched for on the Kaihu Plateau.

Human History and Influence

No evidence of pre-European occupation or use of Kaihu Forest by the Maori was found although the area has not been formally surveyed.

Most of the area is unmodified. Logging was confined to the southeastern portion of the forest which has a long history of timber working and burning. Records show that the largest kauri ever known, named Kairaru, grew in this region until it perished during the disastrous fires which swept the area during 1899 to 1901. The tree had a girth of 20.1 m with a height to the first branch of 30.5 m (Mair, 1891). Several recent attempts to locate the remains of the stump were unsuccessful. At the beginning of this century, the Tutamoe contract for 124,000 m³ of kauri was signed. Large trees were removed from the area; one was 14.3 m in girth. Timber was taken out by bullocks, skidded roads and catamarans, chutes and winches and 11 km of railway track. In 1910 a big drive of kauri under Tommy Hawkins was made. After two years of felling 14 million feet of kauri was driven down the Awakino River into booms on the Wairoa River over 10 days. Just south of Kaihu Forest 5,000 ha of land was granted to disillusioned squatters from Marlborough in Nelson in 1890; the settlement still exists. Approximately 65 years ago the area southeast of Tutamoe was logged for kauri and subsequently burnt several times. Remnants of old logging roads can be found in the region and local residents talk of a large kauri dam in the steepest and most southerly catchment of the upper Kairaru Stream. Adjoining landowners extracted minor forest produce for fencing the common boundary while the most recent activity, during the 1950s and 1960s, was timber extraction for fence and sawn produce by a timber company in Dargaville (closed NZFS file 34/1/14, 1955-1971). Several subsequent applications for green timber were all declined. In 1982 New Zealand Forest Products made application to obtain 314 ha of this regenerating area for exotic afforestation. It was surveyed by New Zealand Forest Service and the application was turned down. The area was retained as State Forest and included in the area proposed as a scientific reserve.

Recreational Facilities and Opportunities

A New Zealand Walkway track starts at Karaka Tutamoe Road in the northeast and crosses farmland to enter the forest. The low grade track climbs steadily to Tutamoe Trig where spectacular views across Northland can be appreciated. No other tracks or other facilities are offered in Kaihu although remnants of old logging roads in the southeastern portion of

the forest can be followed. These offer a good day walk to the trig and the old timber workings may be of interest (Lyford, 1982. unpubl. int. report).

Research Carried Out and Suggested

An internal Forest Service report on Kaihu State Forest was produced in 1966 by M.J. Johnston. This covered timber quality, and quantity as well as other relevant information; it involved several days field inspection of the forest.

The area of regenerating forest southeast of Tutamoe Trig was surveyed by W.J. Lyford in 1982 and a report covering the feasibility of converting this area into exotics, was produced. This area provides a rare opportunity to study the process of secondary succession back to mature forest as it is the only such forest which will be afforded protection for scientific purposes in the Ecological District.

The unusual physical features of Kaihu Forest and the vegetation types present are of scientific interest and would be relevant to the study of plant communities.

Summary, Discussion and Recommendations

The proposed Kaihu Ecological Area is a 2425 ha tract of indigenous forest 20 km northwest of Dargaville. Most of the forest is unmodified and occupies a swampy plateau which constitutes the southern and highest section of the Tutamoe Range. The highest point in the forest, Tutamoe, falls just short of being the highest point in Northland. The main feature of the proposed Ecological Area is the large area of unique high rainfall upland forest which covers an altitudinal range between 90 and 760 m a.s.l.

The Dargaville Water Supply Reserve abuts the proposed Ecological Area in the west thus forming a continuous 3700 ha tract of forest, most of which is unmodified. It is therefore desirable to maintain contact with the Dargaville Borough Council to ensure that both areas are managed in a compatible and co-ordinated manner.

The edges of the Kaihu plateau are steep and a number of earth and rock slips are present. Several streams which eventually join the Wairoa River flowing through Dargaville, drain the plateau.

In places, regeneration of canopy species appears to be occurring although much of the forest is moderately browsed and a small amount of possum damage is evident. A number of goats were seen in stream beds and on the sides of the plateau but goat damage, at this stage, is not serious in the dense vegetation on the plateau. A few goats with collars on were seen and these undoubtedly came from neighbouring farms. Only parts of the forest boundary are fenced and some of these fences are in poor condition leaving the forest open to wandering animals.

Exotic plants probably do not present any threat to the forest although some *Hakea salicifolia* and a mature pine tree are growing in the area of regeneration on the southwestern slopes below Tutamoe Trig. It is possible that *Hakea* could become established in the area.

The Wildlife Service has rated Kaihu Forest as a high value forested habitat. North Island brown kiwi, pied tit and kauri snail are all present. Kaka and kokako, which have been recorded previously (Forest Service Working Plan Control Report, 1965), were not seen or heard during this study. Further faunal survey work is needed. The status of kokako in the forest should be determined and invertebrate species lists compiled. Lizards and frogs should be surveyed for.

A walkway (part of the New Zealand Walkway system) climbs to Tutamoe Trig from Karaka Tutamoe Road in the northeast and offers excellent views from coast to coast. This walkway is the only developed track in Kaihu Ecological Area. The forest has values as a semi-remote area for experienced trampers wishing to explore and navigate untracked bush country. The area to the southeast of Mt Tutamoe contains old kauri dams, camps and logging roads which could be developed and linked up to Mt Tutamoe track.

Based on the above discussion, the following management recommendations are made in order of priority.

1. That goat numbers in the forest be reduced to the lowest practicable level and that their numbers and influence on forest condition be monitored thereafter.
2. That the influence of possums on forest condition be monitored.
3. That the condition of fences around the forest be assessed and the fences upgraded where necessary.
4. That contact with the Dargaville Borough Council over management of the entire Kaihu Forest including the Dargaville Water Supply Reserve be established and maintained.
5. That a complete fauna survey be undertaken and that kokako be searched for using tapes.
6. That Kaihu Forest be retained as a semi-remote area with no further recreational development other than tracking in the area to the southeast of Mt Tutamoe.

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Appendix 1 : Botanical Species List

Numbers following some of the scientific names are the reference numbers of collected specimens held at the Auckland Institute and Museum. Numbers following the Bryophyte names correspond to collected specimens held at Auckland University.

Fern and Fern Allies

<i>Adiantum cunninghamii</i>	maidenhair fern
<i>Anarthropteris lanceolata</i>	lance fern
<i>Asplenium bulbiferum</i> ssp. <i>bulbiferum</i>	manamana, hen and chicken fern
<i>A. flaccidum</i> var. <i>flaccidum</i>	raukatauri, hanging spleenwort
<i>A. oblongifolium</i>	shining spleenwort
<i>A. polyodon</i>	
<i>Blechnum chambersii</i>	
<i>B. colensoi</i> 166566	
<i>B. discolor</i>	piupiu, crownfern
<i>B. filiforme</i>	climbing sweetfern
<i>B. fluviatile</i>	
<i>B. fraseri</i>	Fraser's hardfern
<i>B. membranaceum</i>	thin hardfern
<i>B. nigrum</i> 166135	black hardfern
<i>B. procerum</i> 167637	
<i>B. sp.</i> (<i>B. capense</i> agg., lowland species)	kiokio
<i>Cardiomanes reniforme</i>	kidney fern
<i>Ctenopteris heterophylla</i>	
<i>Cyathea dealbata</i>	ponga, silverfern
<i>C. medullaris</i>	mamaku, black tree fern
<i>C. smithii</i>	soft tree fern, katote
<i>Deparia petersenii</i> (= <i>Athyrium japonicum</i>) 166084	
<i>Dicksonia lanata</i>	
<i>D. squarrosa</i>	wheki
<i>Diplazium australe</i> (= <i>Athyrium australe</i>)	
<i>Doodia media</i> sub-species <i>australis</i> 166119	
<i>Gleichenia microphylla</i>	tangle fern, waewae-kaka
<i>Grammitis billardieri</i> 164930 166580 167581 167591	strap fern
<i>G. ciliata</i>	"
<i>G. pseudociliata</i>	"
<i>Histiopteris incisa</i>	swamp fern
<i>Hymenophyllum armstrongii</i> 166102 166562	filmy fern
<i>H. atrovirens</i> 166120 166628	"
<i>H. demissum</i>	"
<i>H. dilatatum</i>	"
<i>H. ferrugineum</i>	"
<i>H. flabellatum</i>	"
<i>H. flexuosum</i> 165009 166106	"
<i>H. lyallii</i> 166089	"
<i>H. multifidum</i>	"
<i>H. rarum</i> 166103	"
<i>H. revolutum</i>	"
<i>H. sanguinolentum</i>	piripiri, filmy fern
<i>H. scabrum</i>	filmy fern
<i>Lastreopsis glabella</i> 166099 166585	
<i>L. hispida</i>	
<i>Leptopteris hymenophylloides</i>	heruheru, crepefern
<i>Lindsaea trichomanoides</i> 166583	
<i>Lycopodium deuterodensum</i> 166079	club moss
<i>L. varium</i> (incl. <i>L. billardieri</i>)	"

<i>L. volubile</i>	club moss
<i>Lygodium articulatum</i>	mangemange
<i>Paesia scaberula</i>	pig fern, hard fern, ringfern
<i>Phymatosorus diversifolius</i>	maratata, hound's tongue
<i>P. scandens</i>	fragrant fern, moki
<i>Pneumatopteris pennigera</i>	pakauroharoha
<i>Pteridium esculentum</i>	bracken
<i>Pteris tremula</i> 166094	shaking bracken
<i>Pyrrosia serpens</i>	leatherleaf fern
<i>Rumohra adiantiformis</i>	climbing shield fern
<i>Sticheris cunninghamii</i> (= <i>Gleichenia cunninghamii</i>)	umbrella fern, tapuwae kotuku
<i>Tmesipteris elongata</i> sub-species <i>elongata</i>	
<i>T. lanceolata</i>	
<i>T. sigmatifolia</i>	
<i>T. tannensis</i>	
<i>Trichomanes elongatum</i> 166104	filmy fern
<i>T. endlicherianum</i> 166103 166584	"
<i>T. strictum</i> 166088	"
<i>T. venosum</i>	"

Gymnosperms

<i>Agathis australis</i>	kauri
<i>Dacrycarpus dacrydioides</i>	kahikatea
<i>Dacrydium cupressinum</i>	rimu
<i>Libocedrus plumosa</i>	kawaka, cedar
<i>Phyllocladus glaucus</i>	toatoa
<i>P. trichomanoides</i>	tanekaha
<i>Pinus</i> sp. *	pine
<i>Podocarpus hallii</i>	Hall's totara
<i>P. totara</i>	totara
<i>Prumnopitys ferruginea</i>	miro

Dicotyledons

<i>Acaena anserinifolia</i>	bidibid
<i>Ackama rosaeifolia</i>	makamaka
<i>Alseuosmia macrophylla</i>	karapapa
<i>Aristotelia serrata</i>	makomako, wineberry
<i>Beilschmiedia tarairi</i>	taraire
<i>B. tawa</i>	tawa
<i>Brachyglottis repanda</i>	rangiora
<i>Callitriche stagnalis</i> 167590	
<i>Carmichaelia aligera</i>	broom
<i>Carpodetus serratus</i>	putaputaweta, marbleleaf
<i>Centaureium erythraea</i> *	centaury
<i>Centella uniflora</i>	
<i>Cirsium vulgare</i> *	Scotch thistle
<i>Clematis cunninghamii</i> (= <i>C. parviflora</i>)	
<i>C. paniculata</i>	puawananga
<i>Coprosma arborea</i>	mamangi
<i>C. areolata</i>	
<i>C. grandifolia</i>	kanono
<i>C. lucida</i>	karamu
<i>C. rhamnoides</i>	
<i>C. robusta</i>	karamu
<i>C. propinqua</i> x <i>C. robusta</i> 166073	
<i>Coriaria arborea</i>	tutu

<i>Cyathodes fasciculata</i>	mingimingi
<i>Digitalis purpurea*</i>	fox glove
<i>Dracophyllum latifolium</i>	neinei
<i>D. traversii</i> (= <i>D. pyramidale</i>) 166086	
<i>Dysoxylum spectabile</i>	kohekohe
<i>Elaeocarpus dentatus</i>	hinau
<i>E. hookerianus</i> 166582	pokaka
<i>Elatostema rugosum</i>	parataniwha
<i>Epilobium rotundifolium</i> 166117 166571	
<i>Eupatorium adenophorum*</i>	Mexican devil weed
<i>Fuchsia excorticata</i>	fuchsia, kotukutuku
<i>Gaultheria antipoda</i> 166118	
<i>Geniostoma rupestre</i> var. <i>crassum</i>	hangehange
<i>Gnaphalium gymnocephalum</i>	
<i>G. spicatum*</i>	
<i>Gonocarpus incanus</i>	
<i>Griselinia littoralis</i> 166570	broadleaf
<i>G. lucida</i>	puka, shining broadleaf
<i>Hakea salicifolia*</i>	willow leaved hakea
<i>Hebe stricta</i> var. <i>stricta</i>	koromiko
<i>Hedycarya arborea</i>	pigeonwood
<i>Hoheria populnea</i> var. <i>populnea</i>	lacebark
<i>Hydrocotyle dissecta</i> 166087	
<i>H. moschata</i>	
<i>Hypericum japonicum</i>	catsear
<i>Hypochoeris radicata*</i>	tawari
<i>Ixerba brexioides</i>	rewarewa
<i>Knightia excelsa</i>	pukatea
<i>Laurelia novae-zealandiae</i>	mangeao
<i>Litsea calicaris</i>	ramarama
<i>Lophomyrtus bullata</i>	
<i>Lotus pedunculatus*</i>	large-leaved mahoe
<i>Melicytus macrophyllus</i>	mahoe
<i>M. ramiflorus</i>	climbing rata, akatea
<i>Metrosideros albiflora</i>	"
<i>M. diffusa</i>	"
<i>M. fulgens</i>	" , akakura
<i>M. perforata</i>	" , akatorotoro
<i>M. robusta</i>	northern rata
<i>M. umbellata</i> 166083	southern rata
<i>Mida salicifolia</i>	willow leaved maire
<i>Muehlenbeckia australis</i>	
<i>Myrsine australis</i>	mapou, red matipo
<i>M. salicina</i>	toro
<i>Nertera depressa</i>	
<i>N. dichondraefolia</i>	white maire
<i>Nestegis lanceolata</i>	narrow-leaved maire
<i>N. montana</i>	heketara
<i>Olearia rani</i>	akaiore
<i>Parsonsia</i> sp.	inkweed
<i>Phytolacca otandra*</i>	karo
<i>Pittosporum cornifolium</i>	
<i>P. kirkii</i>	
<i>Plantago australis*</i>	narrow leaved plantain
<i>P. lanceolata*</i>	broad leaved plantain
<i>P. major*</i>	kumeraho
<i>Pomaderris kumeraho</i> 166078	
<i>P. phyllicifolia</i> var. <i>ericifolia</i>	
<i>Prunella vulgaris*</i>	selfheal
<i>Pseudopanax anomalus</i>	

<i>P. arboreus</i>	fivefinger
<i>P. crassifolius</i>	lancewood
<i>P. edgerleyi</i>	raukawa
<i>Pseudowintera axillaris</i>	horopito
<i>Quintinia serrata</i>	tawheowheo
<i>Ranunculus hirtus</i> 166080	
<i>R. repens</i> *	buttercup
<i>Rhabdothamnus solandri</i>	waiu-atua
<i>Rubus australis</i>	bush lawyer
<i>R. cissoides</i>	"
<i>R. fruticosus</i> agg.*	blackberry
<i>Rumex conglomeratus</i> *	clustered dock
<i>Senecio bipinnatisectus</i> *	
<i>S. glomeratus</i>	
<i>S. jacobaea</i> *	ragwort
<i>Senecio kirkii</i>	Kirk's tree daisy
<i>S. minimus</i>	
<i>Schefflera digitata</i>	pate
<i>Solanum nigrum</i>	black nightshade
<i>Sonchus oleraceus</i> *	puha, sow thistle
<i>Syzygium maire</i>	maire tawake, swamp maire
<i>Toronia toru</i>	toru
<i>Ulex europaeus</i> *	gorse
<i>Urtica incisa</i> 166081	nettle
<i>Viola filicaulis</i> 166149	
<i>Weinmannia silvicola</i> var. <i>silvicola</i>	towai

Monocotyledons

<i>Acianthus fornicatus</i> var. <i>sinclairii</i>	
<i>Agrostis capillaris</i> *	brown top
<i>A. stolonifera</i> *	creeping bent
<i>Anthoxanthum odoratum</i> *	sweet vernal
<i>Astelia</i> sp. (c.f. <i>A. fragrans</i>) 167646	
<i>A. sp.</i> (c.f. <i>A. nervosa</i>) 167646	
<i>A. solandri</i>	kowharawhara, perching lily
<i>A. trinervia</i>	kauri grass
<i>Bulbophyllum pygmaeum</i>	
<i>Carex</i> sp. (c.f. <i>brownii</i>)*	
<i>C. dissita</i> 167617	
<i>C. geminata</i> agg. 167571,572,645	
<i>C. lessonianum</i>	
<i>C. longebrachiata</i> * 167578	Australian sedge
<i>C. ochrosaccus</i> 167577,648,650	
<i>Collospermum hastatum</i>	perching lily
<i>C. microspermum</i>	"
<i>Cordyline banksii</i>	ti ngahere, bush cabbage tree
<i>C. pumilio</i>	ti koraha
<i>Cortaderia fulvida</i>	toetoe
<i>C. selloana</i> *	pampas grass
<i>Corybas orbiculatus</i>	
<i>C. rivularis</i>	
<i>Cyperus eragrostis</i> *	
<i>Dactylis glomerata</i> *	cocksfoot
<i>Dendrobium cunninghamii</i>	epiphytic orchid

<i>Dianella nigra</i>	turutu, blueberry
<i>Earina autumnalis</i>	Easter orchid
<i>Eleocharis gracilis</i> 167592	
<i>Freycinetia baueriana</i> ssp. <i>banksii</i>	kiekie
<i>Gahnia pauciflora</i> 167649	
<i>G. setifolia</i>	
<i>G. xanthocarpa</i>	toi-kiwi
<i>Holcus lanatus</i> *	Yorkshire fog
<i>Juncus bufonius</i> * 167618	
<i>J. effusus</i> *	soft rush
<i>J. gregiflorus</i> 167647	
<i>J. holoschoenus</i> 167575, 608	
<i>J. pallidus</i>	
<i>J. planifolius</i> 167619	
<i>J. prismatocarpus</i> 167621	
<i>J. tenuis</i> * 167582	
<i>J. usitatus</i>	
<i>Libertia pulchella</i>	native iris
<i>Microlaena avenacea</i>	bush rice grass
<i>M. stipoides</i>	meadow rice grass
<i>Microtis parviflora</i>	
<i>Oplismenus</i> f. <i>imbecillis</i>	
<i>Paspalum dilatatum</i> *	paspalum
<i>Phormium cookianum</i>	mountain flax
<i>Pterostylis banksii</i>	
<i>P. trullifolia</i>	
<i>P. brumalis</i> or <i>P. trullifolia</i>	
<i>Rhopalostylis sapida</i>	nikau
<i>Ripogonum scandens</i>	supplejack
<i>Rytidosperma gracile</i>	
<i>R. unarede</i>	
<i>Schoenus apogon</i> 167620	
<i>Scirpus inundatus</i>	
<i>S. reticularis</i> 167586	
<i>Uncinia uncinata</i>	hook-sedge
<i>U. zotovii</i>	hook-sedge
<i>Vulpia bromoides</i>	

* Adventive

BryophytesMosses

Achrophyllum dentatum (2)
A. quadrifarium (2)
Brachythecium sp.
Bryum billardieri (2)
Calomnion laetum (2)
Camptochaete arbuscula (2)
Campylopus introflexus (2)
C. pyriformis (1) (2)
Catharomnion ciliatum (2)
Cladomnion ericoides (1) (2)
Cryptopodium bartramiioides (2)
Cyathophorum bulbosum (2)
Cyrtopus setosus (2)
Dicnemon calycinum (1) (2)
Dicranoloma billardieri (2)
D. grossialare (1) (2)
D. menziesii (1) (2)
D. plurisetum (1) (2)
Dicranum trichopodium (1) (2)
Distichophyllum pulchellum (1) (2)
D. rotundifolium (1) (2)
Echinodium hispidulum
Eriopus cristatus (1) (2)
Fissidens species
Holomitrium perichaetiale (1) (2)
Hymenodon pilifer (2)
Hypnodendron arcuatum (1) (2)
H. colensoi (1) (2)
H. menziesii (1) (2)
Hypnum chrysogaster (2)
Hypopterygium commutatum (1) (2)
Hypopterygium filiculaeforme
H. rotulatum (1) (2)
H. setiferum
Isopterygium limatum (1) (2)
Leptostomum sp. (2)
Leptothea sp.
Leucobryum candidum (1) (2)
Lopidium concinuum (2)
Macromitrium longipes (1) (2)
Orthorrhynchium elegans (2)
Polytrichum juniperinum (1)(2)
Pterygophyllum dentatum
P. quadrifarium
Ptychomnion aciculare (1) (2)
Racopilum convolutaceum (2)
Rhizogonium bifarium (1)(2)
R. distichum (1) (2)
R. novae-hollandiae (1) (2)
Sematophyllum amoerum (1) (2)
Tayloria callophylla (2)
Thamnum pandum
Thuidium furfurosus (2)

Thuidium laevisculum
Trachyloma diversinerve (1)
T. planifolius
Weymouthia cochlearifolia (1) (2)
W. mollis (2)
Wijkia extenuata (2)
Zygodon intermedius (1) (2)

Liverworts

Aneura sp.
Bazzania tayloriana
Chiloscyphus
Lepidolaena taylorii
Lepidozia glaucophylla
L. microphylla
L. spinosissima
Lophocolea spp.
Marchantia sp.
Metzgeria
Monoclea forsteri
Pallavicinia sp.
Plagiochila fruticella
P. ?fuscella
P. ?lyallii
P. retrospectans
Porella elegantula
Radula dentifolia
Riccardia spp.
Shistochila balfouriana
Symphyogyna subsimplex
Treubia lacunosa
Trichocolea lanata
T. mollissima
Tylimanthus ?saccatus

(1) Voucher specimens lodged in the Herbarium of the Auckland Institute and Museum (Ak).

(2) Mosses recorded on Tutamoe Walkway and area west of the trig, 23 Jan. 1985. Compiled by J.E. Beever, P.J. Brownsey, M. Whitehead and F. Barnes.

Appendix 2 : Faunal Species ListNative Birds

<i>Anthus novaeseelandiae</i>	NZ pipit
<i>Apteryx australis mantelli</i>	North Island brown kiwi
<i>Bowdleria punctata</i>	North Island fernbird
<i>Chalcites lucidus*</i>	shining cuckoo
<i>Circus approximans</i>	harrier hawk
<i>Eudynamis taitensis*</i>	long-tailed cuckoo
<i>Gerygone igata</i>	greywarbler
<i>Halcyon sancta</i>	kingfisher
<i>Hemiphaga novaeseelandiae</i>	NZ pigeon
<i>Hirundo neoxena</i>	welcome swallow
<i>Ninox novaeseelandiae</i>	morepork
<i>Petroica macrocephala</i>	pied tit
<i>Prothemadera novaeseelandiae</i>	tui
<i>Rhipidura fuliginosa</i>	North Island fantail
<i>Zosterops lateralis</i>	silvereve

Introduced Birds

<i>Acridotheres tristis</i>	Indian myna
<i>Alauda arvensis</i>	skylark
<i>Emberiza citrinella</i>	yellow hammer
<i>Fringilla coelebs</i>	chaffinch
<i>Phasianus colchicus</i>	pheasant
<i>Platycercus eximius</i>	eastern rosella
<i>Prunella modularis occidentalis</i>	hedge sparrow
<i>Turdus merula</i>	blackbird
<i>T. philomelos</i>	songthrush

Native Invertebrates

<i>Paranephrops planifrons</i>	freshwater crayfish, kouru
<i>Paryphanta busbyi busbyi</i>	kauri snail
<i>Pantosalsis</i> sp.	bush harvestman spider

Introduced Mammals

<i>Bos taurus</i>	feral cow
<i>Canis familiaris</i>	wild dog
<i>Capra hircus</i>	feral goat
<i>Felis catus</i>	feral cat
<i>Rattus rattus</i>	ship rat
<i>Sus scrofa</i>	wild pig
<i>Trichosurus vulpecula</i>	brush-tailed possum

* Annotated Wildlife Lists - NZ Wildlife Service