

LATE HOLOCENE CHANGES IN THE
VEGETATION OF WESTERN TARANAKI
INVESTIGATED BY SOIL PALYNOLOGY

VOLUME 1

CYNTHIA M. LEES

1987

LEEC 87/2

LOW MARKET PRICES IN THE PRODUCTION OF WOODEN TRAYS

CONDUCTED BY WILL R. HARTMAN

1942

PHILIP W. HARRIS AND STEPHEN W. HARRIS

A thesis presented in partial fulfillment of

the requirements for the

degree of Master of Philosophy

at Illinois University

Urbana, Ill.

1942

INTRODUCTION

LATE HOLOCENE CHANGES IN THE VEGETATION OF WESTERN TARARAKI

INVESTIGATED BY SOIL PALYNOLOGY

ORANGE	ORANGE	GREEN	YELLOW	RED
Eastern low altitude sites	Eastern low altitude sites	Eastern ring plain sites	Western sites	Northern
Totara Bay	Totara Bay	Messenger's Farm	Poukai 1	National Swamp Reserve
Tea 24. Bay	Tea 24. Bay	Spence's Farm	Spence's Farm 2	Bowden Reserve
Marfell Rd. Bay	Marfell Rd. Bay	Spence's Farm 3	Spence's Farm 4	Matarikorua
				Taukaka

POLLEN DIAGRAMS AND STRATIGRAPHIC TABLES

A thesis presented in partial fulfilment of

the requirements for the

Degree of Doctor of Philosophy

at Massey University

Cynthia M. Lees

1987

THOMAS HENRY WOODS

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1961

1961

1961

INTRODUCTION

Pollen Diagrams have been separated by coloured dividers

BLUE	ORANGE	GREEN	YELLOW	RED
Eastern high altitude sites	Eastern low altitude sites	Eastern ring plain sites	Western sites	Northern
Manganui Bog	Potaema Bog	Messenger's Farm	Puniho 1	Motunui Swamp Reserve
Stratford Mt. Road	York Rd. Bog Norfolk Rd. Bog	Midhurst 1 Midhurst 2 Ngaere Swamp Ratapiko Swamp	Puniho 2 Jones' Farm 1 Jones' Farm 2 Pollard's Farm	Bowden Reserve Matarikoriko Umutekai

Note: In graphs with grains/cm³ data depth of colour correlates with degrees of magnitude (x10 & x 100)
Stratigraphic tables face the first pollen diagram of the set for a site.
Lists of graphs presented are also shown.

INTRODUCTION

These diagrams are the result of a series of experiments

These diagrams have been separated by colored dividers

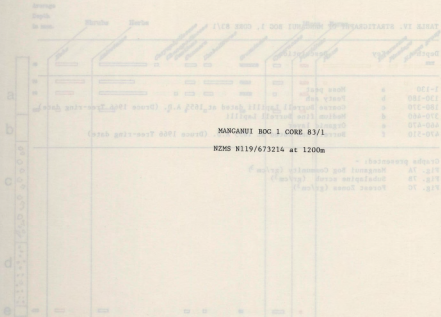
RED	YELLOW	GREEN	ORANGE	BLUE
Northern	Western	Eastern ring	Eastern low	Eastern high
	plate sites	plate sites	altitude sites	altitude sites
Northern Swamp Reserve	Point 1	Messinger's Yard	Tolson Bog	Mangrove Bog
London Reserve	Point 2	Midway 1	Top Mt. Bog	Steeple Mt. Bog
Naturalistic	Point 3	Midway 2	Point Mt. Bog	
Central	Point 4	Point Swamp		
	Point 5	Point Swamp		

Note: In graphs with graphs, data depth of color correlates with degree of magnitude (x10 & x 100)
 Geographic tables for the first column of the set for a site.
 Lists of graphs presented are also shown.

TA MANGANUI 1 BOG COMMUNITY

Abundant Count - Grains per cm³

Fig reference: NZMS 1119/673214 at 1200m



1119/673214 / Printed in New Zealand by the Government Printer, Wellington, 1967.

TABLE IV. STRATIGRAPHY OF MANGANUI BOG 1, CORE 83/1

Depth mm	Key	Description
1-130	a	Moss peat
130-180	b	Peaty ash
180-370	c	Coarse Burrell Lapilli dated at 1655 A.D. (Druce 1966 Tree-ring date)
370-460	d	Medium fine Burrell Lapilli
460-470	e	Organic layer
470-510	f	Burrell Ash dated at 1655 A.D. (Druce 1966 Tree-ring date)

Graphs presented: -

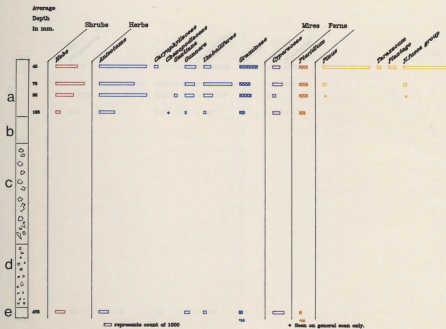
- Fig. 7A Manganui Bog Community (gr/cm³)
 Fig. 7B Subalpine scrub (gr/cm³)
 Fig. 7C Forest Zones (gr/cm³)

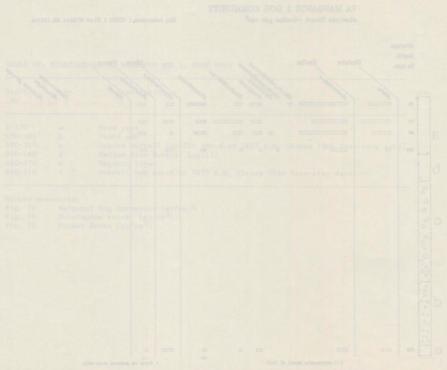
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7A MANGANUI 1 BOG COMMUNITY

Absolute Count - Grains per cm³

Map reference: NZMS 1 N119 873814 AL.1200m

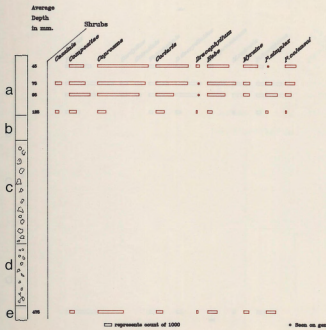




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7B MANGANUI 1 SUBALPINE SCRUB
 Absolute Count - Grains per cm³

Map reference: NZMS 1 N119 873E14 Alt. 1200m



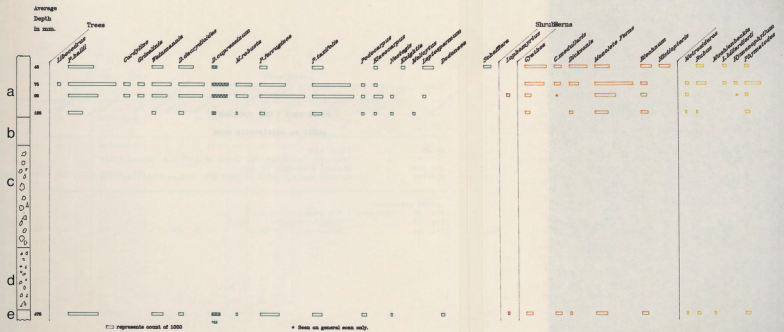
UNIVERSITY OF CALIFORNIA
 Department of Geology
 University of California, Berkeley, California



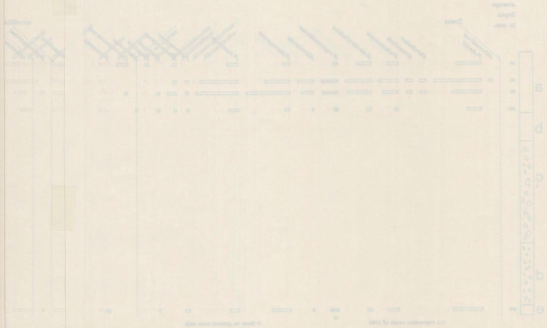
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7C MANGANUI 1 FOREST ZONES
 Absolute Count - Grains per cm³

Map reference: NZMS 1 N119 073214 AIL1200m

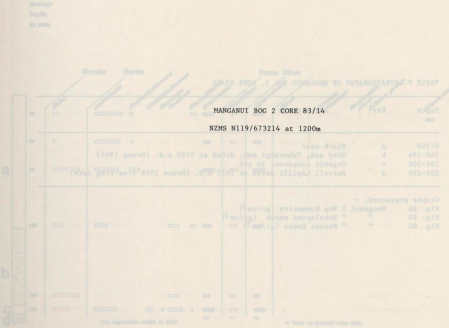


BA MANGANUI 2 HOG COMMUNITY
 Shekela Coast - Grades per core



BA MANGANUI 2 HOG COMMUNITY
 Shekela Coast - Grades per core

Map reference: NZMS 1119/673214 AL 1200m



MANGANUI HOG 2 CORE 83/14
 NZMS 1119/673214 at 1200m

Graphs presented:
 1. Manganui 2 Hog Community (grey)
 2. Submarine sand (white)
 3. Fossiliferous (black)

* Data on ground water only.

TABLE V. STRATIGRAPHY OF MANGANUI BOG 2, CORE 83/14

Depth mm	Key	Description
0-140	a	Black peat
140-194	b	Grey ash, Tahurangi Ash, dated at 1755 a.d. (Druce 1966)
194-206	c	Organic component in ash
209-290	d	Burrell Lapilli dated at 1655 A.D. (Druce 1966 Tree-ring date)

Graphs presented: -

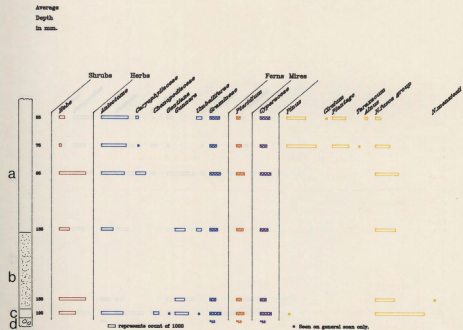
- Fig. 8A Manganui 2 Bog Community (gr/cm³)
 Fig. 8B " Subalpine scrub (gr/cm³)
 Fig. 8C " Forest Zones (gr/cm³)

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8A MANGANUI 2 BOG COMMUNITY

Absolute Count - Grains per cm³

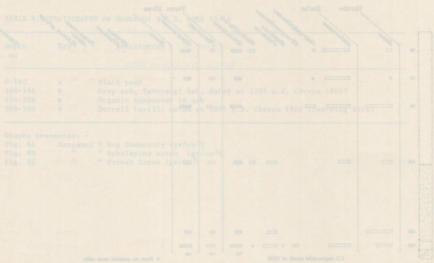
Map reference: NZMS 1 N119 873214 AH.1200m



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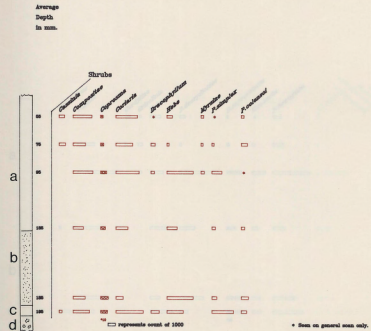


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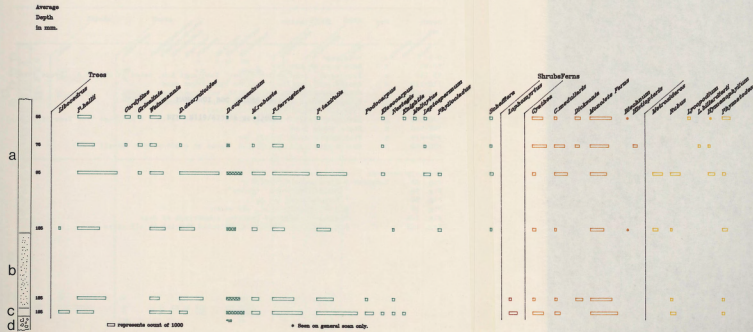
8B MANGANUI 2 SUBALPINE SCRUB

Absolute Count - Grains per cm²

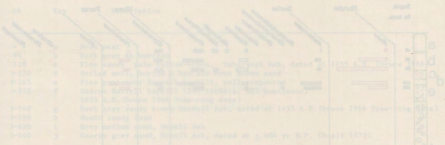
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YITHUMMOO DOE 8 KUNADKAM AN
 THE STRATIGRAPHY OF MANGANUI NO. 3, CORR. 1971

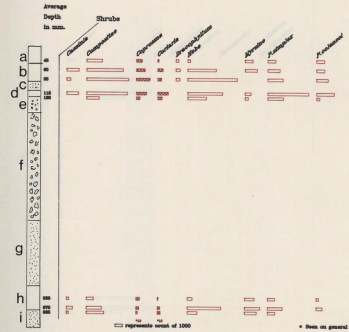


- data presented:
- g-74 Manganui 3 Veg Community (1971)
 - g-95 " Subalpine scrub (1971)
 - g-96 " Forest (1971)
 - g-10 " Veg Total (1971)
 - g-114 Changes in Selected Species, comparison of data
 - g-115 Veg Community, Changes in Selected Species at all sites

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9B MANGANUI 3 SUBALPINE SCRUB
 Absolute Count - Grains per cm³

Map reference: NIMS 1 N119 873214 AL.1000m



9C MANGANUI 3 FOREST ZONES

Absolute Count - Grains per cm³

Map reference: H282 I R119 078214 ALL 1:200m



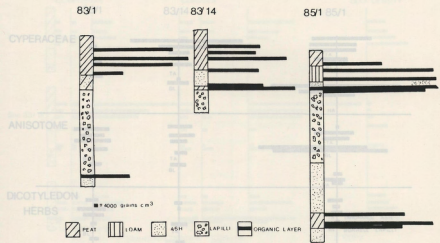
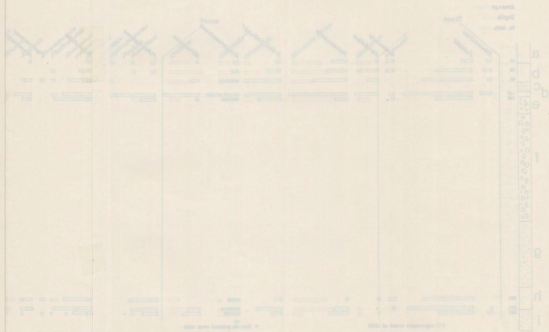


FIG.10 MANGANUI BOG, TOTAL GRAINS/CM³, ALL SITES.

FIG.11A MANGANUI BOG COMMUNITY.

CHANGES IN SELECTED SPECIES AT ALL THREE SITES.

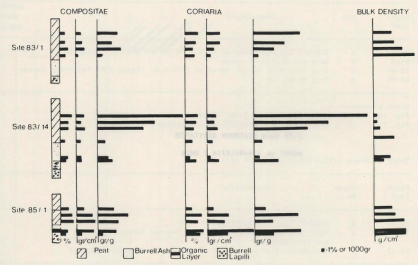
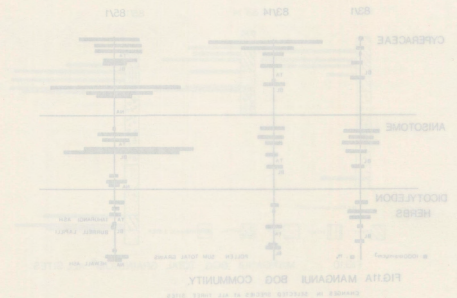


Fig 11B MANGANUI BOG SELECTED SPECIES

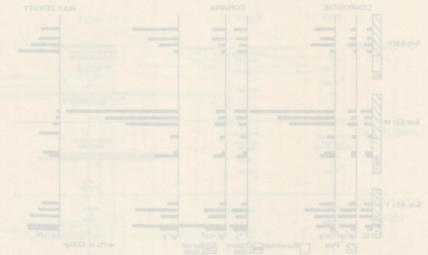
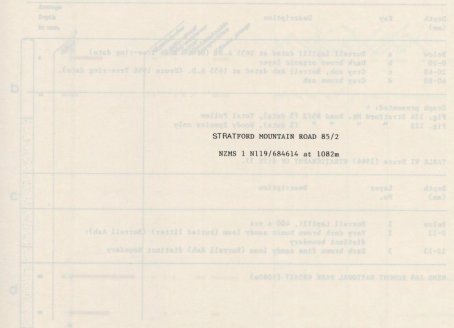


FIG. 118 MANHAWB BOG SELECTED SPICES
 THE H. H. H. COMPANY

TABLE VII STRATIGRAPHY OF STRATFORD MOUNTAIN ROAD, SITE 85/2



STRATFORD MOUNTAIN ROAD 85/2

NIMS 1 N119/684614 at 1082m

TABLE VII STRATIGRAPHY OF STRATFORD MOUNTAIN ROAD, SITE 85/2

Depth (mm)	Key	Description
Below	a	Burrell lapilli dated at 1655 A.D. (Druce 1966 Tree-ring date)
0-20	b	Dark brown organic layer
20-60	c	Grey ash, Burrell Ash dated at 1655 A.D. (Druce 1966 Tree-ring date).
60-80	d	Grey brown ash

Graph presented: -
 Fig. 12A Stratford Mt. Road 85/2 (% data), Total Pollen
 Fig. 12B " " " " (% data), Woody Species only

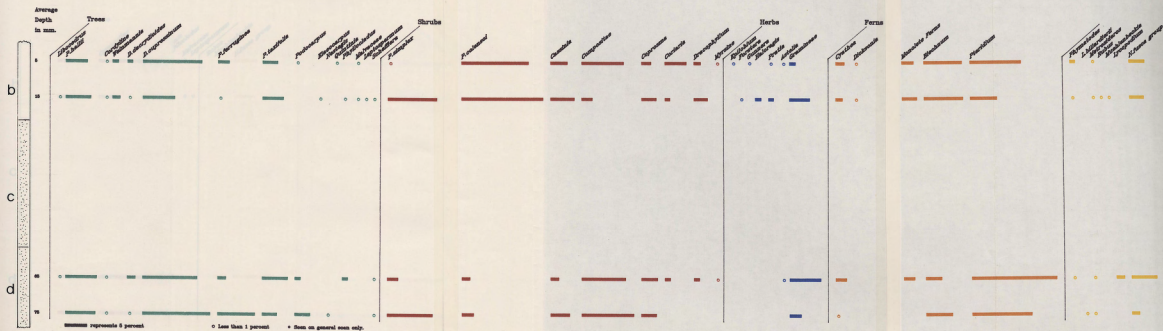
TABLE VI Druce (1966) STRATIGRAPHY OF SITE 37.

Depth (mm)	Layer No.	Description
Below	1	Burrell Lapilli, 400 ± yrs
0-12	2	Very dark brown humic sandy loam (buried litter) (Burrell Ash): distinct boundary
12-13	3	Dark brown fine sandy loam (Burrell Ash) distinct boundary

NZMS 169 EGMONT NATIONAL PARK 685617 (1080m)

12A STRATFORD MT.ROAD 85/2
 Percentage of Total Pollen

Map reference: NZMS 1 N119 684614 ALT.1082M

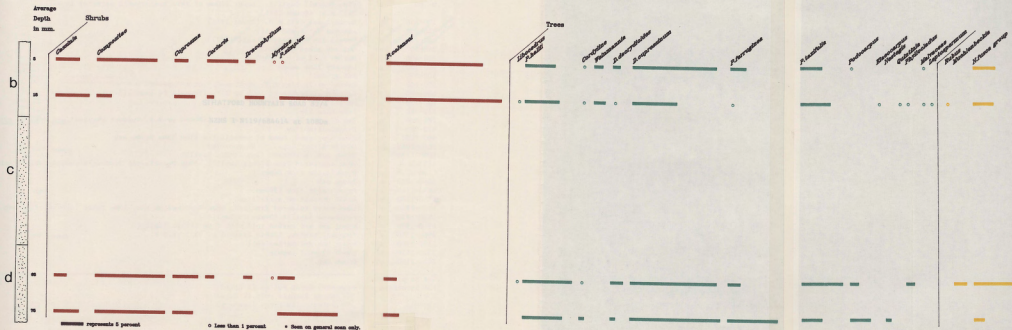


12B STRATFORD MT. RD. WOODY SP

12B STRATFORD MT. RD. WOODY SP

Percentage of Pollen

Map reference: NEMS 1 N119 004614 AH.1068m



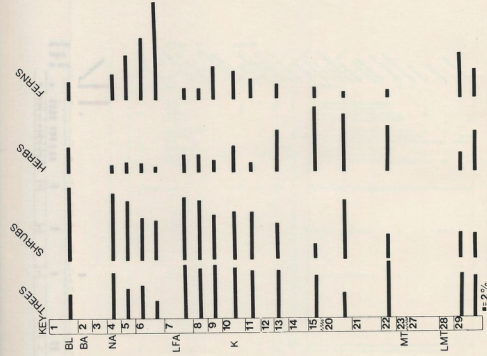
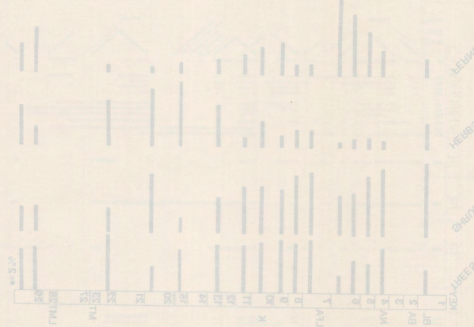
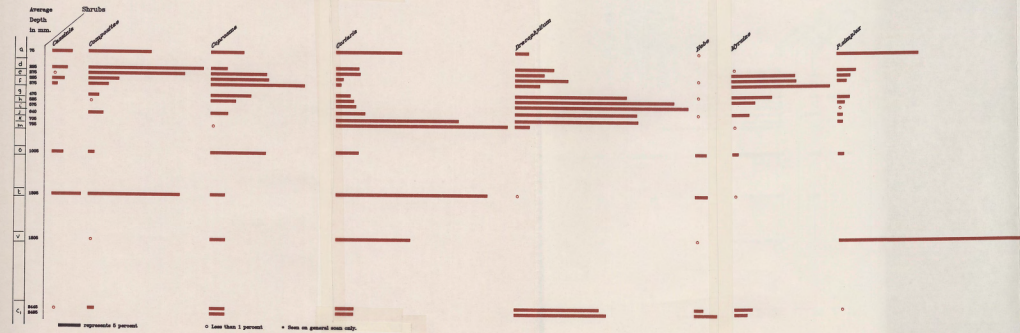


FIG. 13C STRATFORD 82/4 FOREST LIFE FORMS



13B STRATFORD MT. RD. WOODY SPP
Percentage of Pollen

Map reference: NMS 1 N119 65614 AIL 1000m



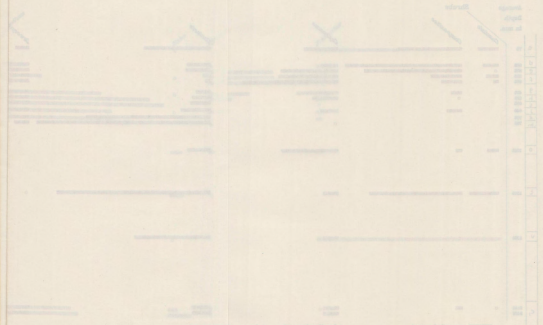
Minimum represents 5 percent
○ Less than 1 percent
* Seen on general scan only.



Minimum represents 5 percent
○ Less than 1 percent
* Seen on general scan only.

THE WOODS MOUNTAIN STATION

Percentage of Total Volume



14A POTAMA BOG COMMUNITY

Shrubland Core - Grains per core

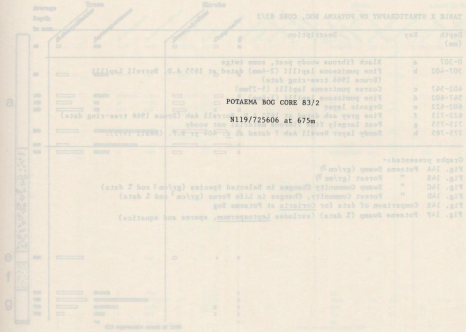


TABLE X STRATIGRAPHY OF POTAEMA BOG, CORE 83/2

Depth (mm)	Key	Description
0-307	a	Black fibrous woody peat, some twigs
307-402	b	Fine pumiceous lapilli (2-4mm) dated at 1655 A.D. Burrell Lapilli (Druce 1966 tree-ring date)
402-547	c	Coarse pumiceous lapilli (5-25mm)
547-602	d	Fine pumiceous lapilli (1-4mm)
602-622	e	Organic layer
622-715	f	Fine grey ash dated at 1655 A.D. Burrell Ash (Druce 1966 tree-ring date)
715-755	g	Peat largely fine fibrous material not woody
775-785	h	Sandy layer Newall Ash ? dated at c. 404 yr B.P. (Neall 1972).

Graphs presented:-

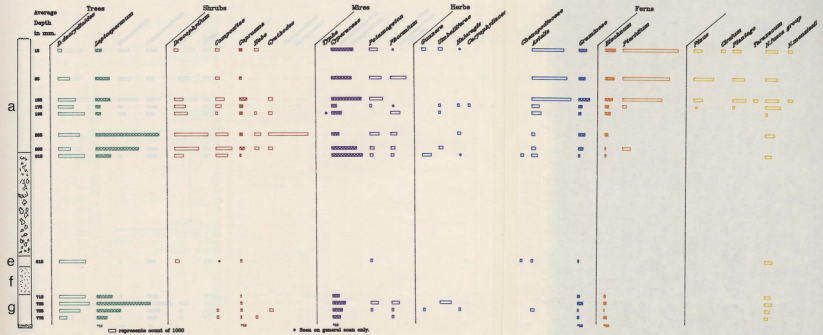
- Fig. 14A Potaema Swamp (gr/cm³)
- Fig. 14B " Forest (gr/cm³)
- Fig. 14C " Swamp Community Changes in Selected Species (gr/cm³ and % data)
- Fig. 14D " Forest Community, Changes in Life Forms (gr/cm³ and % data)
- Fig. 14E Comparison of data for *Coriaria* at Potaema Bog
- Fig. 14F Potaema Swamp (% data) (excludes *Leptospermum*, spores and aquatics)

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14A POTAEMA BOG COMMUNITY

Absolute Count - Grains per cm³

Map reference: NZMS 1 N119 795006 AL-875m



YERLENDIG TERROV AMALATPHI BAY

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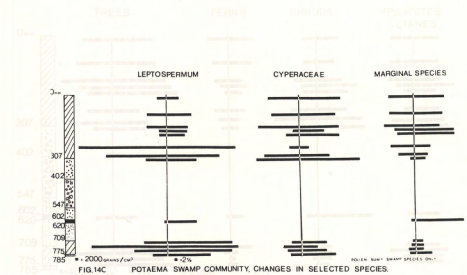


FIG.14C POTAEMA SWAMP COMMUNITY, CHANGES IN SELECTED SPECIES.

FIG.14D POTAEMA FOREST COMMUNITY, CHANGES IN LIFE FORMS

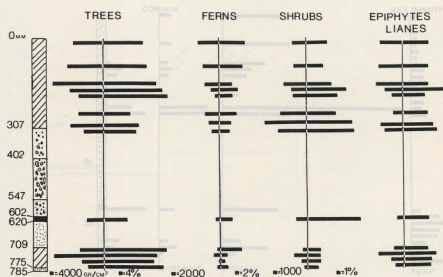
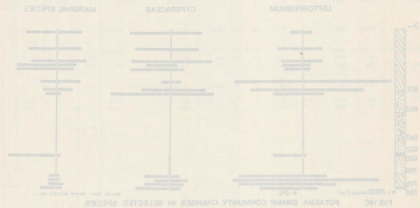
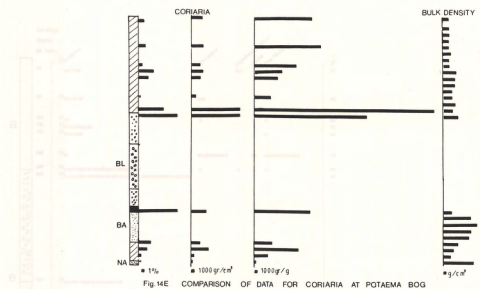
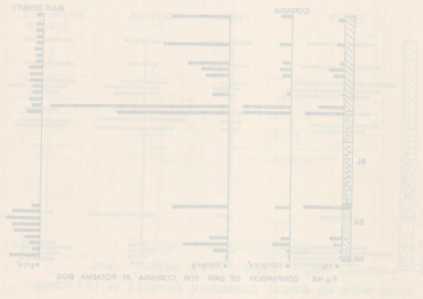


FIG.14D POTAEMA FOREST COMMUNITY, CHANGES IN LIFE FORMS.





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14F POTAEWA SELECTED SPECIES
 Percentage of Pollen

Map reference: NZMS 1 N119 725006 All.870m

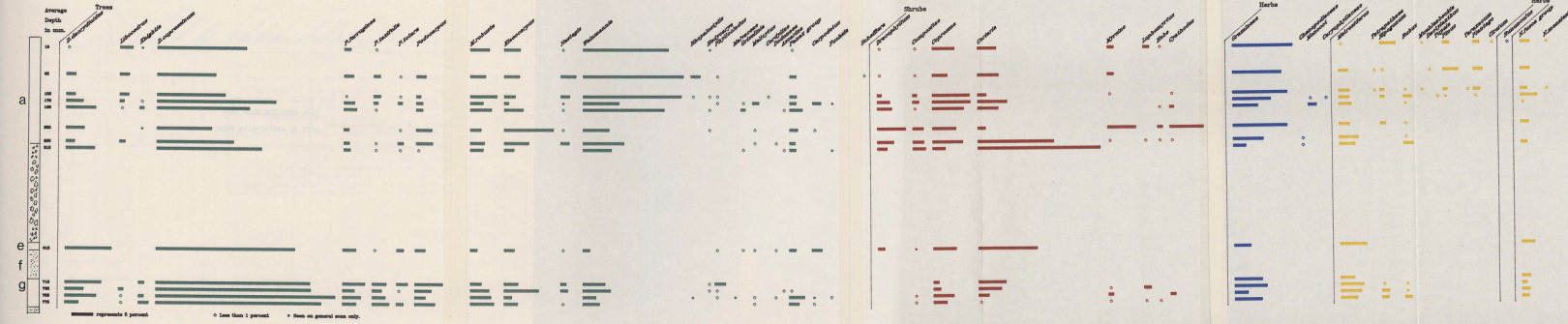


TABLE XI STRATIGRAPHY OF YORK ROAD BOG, CORE 84/2

Depth (mm)	Key	Description
0-248	a	Fibrous peat with small twigs
248-323	b	Scattered fine lapilli rarely < 5mm
323-408	c	Dense layer of Burrell Lapilli variable size dated at 1655 A.D. (Druce 1966 tree-ring date)
408-428	d	Organic layer
428-620	e	Mineralised peat, fine organic matter

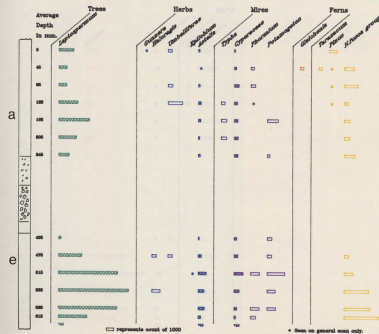
Graphs presented:-

- Fig. 15A York Road Bog Community (gr/cm³)
- Fig. 15B " " Forest Community (gr/cm³)
- Fig. 15C " " Changes at the bog Margin (gr/cm³)
- Fig. 15D " " Changes at the bog Margin (% data)

15A YORK RD. BOG COMMUNITY

Absolute Count - Grains per cm³

Map reference: NEDMS 1 N119 T65644 AP.525m



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YINJUMCO OOLSH XSDY AGI
 The big red-bellied woodpecker



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15B YORK RD. FOREST COMMUNITY
 Absolute Count - Grains per cm² Map reference: NIMS 1 N119 745644 ALT. 520M



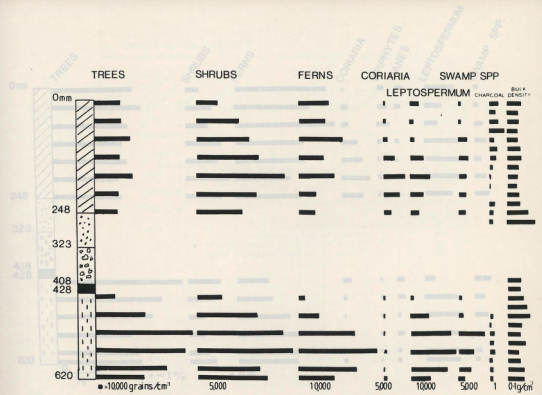


FIG. 15C YORK ROAD, CHANGES AT THE SWAMP MARGIN.

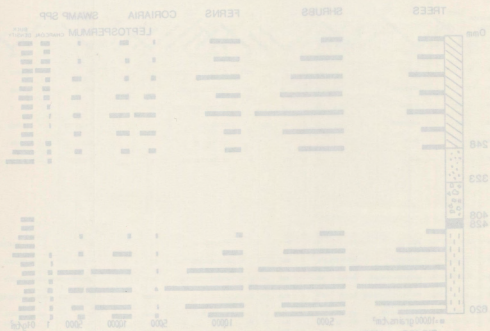


FIG. 15C YORK ROAD, CHANGES AT THE SWAMP MARGIN.

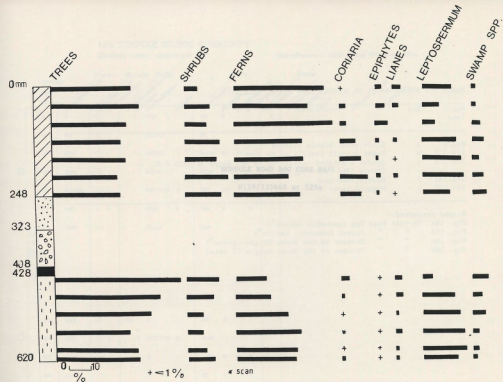
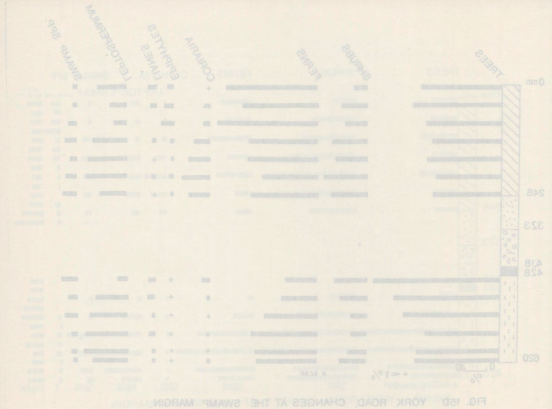


FIG. 15D YORK ROAD, CHANGES AT THE SWAMP MARGIN.



16A NORFOLK RD. BOG COMMUNITY
 Absolute Count - Grains per cm³

TABLE XII STRATIGRAPHY OF NORFOLK ROAD BOG COMMUNITY

Depth (cm)	Description	Grains per cm ³
0-150	Black peat, highly fibrous	1000
150-210	Dark brown peat, highly fibrous	1000
210-270	Dark brown peat, highly fibrous	1000
270-330	Dark brown peat, highly fibrous	1000
330-390	Dark brown peat, highly fibrous	1000
390-450	Dark brown peat, highly fibrous	1000
450-510	Dark brown peat, highly fibrous	1000
510-570	Dark brown peat, highly fibrous	1000
570-630	Dark brown peat, highly fibrous	1000
630-690	Dark brown peat, highly fibrous	1000
690-750	Dark brown peat, highly fibrous	1000
750-810	Dark brown peat, highly fibrous	1000
810-870	Dark brown peat, highly fibrous	1000

NORFOLK ROAD BOG CORE 84/1

N119/735660 at 525m

Grains per cm³
 Yfg. 16a Norfolk Road Bog Community (gr/cm³)
 Yfg. 16b " " " " " "
 Yfg. 16c " " " " " "
 Yfg. 16d " " " " " "
 Yfg. 16e " " " " " "

TABLE XII STRATIGRAPHY OF NORFOLK ROAD SWAMP, CORE 84/1

Depth (mm)	Key	Description
0-270	a	Black peat, highly fibrous
270-330	b	Dense Burrell Lapilli up to 10mm
330-370	c	Sparse scattered lapilli up to 4mm dated at 1655 A.D. (Druce 1966 Tree-ring date)
370-590	d	Mineralised peat
590-600	e	Organic layer

Graphs presented:-

- Fig. 16A Norfolk Road Bog Community (gr/cm³)
- Fig. 16B " " Forest Community (gr/cm³)
- Fig. 16C " " Changes at the Swamp Margin (gr/cm³)
- Fig. 16D " " Changes at the Swamp margin (% data)

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16A NORFOLK RD. BOG COMMUNITY

Absolute Count - Grains per cm³

Map reference: NZMS 1 N119 735000 AN.525m



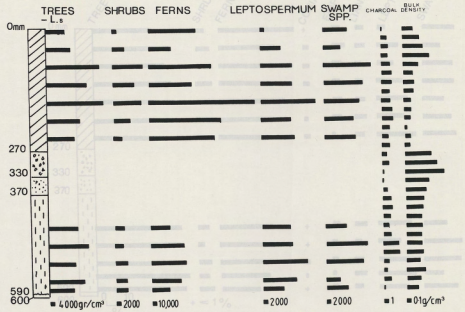


FIG. 16C NORFOLK ROAD, CHANGES AT THE SWAMP MARGIN.

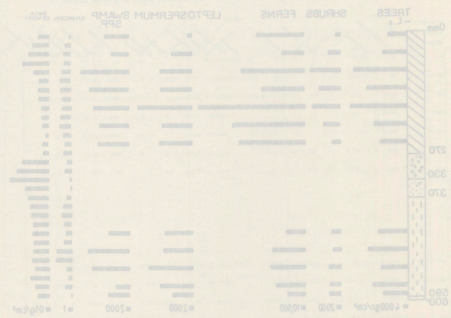


FIG. 16C NORFOLK ROAD, CHANGES AT THE SWAMP MARGIN.

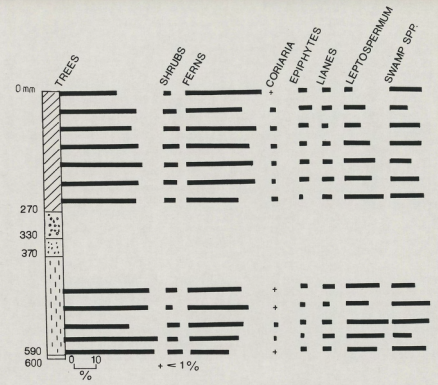


FIG. 16D NORFOLK ROAD, CHANGES AT THE SWAMP MARGIN.

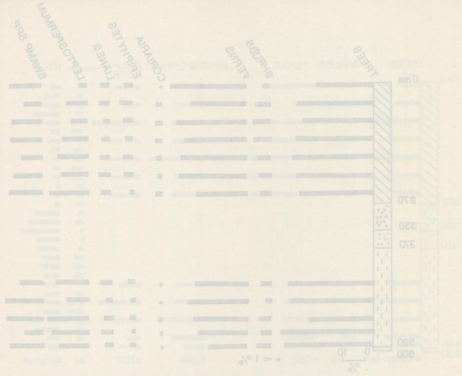


FIG. 160 NORFOLK - ROAD CHANGES AT THE SWAMP MARGIN.

Average
Depth
to water

TABLE XIII
SUMMARY OF DATA FROM THE
WATER TABLE

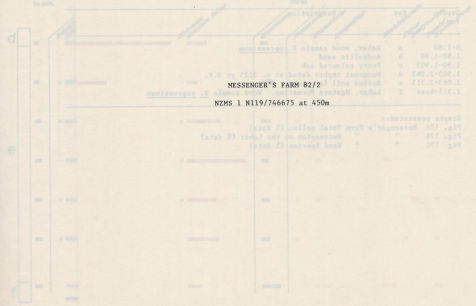


TABLE XIII STRATIGRAPHY OF MESSENGER'S FARM, SITE B2/2

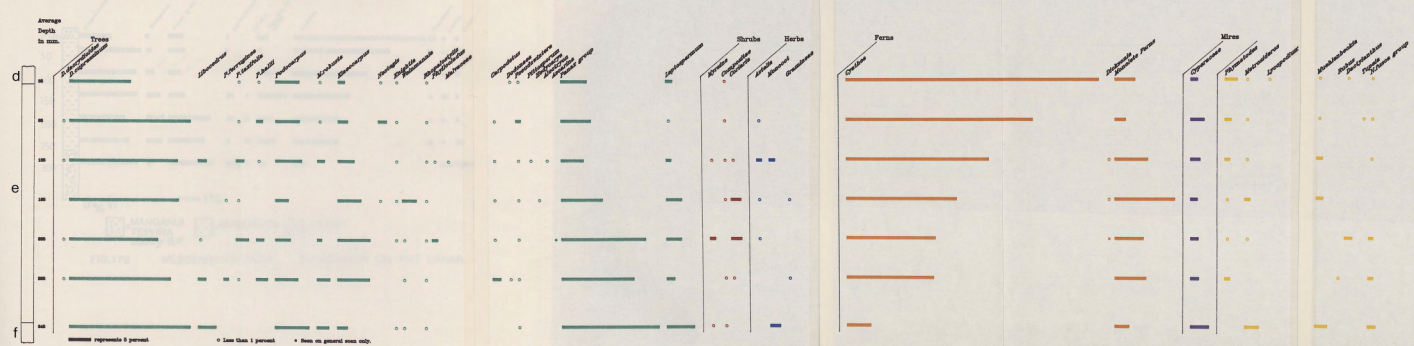
Depth (mm)	Key	Description
0-1.80	a	Lahar, wood sample <i>D. cupressinum</i>
1.80-1.90	b	Andesitic sand
1.90-1.903	c	Putty coloured ash
1.903-2.063	d	Mangrove tephra dated at c. 3125 yr B.P.
2.063-2.313	e	Buried soil (sampled)
2.313-base	f	Lahar, Ngatoro Formation. Wood sample <i>D. cupressinum</i>

Graphs presented:-

- Fig. 17A Messenger's Farm Total pollen (% data)
- Fig. 17B " Succession on the Lahar (% data)
- Fig. 17C " " Wood Species (% data)

LIBRARY: 550472/ERS / PVOJ: BS / PLOTTED 13 MAR 87 17:21:48 PVL / FRAME NO. 5

17A MESSENGER'S FARM FOREST
Percentage of Total Pollen
Map reference: NZMS 1 N119 740075 AIL-650



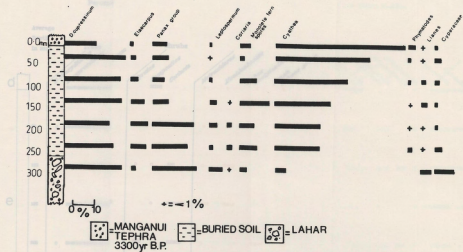
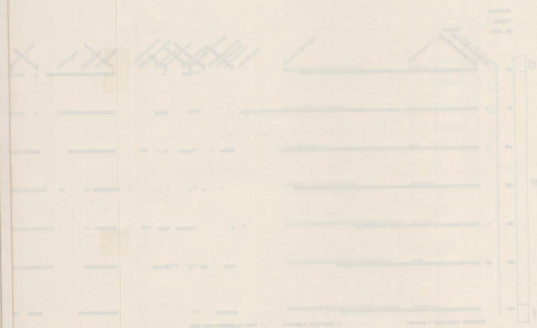


FIG.17B MESSENGER'S FARM, SUCCESSION ON THE LAHAR.

10A MIDHURST 1 SWAMP
 Absolute Count - Grains per cc



10A MIDHURST 1 SWAMP
 Absolute Count - Grains per cc

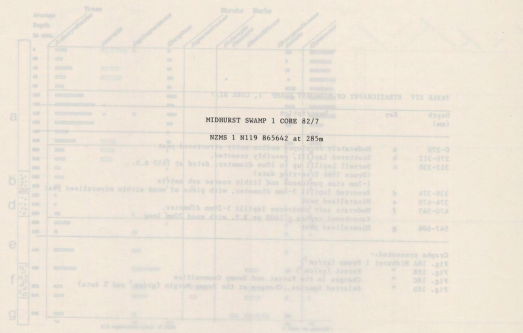


TABLE XIV STRATIGRAPHY OF MIDHURST SWAMP 1, CORE 82/7

Depth (mm)	Key	Description
0-270	a	Moderately developed medium nutty structured peat
270-312	b	Scattered lapilli, possibly resorted.
312-338	c	Burrell Lapilli up to 10mm diameter; dated at 1655 A.D. (Druce 1966 Tree-ring date)
338-374	d	1-2mm size pumiceous and lithic coarse ash matrix
374-470	e	Resorted lapilli 3-6mm diameter, with piece of wood within mineralised peat
470-547	f	Mineralised peat
547-606	g	Moderate soft pumiceous lapilli 5-20mm diameter. Kaupokonui tephra c 1400 yr B.P. with wood 70mm long
		Mineralised peat

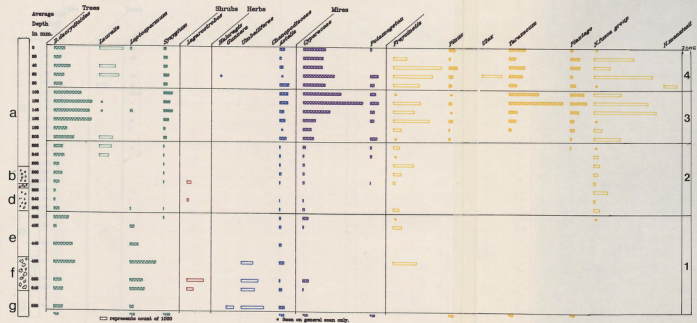
Graphs presented:-

- Fig. 18A Midhurst 1 Swamp (gr/cm³)
- Fig. 18B " Forest (gr/cm³)
- Fig. 18C " Changes in the Forest and Swamp Communities
- Fig. 18D " Selected Species, Changes at the Swamp Margin (gr/cm³ and % data)

Lamp: S804721EES / Pro: SS / dated 13 Mar 67 17:46:36 File: Swamp no. 1

18A MIDHURST 1 SWAMP
Absolute Count - Grains per cm³

Map reference: NZMS 1 K119 860442 AN.886m

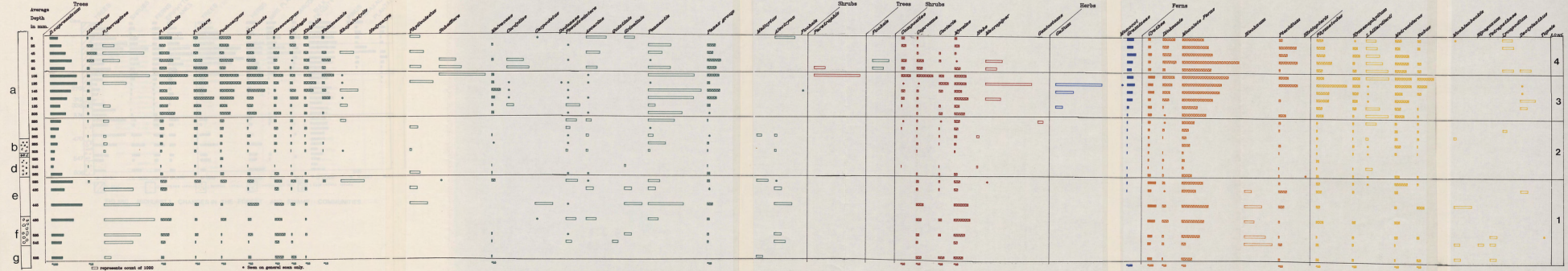


□ represents count of 1000

* Based on general mean only.

18B MIDHURST 1 FOREST
Absolute Count - Grains per cm³

Map reference: NMS 1 N119 885642 AN.285m



User: SB0472/EEB / Proj: SE / Plotted 19 Mar 87 08:28:48 Thu / Press no. 1
 File: 18B180472/EEB/PROJ/SE/PLOTTED/19MAR87/082848THU/PRESSNO.1

TREES & SHRUBS

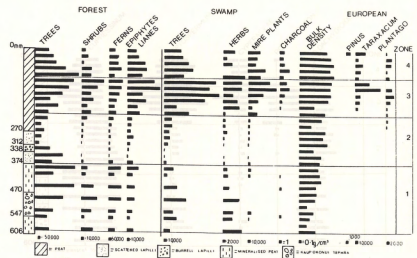


FIG. 18C MIDHURST 1, CHANGES IN THE FOREST AND SWAMP COMMUNITIES.

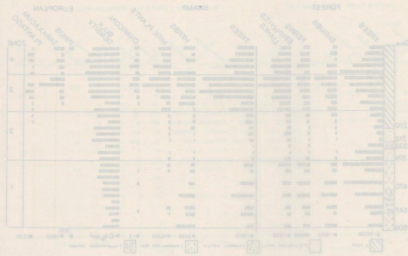


FIG. 18C. MIDHURST 1, CHANGES IN THE FOREST AND SWAMP COMMUNITIES.

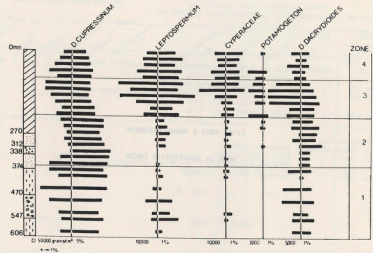
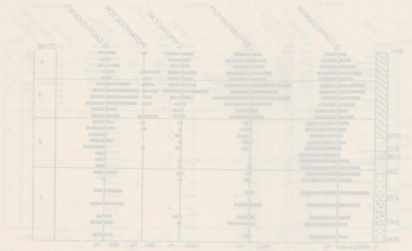


FIG. 18D. MIDHURST 1, SELECTED SPECIES, CHANGES AT THE SWAMP MARGIN.

FIG 180. MIDHURST 1 DETECTED SPECIES CHANGED AT THE SWAMP MARCH



180A MIDHURST 2 SWAMP

Abundance (Grains) - Grains per cm³

TABLE 181. STATEMENT OF MIDHURST SWAMP 2, CORE 83/13

Depth (cm)	Grain Description	Grain Count
0-110	Slightly greasy peaty loam	120-130
110-120	Slightly greasy peaty loam	120-130
120-130	Same as above with large woody fragments	120-130
130-140	Dispersed fine <i>Polypodium tuberosum</i> (dated at 1922 A.D.)	120-130
140-150	(Green 1908 Tree-ring date)	120-130
150-160	Slightly greasy peaty loam	120-130
MIDHURST SWAMP 2 CORE 83/13		
160-170	Grasses present	120-130
170-180	Forest (green)	120-130
180-190	Forest (green)	120-130
190-200	Grasses in (green)	120-130
200-210	Dispersed (green) (7 date)	120-130
210-220		120-130
220-230		120-130
230-240		120-130
240-250		120-130
250-260		120-130
260-270		120-130
270-280		120-130
280-290		120-130
290-300		120-130

TABLE XV STRATIGRAPHY OF MIDHURST SWAMP 2, CORE 83/13

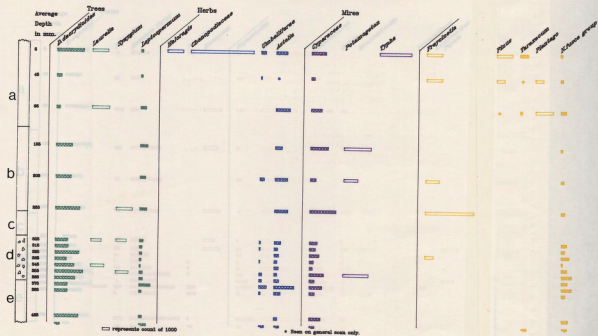
Depth (mm)	Key	Description
0-120	a	Medium nutty structured loamy peat
120-258	b	Slightly greasy peaty loam
258-310	c	Same as above with large woody fragments
310-370	d	Dispersed fine pumiceous Burrell Lapilli dated at 1655 A.D. (Druce 1966 Tree-ring date)
370-436	e	Slightly greasy peaty loam

Graphs presented:-

- Fig. 19A Midhurst 2 Swamp (gr/cm³)
- Fig. 19B " Forest (gr/cm³)
- Fig. 19C " Changes in the Forest and Swamp Communities
- Fig. 19D " Selected Species (% data)

19A MIDHURST 2 SWAMP
Absolute Count -Grains per cm³

Map reference : NZMS 1 N119 874645 All 200m



Layer: SSO47ALEES / Proj: SM / Plotted 06 Mar 87 08:26:40 Fri / Frame no. 4

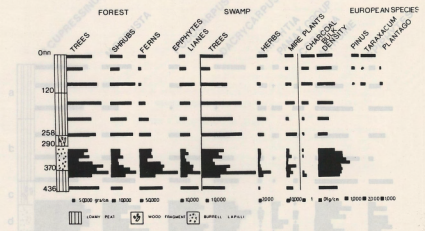
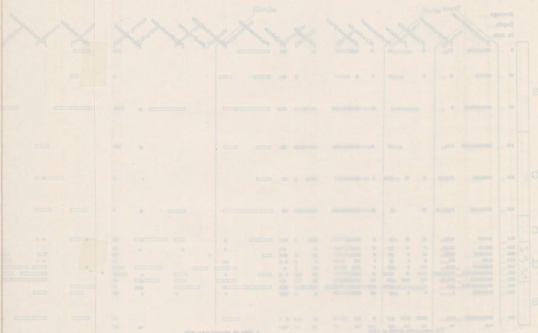


FIG. 19C MIDHURST 2. CHANGES IN THE FOREST AND SWAMP COMMUNITIES.

FIG. 19D MIDHURST 2 SELECTED SPECIES

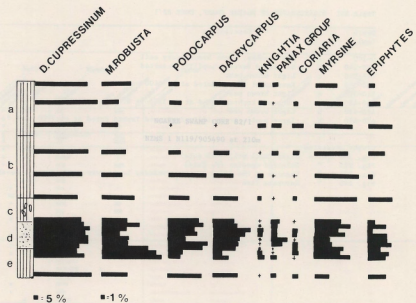


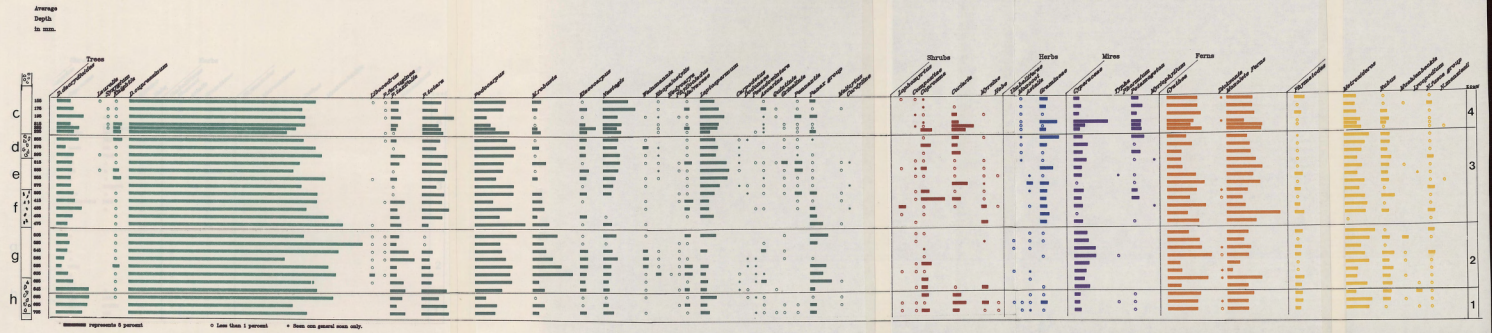
FIG.19D MIDHURST 2 SELECTED SPECIES

TABLE XVI STRATIGRAPHY OF NGAERE SWAMP, CORE 82/1

Depth (mm)	Key	Description
0-100	a	Dry crumbly, light brown peaty soil
100-140	b	Scattered Burrell Lapilli, resorted
140-240	c	Light brown peat
240-310	d	Kaupokonui tephra dated at \pm 1400 yr B.P.
310-390	e	Light brown peat
390-480	f	Manganui tephra, dated at \pm 3125 yr B.P.
480-620	g	Light brown peat
620-690	h	Large pumiceous lapilli, Inglewood Tephra dated at \pm 3800 yr B.P.

Graphs presented:-
 Fig. 20A Ngaere Swamp Total pollen (% data)
 Fig. 20B " Selected species (% data)
 Fig. 20C " Changes at the Swamp Margin, excludes Leptospermum, spores and aquatics (% data)
 Fig. 20D " European Time

20A NGAERE SWAMP COMMUNITY
 Percentage of Total Pollen
 Map reference: NZMS 1 N119 905490 AM.210m



User: 580472LERS / Proj: 88 / Plotted 16 Mar 87 11:05:53 Mon / Frame no. 1
 P 118 - 000000-000472LERS-PROJ-88 / User: 580472LERS-PROJ-88 / 87-03-28 18:47:20:480

20B NGAERE SELECTED SPECIES
 Percentage of Pollen
 Map reference: NZMS 1 N119 905490 A1L210m



Uran: S80472L.EES / Proj: 55 / Plotted 16 Mar 87 11:28:36 Mon / Frame no. 1
 Plot: 498030-500472L.EES-PC-A1L210m-905490-110-1 / Last mod.: 87-02-25 16:00:24 Wed

SELECTED SWAMP SPECIES AND FOREST SUMMARY

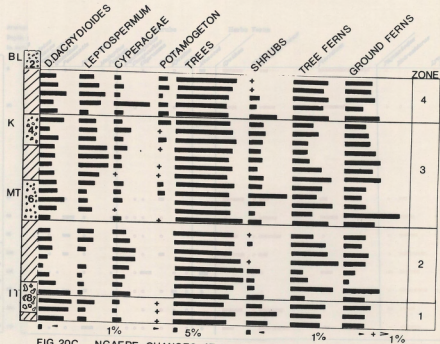
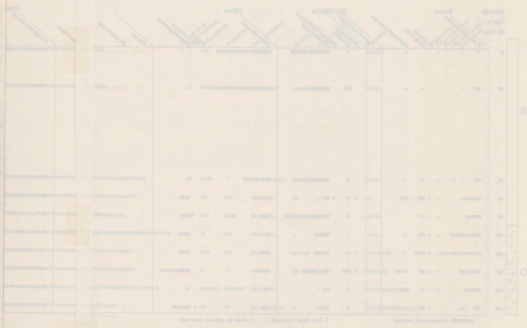


FIG.20C NGAERE, CHANGES AT THE SWAMP MARGIN.

SOIL MECHANICAL ANALYSIS SHEET
 Percentage of Total Solids



R1A RATAPIKO SWAMP COMMUNITY
 Abasco Canal - Drain per sec

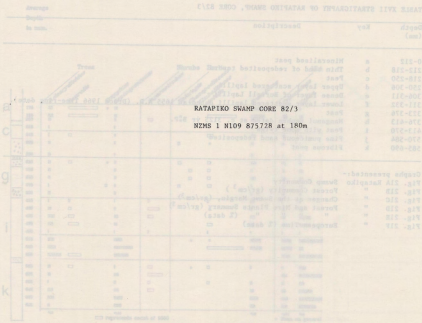


TABLE XVII STRATIGRAPHY OF RATAPIKO SWAMP, CORE 82/3

Depth (mm)	Key	Description
0-212	a	Mineralised peat
212-218	b	Thin band of redeposited tephra
218-250	c	Peat
250-306	d	Upper layer scattered lapilli
306-311	e	Dense layer of Burrell Lapilli
311-332	f	Lower layer scattered lapilli dated at 1655 A.D. (Druce 1966 Tree-ring date).
323-376	g	Peat
376-413	h	Manganui tephra dated at c. 3125 yr B.P.
413-570	i	Peat with some twigs
570-584	j	Fine puniceous sand redeposited
585-690	k	Fibrous peat

Graphs presented:-

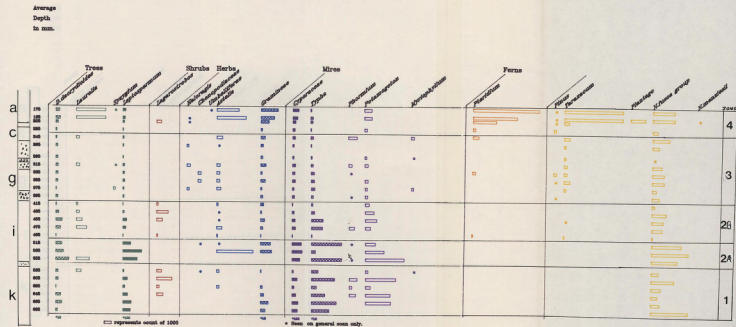
- Fig. 21A Ratapiko Swamp Community
- Fig. 21B " Forest Community (gr/cm³)
- Fig. 21C " Changes at the Swamp Margin, (gr/cm³)
- Fig. 21D " Forest and Mire Plants Summary (gr/cm³)
- Fig. 21E " " " (% data)
- Fig. 21F " European Time (% data)

User: 890472LEES / Proj: 88 / Plotted 16 Mar 87 12:06:04 Mon / Frame no. 1
 PLOT / LANK MARK: 87-02-20. 121. 0.0 16. 1984

21A RATAPIKO SWAMP COMMUNITY

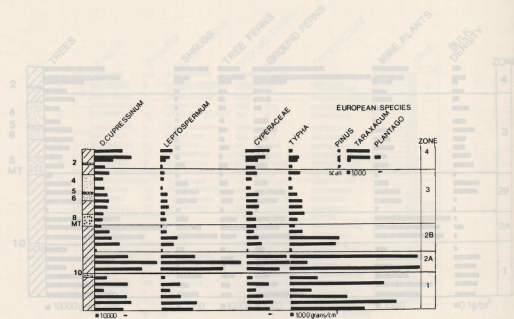
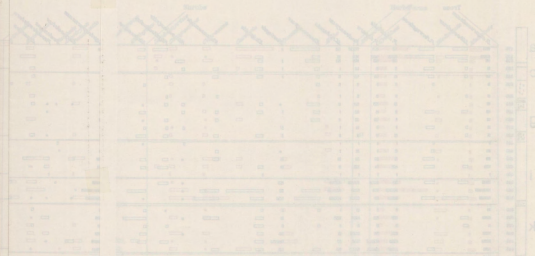
Absolute Count - Grains per cm³

Map reference: NZMS 1100 870728 A1L100m



TEHNOV OBTATAN SIS

... ..



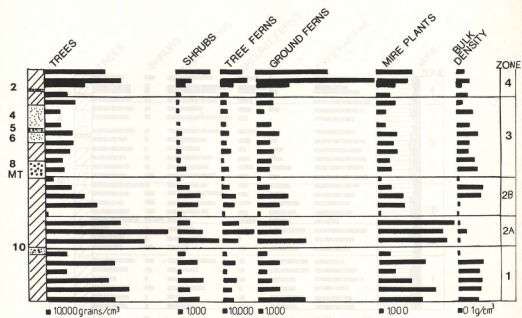


FIG.21D RATAPIKO FOREST AND MIRE PLANTS SUMMARY

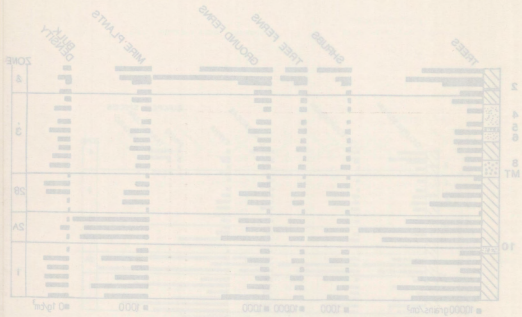


FIG. 21D RATAPIKO FOREST AND MIRE PLANTS SUMMARY

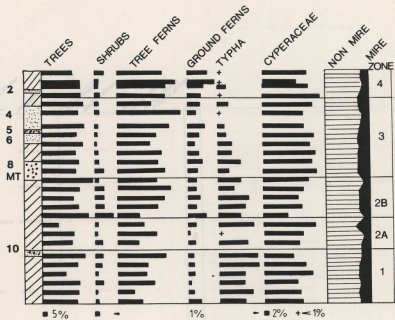


FIG. 21E RATAPIKO

FOREST AND MIRE PLANTS SUMMARY

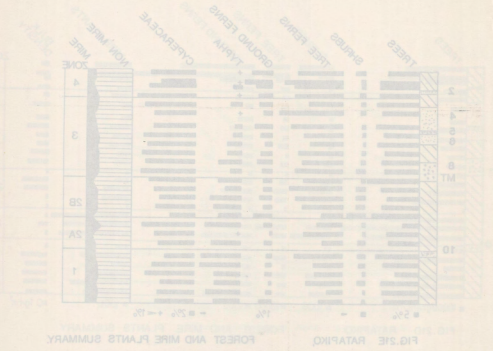
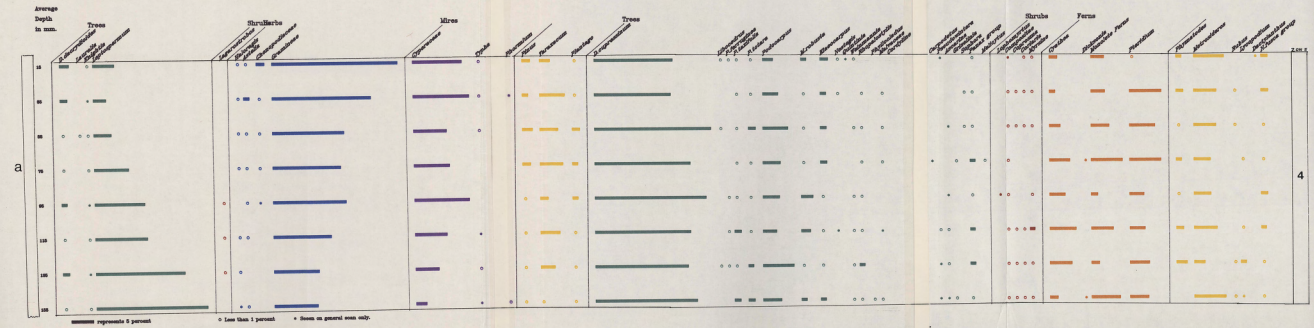


FIG 21E RATAPIKO
FOREST AND MIRE PLANTS SUMMARY

Urem: 990472LES / Proj: 88 / Plotted 16 Mar 87 12:30:36 Mon / Frame no. 1
 File: <user>990472LES-POLLEN-RATAPIKO-PL01 / Last mod.: 87-05-25 18:44:52 Wed

21F RATAPIKO EUROPEAN TIME
 Percentage of Total Pollen

Map reference: NZMS 1 N100 070720 A3L180m



Legend:
 ■ represent 5 percent
 ● Less than 1 percent
 * Seen on ground level only

THE NATIONAL ANTHROPOLOGICAL ARCHIVES

THE NATIONAL ANTHROPOLOGICAL ARCHIVES

THE NATIONAL ANTHROPOLOGICAL ARCHIVES

NO.	NAME	DATE	PLACE	REMARKS
1				
2				
3				
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THE NATIONAL ANTHROPOLOGICAL ARCHIVES



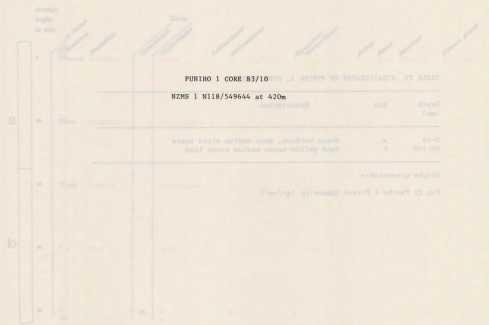


TABLE XX STRATIGRAPHY OF PUNIHO 1, CORE 83/10

Depth (mm)	Key	Description
0-40	a	Humic horizon, many medium sized roots
40-140	b	Dark yellow-brown medium sandy loam

Graphs presented:-

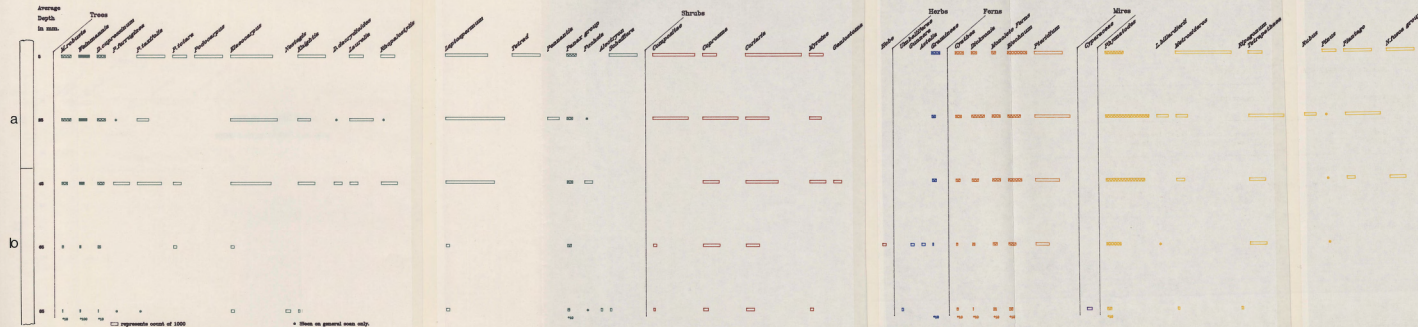
Fig. 22 Puniho 1 Forest Community (gr/cm³)

User: SSO472LEES / Proj: SS / Plotted 18 Mar 87 12:46:40 Mon / Frame no. 1
File: <user>SSO472LEES>PUN10.PLOT / Last mod.: 87-03-03 07:56:24 Tue

22A PUNIHO 1 FOREST COMMUNITY

Absolute Count - Grains per cm³

Map reference: NZMS 1 N118 549864 Alt. 420m



YINSHANSHU TOWER 1 FOREST COMMUNITY

Height (m) - 397m
 Date of collection - 1983/11

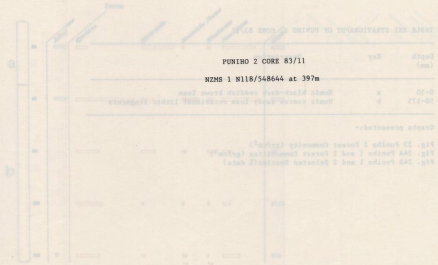


Height
 Date
 etc.

TABLE XII STATISTICS OF TOWER 2 CORE

PUNING 2 CORE 83/11

NZMS 1 N118/548644 at 397m



Depth (m)
 0-20
 20-172

Groups present:-
 Yig. 12 Puning 1 forest community (Yig. 12)
 Yig. 144 Puning 1 and 1 forest community (Yig. 144)
 Yig. 148 Puning 1 and 1 forest community (Yig. 148)

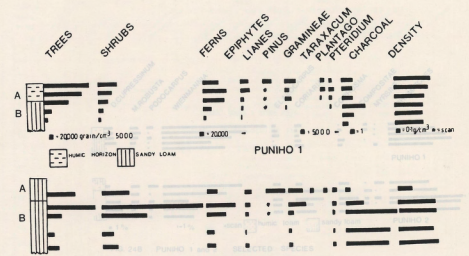
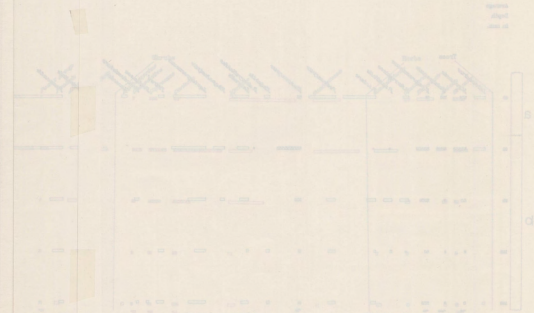


FIG 24A FOREST COMMUNITIES PUNIHO 2

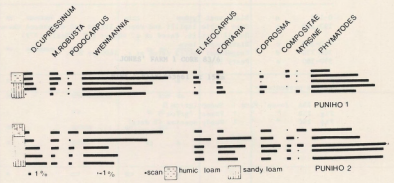
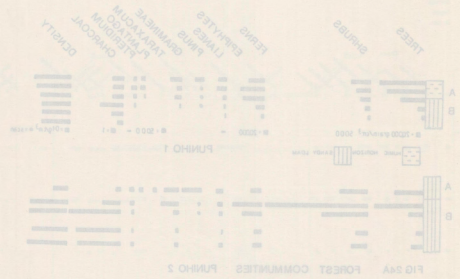
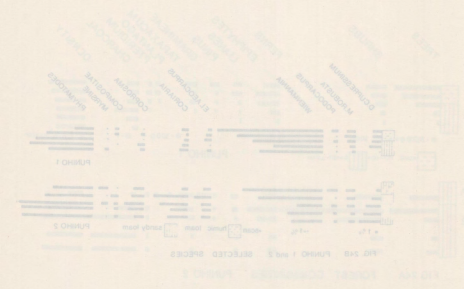


FIG. 24B PUNIHO 1 and 2 SELECTED SPECIES



DEA JONES FARM 1 SWAMP

Absolute Count - Grains per cm³

Map reference: NZMS 1 N118 445661 66.150m

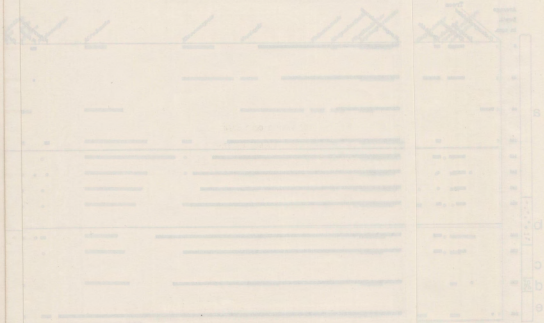
Depth cm	Zone	Mass	Grain	Grain count	Grain count	Grain count	Grain count
0-100							
100-200							
200-300							
300-400							
400-500							
500-600							
600-700							
700-800							
800-900							
900-1000							

Notes: 1. Jones' Farm 1 Core 83/6
2. NZMS 1 N118 445661 at 152m
3. Grains presented

DEPT. OF SCIENCE AND TECHNOLOGY / P.O. BOX 1470 / WELLINGTON, NEW ZEALAND
 PRINTED IN NEW ZEALAND BY THE GOVERNMENT PRINTERS

SOIL JONES

to vegetation



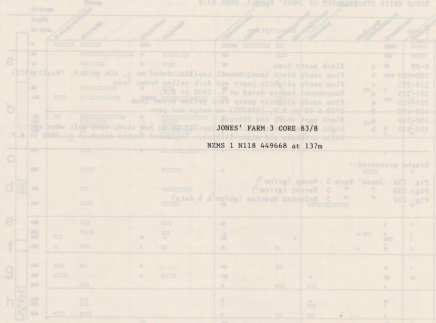
Soil description

SOIL JONES FARM 3 SWAMP

Absolute Count - Order per cm²

Soil reference: NZMS 1 N118 449668 AL127a

SOIL REFERENCE: NZMS 1 N118 449668 AL127a



JONES' FARM 3 CORE 83/8
NZMS 1 N118 449668 at 137m

Soil description

Soil description

TABLE XXIII STRATIGRAPHY OF JONES' FARM 3, CORE R3/B

Depth (mm)	Key	Description
0-85	a	Black peaty loam
193-260	b	Fine sandy black loam, Newall Lapilli. dated at c. 404 yr B.P. (Neall 1972)
210-295	c	Fine sandy slightly peaty and dark yellow brown loam
295-325	d	Kaupokonui tephra dated at c. 1400 yr B.P.
325-420	e	Fine sandy slightly peaty dark yellow brown loam
420-450	f	2750 ± 60 yr B.P. (NZ6705) on twigs and peat
450-510	g	Black peat woody and fibrous
510-575	h	Light yellow brown pumiceous lapilli up to 5mm size, very soft when wet. Mafic crystals and minor lithics. Inglewood Tephra dated at c. 3800 yr B.P.

Graphs presented:-

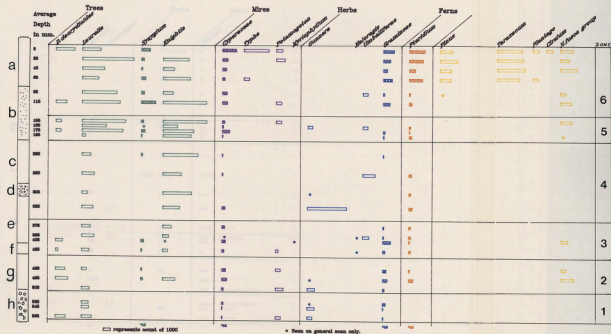
- Fig. 25A Jones' Farm 3 Swamp (gr/cm³)
 Fig. 25B " " 3 Forest (gr/cm³)
 Fig. 25C " " 3 Selected Species (gr/cm³ & % data)

User: S80472LEES / Proj: SB / Plotted 19 Mar 87 17:27:04 Thu / Frame no. 1
 File: <USER>S80472LEES-POL.LIB-CH3SWP.PLOT / Last mod.: 87-02-25, 18:28:40 Wed

26A JONES' FARM 3 SWAMP

Absolute Count - Grains per cm³

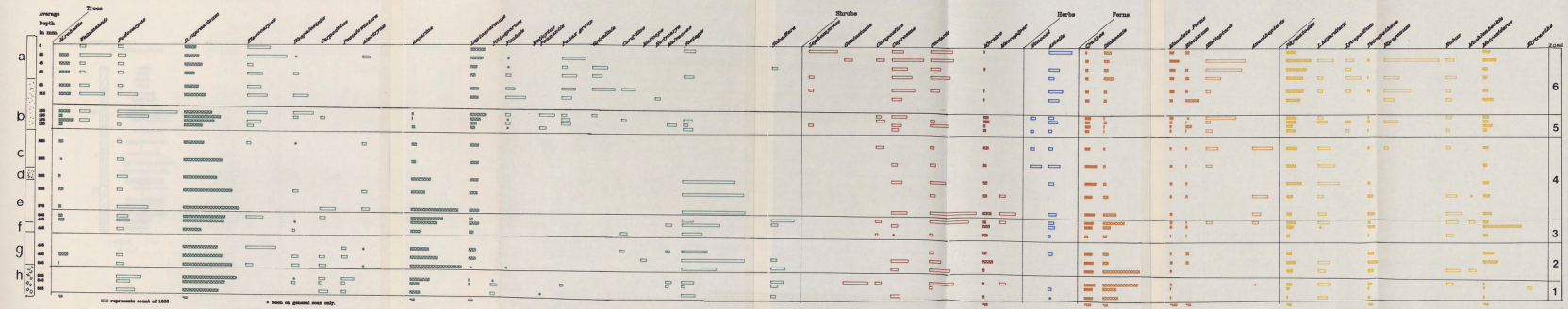
Map reference: EDMS 1 N118 440080 AL137m



GLASS & MEAT 'WIND' AND
 For my records - Jones' Forest

User: S80472L.EES / Proj: SS / Plotted 19 Mar 87 17:24:28 Thu / Frame no. 1
 File: <S8583>S80472L.EES-DJ.LLEN-JONES-FOR-PL01 / Last mod: 1 87-02-28 18:16:08 Wed

26B JONES' FARM 3 FOREST
 Absolute Count - Grains per cm²
 Map reference: NZMS 1 N118 440980 Alt. 137m



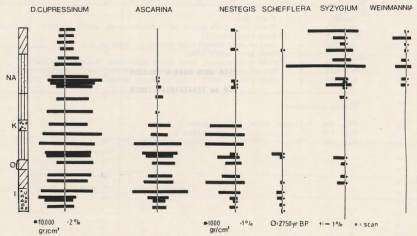
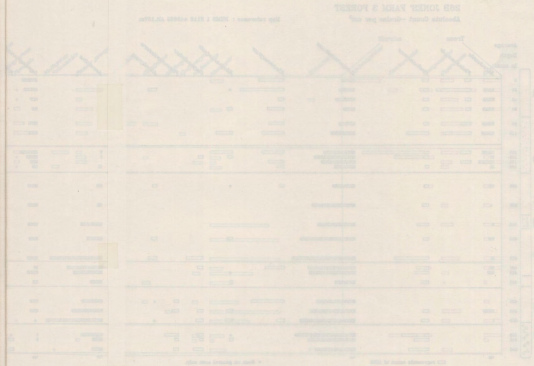


Fig. 26C JONES' FARM 3 SELECTED TREE SPECIES

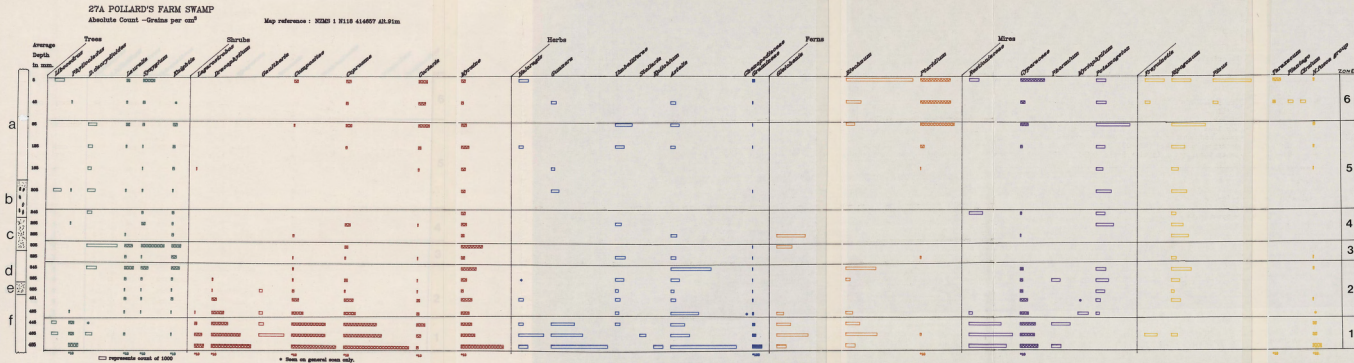
TABLE XXIV STRATIGRAPHY OF POLLARD'S FARM, CORE 83/9

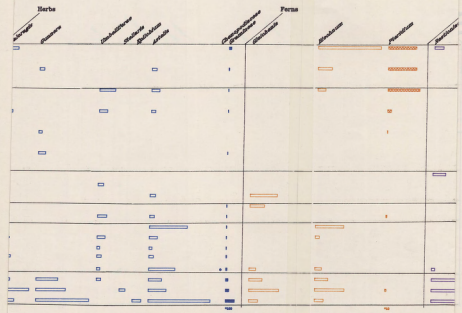
Depth (m)	Key	Description
0-188	a	Black peat
188-260	b	Black peat with seeds of Podocarpaceae, dated (NZ6918) at 795±60 yr B.P.1972) Some fine lapilli
260-320	c	Coarse sand Kaupokonui tephra g. 1400 yr B.P.
320-388	d	Dark grey peaty loam
388-410	e	Pure coarse sand, many white particles "Unnamed tephra"
410-415	f	Dacrydium/Podocarpus wood dated (NZ7007) at 11900±950 yr B.P.
415-500	g	Very greasy peaty loam, strongly allophanic dated (NZ6907) at 9350±730 yr B.P.

Graphs presented:-

- Fig. 25A Pollards' Farm Swamp (gr/cm³)
- Fig. 25B " " Forest (gr/cm³)
- Fig. 25C " " Woody Species (% data)

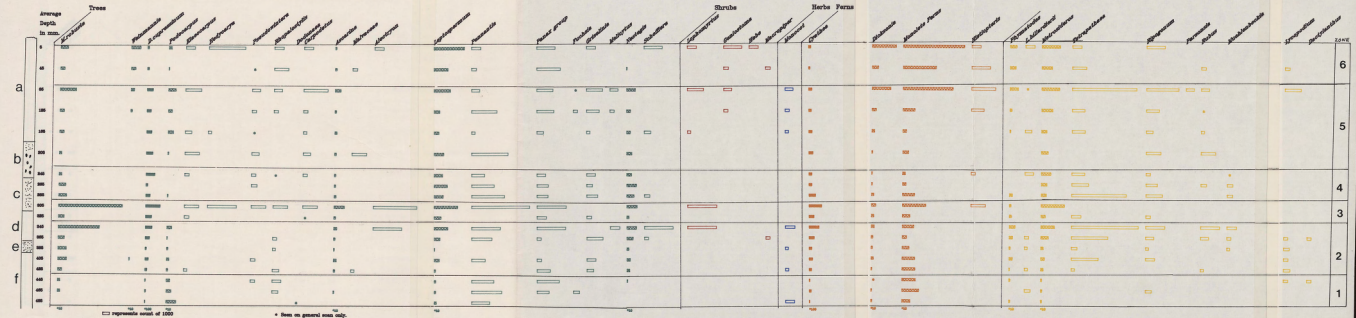
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File: <USER>S90472LEES-POLLARD'S FARM.PLOT / Last Mod.: 87-02-25 19:43:40 Wed





USER: S90472LEES / Proj: 88 / Plotted 19 Mar 87 18:05:38 Thu / Frame no.: 1
 FILE: <DIR>S90472LEES-POLLEN-POLLFOR.PLOT / Last mod.: 87-02-25 18:02:04 Wed

27B POLLARD'S FARM FOREST
 Absolute Count - Grains per cm²
 Map reference: NMS 1 N118 414807 A2.91m



THE POLYMERIZATION OF

STYRENE IN THE PRESENCE OF

PEROXYACETIC ACID

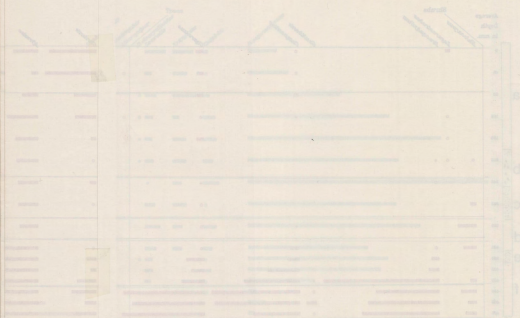
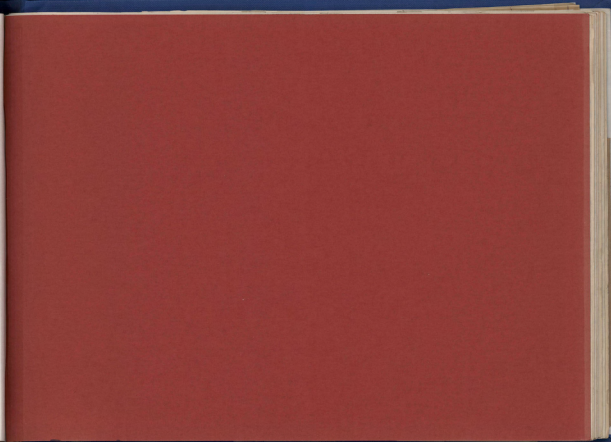


Fig. 1. Polymerization of styrene in the presence of peroxyacetic acid.



SEA MOTUNUI SWAMP

Absolute Core - Section per core

See reference - NZMS 1 N109/844944 at 30m

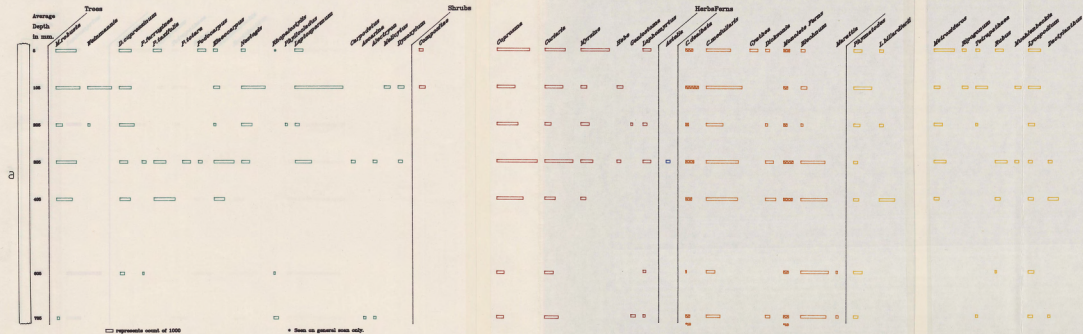
Core Depth (m)	Depth (cm)	Description	Notes
0-10	0-10	Light grey silty clay	
10-20	10-20	MOTUNUI SWAMP CORE 83/12	
20-30	20-30	NZMS 1 N109/844944 at 30m	
30-40	30-40	Light grey silty clay	
40-50	40-50	Light grey silty clay	
50-60	50-60	Light grey silty clay	
60-70	60-70	Light grey silty clay	
70-80	70-80	Light grey silty clay	
80-90	80-90	Light grey silty clay	
90-100	90-100	Light grey silty clay	

Date: 1983/12/12 / Core: 83/12 / Depth: 0-100m / Core: 83/12 / Date: 1983/12/12

100 approximately equal to 1000 cm

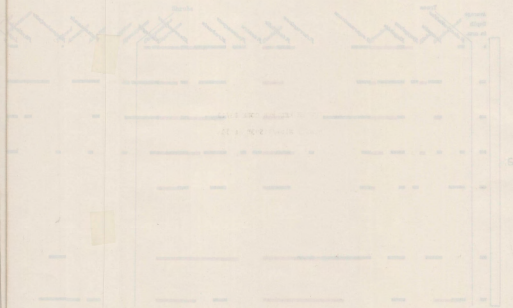
27B MOTUNUI FOREST
Absolute Count - Grains per cm²

Map reference: NIMS 1 N109 844844 AH.30m



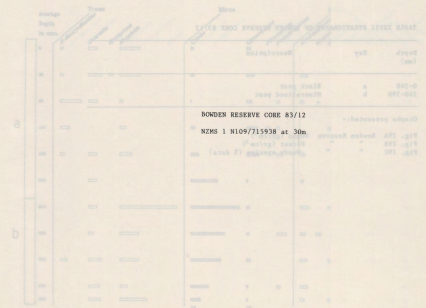
USNR: 550472LES / Proj: 88 / Plotted 02 Mar 87 13:22:52 Mon / Frame no. 1
 P. 11: 400003-950472L.FR32POLL.LHCHMOTFORP.PLOT / Lens used: 87-02-25. 10. 20. 50. 100. 200. 500. 1000.

80C MONTANA WOODY SPA
 Percentage of Total Volume



80A BOWDEN RESERVE SWAMP

Absolute Count - Grains per cm³



DATE: 10/10/88 / PROJ: 88 / PLANTED 17 Sep 87 10:00 AM / FROM: R. J. ...

TABLE XXVII STRATIGRAPHY OF BOWDEN RESERVE CORE 83/12

Depth (mm)	Key	Description
0-240	a	Black peat
240-390	b	Mineralised peat

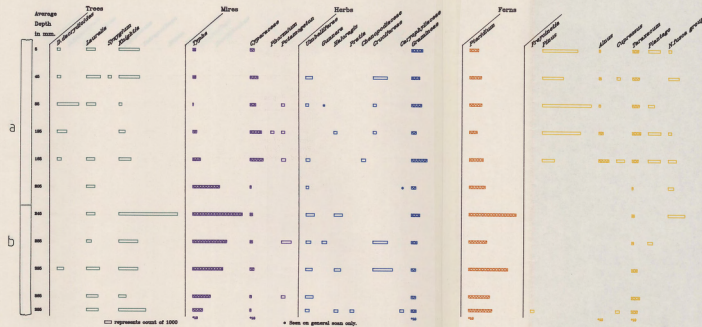
Graphs presented:-

- Fig. 29A Bowden Reserve Swamp (gr/cm^2)
- Fig. 29B " " Forest (gr/cm^2)
- Fig. 29C " " Woody species (% data)

User: 880472LEB / Proj: 88 / Plotted 17 Mar 87 16:57:20 Tue / Frame no. 1
 Plot: <ORIGIN>880472LEB<POLLLEN-RICHNESS>.PLOT / Last mod.: 87-02-25, 16:52:52 Wed

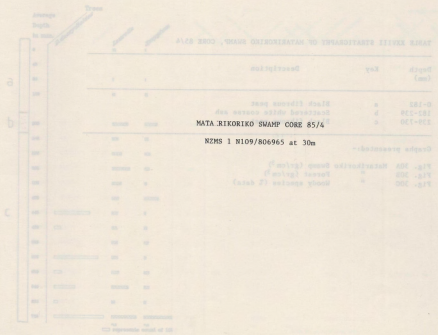
29A BOWDEN RESERVE SWAMP
Absolute Count - Grains per cm^2

Map reference: NZMS 1 N109 715000 AH-50m



30A MATARIKORIKO

Absolute Count - Grade 1



30C BOWEN RESERVE WOODY SPA...

Percentage of Total Lignin



with the 1980-1981 - 1982 - 1983 season

30C MATANGKAI SWAMP COMMUNITY

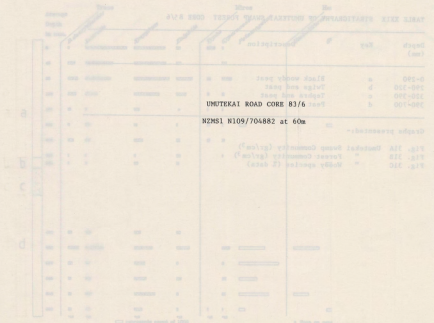
Percentage of Total Volume



31A UMUTEKAI SWAMP COMMUNITY

Shade Class - Order per cm²

Big volume: 10



UMUTEKAI ROAD CORE 83/6

NZMS1 N109/704882 at 60m

112 112 Umutekai Swamp Community (1970/71)
 112 112 Umutekai Swamp Community (1970/71)
 112 112 Umutekai Swamp Community (1970/71)

TABLE XXIX STRATIGRAPHY OF UMUTEKAI SWAMP FOREST CORE 85/6

Depth (mm)	Key	Description
0-290	a	Black woody peat
290-320	b	Twigs and peat
320-390	c	Tephra and peat
390-700	d	Peat

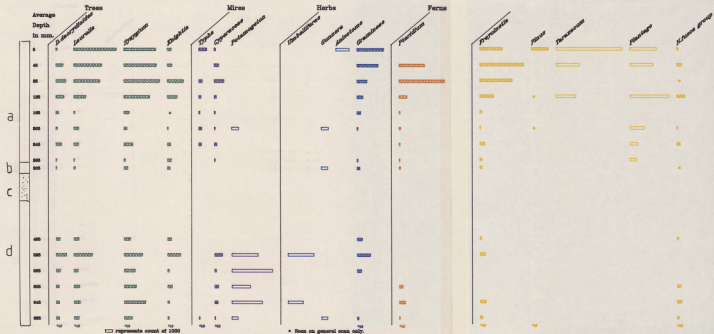
Graphs presented:-

- Fig. 31A Umutekai Swamp Community (gr/cm³)
 Fig. 31B " Forest Community (gr/cm³)
 Fig. 31C " Woody species (% data)

UMR: S90472LEES / Proj: SS / Plotted 17 Mar 87 18:34:42 Tue / Frame no. 1
 File: <DIR>S90472LEES-POLLEN-UMUTEKAI.PLOT / Last mod.: 87-02-25.20:18:48:Wed

31A UMUTEKAI SWAMP COMMUNITY
 Absolute Count - Grains per cm³

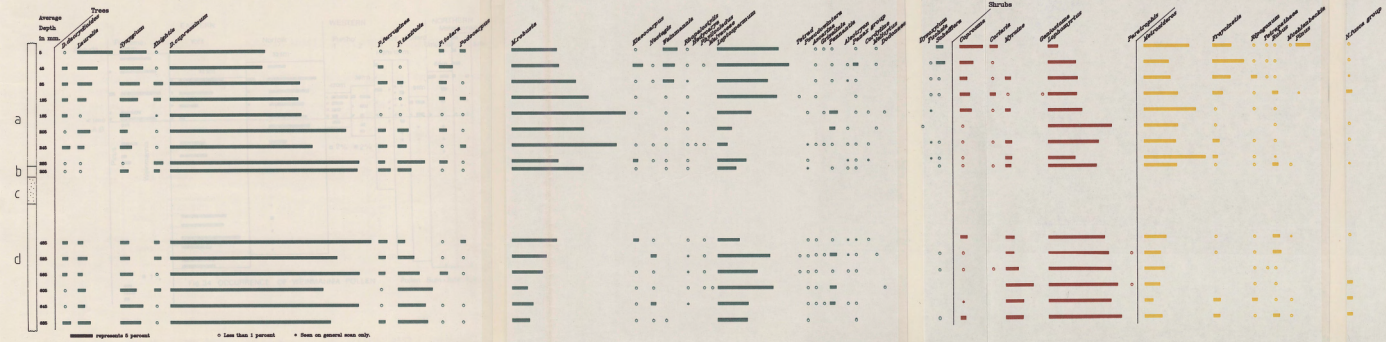
Map reference: NZMS 1 N109 704888 AS.80m



Users: SSO472LES / Proj: 98 / Plotted 17 Mar 87 18:59:36 Tue / Frame no. 1
 File: <USER>SSO472LES-POLLEN-UMUMOODP.PLOT / Last mod.: 87-03-03, 08:38:48 Tue

31C UMUTEKAI WOODY SPP.
 Percentage of Pollen

Map reference: NMS 1 N109 70488 AII.80m



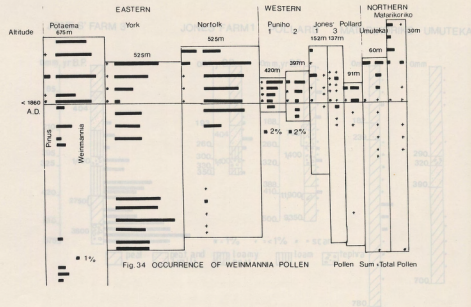
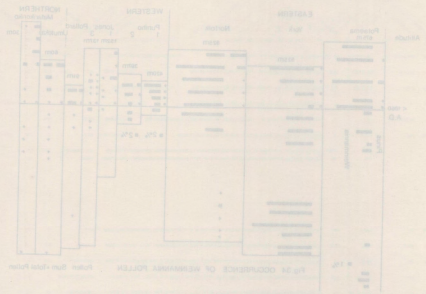


FIG. 35 ASCARINA POLLEN WESTERN AND NORTHERN SITES



JONE S' FARM 3 JONES' FARM 1 POLLARD MATARIKORIKO UMUTEKA

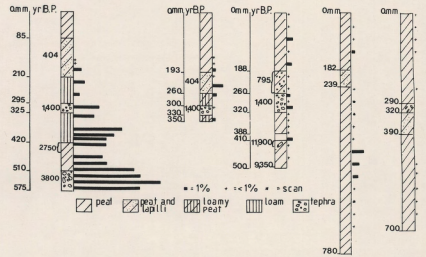
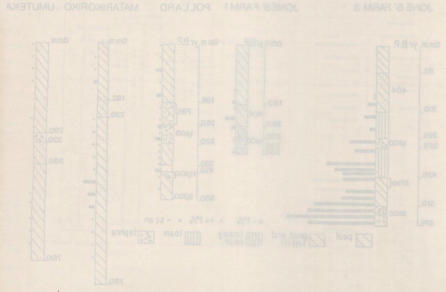


FIG. 35 ASCARINA POLLEN WESTERN AND NORTHERN SITES

FIG. 38 ASCARINIA POLLEN WESTERN AND NORTHERN SITES



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BY

C MLEES

LATE HOLOCENE CHANGES IN THE VEGETATION OF
WESTERN TARANAKI INVESTIGATED BY
SOIL PALYNOLOGY.

VOLUME II











FIG. 36

C. M. LEES

THE STUDY AREA, WESTERN TARANAKI, NORTH ISLAND, NEW ZEALAND.

Source NZMS N108,109,118,119

LEGEND

-  river course
-  railway
-  marsh
-  plantation
-  drain
-  power line
-  indigenous vegetation
-  MUTEKAI
-  golden sites
-  Maori sites





C. M. LEES

1987