069576

ASSOCIATED MINERALS CONSOLIDATED LIMITED

ENEABBA OPERATIONS

VISIT TO

ENEABBA OPERATIONS

ON

THURSDAY 27TH NOVEMBER, 1986

BY

THE MINERAL SANDS AGREEMENT, REHABILITATION COORDINATING COMMITTEE

MR. D. GARDNER	CHAIRMAN DEPT. OF RESOURCES DEVELOPMENT
MR. J. QUILTY	DEPT. OF RESOURCES DEVELOPMENT
MR. P. KNIGHT	SECRETARY DEPT. OF RESOURCES DEVELOPMENT
MR. J. RICHES	DEPARTMENT OF AGRICULTURE
MR. W. CARR	DEPT. OF CONSERVATION & ENVIRONMENT
MR. A. BRADLEY	MINES DEPARTMENT
MR. A. HOPKINS	DEPT. OF CONSERVATION & LAND MANAGEMENT
MR. M. PRIDHAM	DEPARTMENT OF AGRICULTURE (GERALDTON)

C O N T E N T S

1. PROGRAMME

2. PRECIS OF ENEABBA OPERATIONS

3. LEASE PLAN

4. ROUTE FOR VISIT

5. AERIAL PHOTO

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P R O G R A M M E

10.00AM	ARRIVAL MORNING TEA AT OFFICE BRIEFING BY MANAGEMENT
10.45AM	LEAVE FOR NURSERY
11.45AM	LEAVE FOR BANKSIA HOUSE
12.00NOON	LUNCH
12.45PM	LEAVE FOR SITE INSPECTION
1.00PM	1979 REHAB. IN S.W. CORNER OF SOUTHERN DIVISION REHAB.
1.25PM	VIEW TRUCK HOPPER
1.35PM	85 G REHAB IN SOUTHERN DIVISION
2.00PM	1982 REHAB IN NORTHERN DIVISION
2.30PM	WHITE PIT 1985 REHAB. PLUS MONITORING TECHNIQUES
3.00PM	RETURN TO OFFICE

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HISTORICAL DEVELOPMENT AT ENEABBA

The Eneabba deposit is about 300 kilometers north of Perth and 30 kilometers inland. Eneabba has hot, dry summers and warm, wet winters. The yearly rainfall of around 530mm occurs mostly during the winter period resulting from cold fronts and also the occasional summer thunderstorm.

Jennings Mining was the first company to open up operations, on the north end of the field, followed by Western Titanium Ltd., and Allied Eneabba Ltd. to the South.

Associated Minerals Consolidated took over Western Titanium's operation in 1978 and later purchased the Jennings deposits. The AMC Mine was commissioned in June 1976 and has produced consistently since that date.

In 1986 A.M.C's parent company, Renison Goldfields Consolidated Ltd., took over Allied Eneabba's operation and is now the largest mineral sand producer in the world.

The workforce of about 250 is accommodated in two Single Men's Quarters and 150 houses, 60 of which are situated on the coast at Leeman.

A.M.C. operates mining, concentrating and processing facilities at Eneabba. Some mixed concentrate is dried and railed to a second processing plant at Narngulu near Geraldton.

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GEOLOGY OF THE DEPOSIT

The deposit in the Eneabba area, variously estimated from 30-40,000,000 tonnes of heavy mineral is believed to have been formed in the early Pleistoncene geological period, between 1 million and 350,000 years ago.

The mineral sands deposited along an ancient coastline at the base of the Gingin scarp, a prominent erosion cliff within the Perth sedimentary basin. The origin of the minerals was the hinterland of sediments, deposited during the Mesozoic era (100-200 million years ago).

Deposition was assisted by the predominant north-south long-shore drift and a substantial, northward facing bay - similar in configuration to the present day Geographe Bay which promoted the formation of the Capel mineral sands deposit.

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MINING

Mining in the North Section is carried out using self-elevating and open bowl scrapers. When haulage distances increase beyond a practical and economic limit the mining plant is transported to the next ore zone. This process necessitates a two week shutdown about every two years.

Mining in the South Section is achieved with self elevating scrapers delivering to a central truck hopper. Fifty tonne trucks then haul the ore to the South Concentrator.

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CONCENTRATING

1. NORTH CONCENTRATOR

Concentration of the H.M. in the ore occurs by a series of screening, desliming and spiral separation stages. The ore is upgraded from 8 to 10% H.M. in the feed to plus 90% H.M. in the concentrate.

The concentrating process begins with feed preparation. Ore from the feed hopper is fed onto a dry vibrating grizzly at a controlled rate and the coarse oversize (plus 4") is removed. Double deck vibrating screens remove the plus 12mm fraction before desliming by a cluster of Krebbs 26" cyclones. The overflow from the cyclones is treated in a Dorr Oliver Hi Rate thickener where the slimes are densified to 50% solids and process water is recovered via the thickener overflow. The cyclone underflow is further sized at 2mm in a trommel screen. The oversize from all screening stages is rejected as waste product. Trommel undersize is pumped to a 1000 tonne storage tank before the Spiral Plant.

Feed at a specified rate and density is drawn from the storage tank and fed onto 144 triple start Vickers Rougher Spirals. Concentrate from the roughers is further upgraded on MDL HG5 Cleaner and Recleaner spirals. A mids cut is taken off the Rougher spirals and fed to a scavenger circuit consisting of 72 triple start Vickers Spirals. Tails off the Roughers and scavengers are final and are pumped back to the pits. Mids are taken from the Scavs, Cleaners and Recleaners and recirculated over themselves.

The final concentrate product is pumped via five booster stations to the treatment plant storage tank or stockpile depending on treatment plant throughput. Plant feed rate is presently restricted to 1100 tph with a Rougher Spiral capacity of 800 tph. Concentrate production rate varies from 70 t 100 tph of product dependent of feed grade.

2. SOUTH CONCENTRATOR

Essentially, the South Concentrator uses the same techniques to separate the Heavy Minerals from the ore. However, additional scrubbing stages ensures good liberation of fines from the clay bound mineral. All feed is given a single scrubbing pass prior to desliming by 2 clusters of 15" cyclones. An additional scrubbing phase is applied to the plus 1.5mm fraction rejected from the vibrating screen.

Reichart Cones are the major gravity separators with Reichart MK 11B Spirals providing the finishing stage. Ore is upgraded from 11% Heavy Mineral to plus 97% Heavy Mineral. The Concentrate is dried on Site using a horizontal belt filter and fluid bed dryer. Daily trains of 1590 tonnes transport the final product to the Nargulu Dry Mill for further processing.

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P R O C E S S I N G

The Processing Plant separates the Heavy Mineral Concentrate into its component minerals which are:-

ILMENITE

ZIRCON

RUTILE

MONAZITE

Gangue minerals such as Quartz, Kyanite and Staurolite are produced as a tailing.

Raw Concentrate is attritioned at high density to remove clay coatings from the grain surfaces in preparation for electrostatic preparation. The clays and fine Quartz are removed by cyclones and hydrosizers. The clean Heavy Mineral is pumped to a drying shed, where drainage to approximately 4% moisture takes place within 48 hours.

Material is then dried in a two stage fluid bed dryer-heater unit and fed to the Primary Dry circuit at 170°C. Conductors are separated from Non Conductors and Ilmenite removed from Rutile by dry magnetic separation.

Non Conductors are retreated over spirals and wet tables to separa Kyanite and Staurolite from the Zircon/Monazite mixture. After drying, a Monazite Concentrate is recovered by dry magnets and fed to the Monazite Plant where it is upgraded to a final product by screening, magnetic separation and wet and dry gravity separation. The Zircon rich stream is air-tabled to give a final Zircon produc

All product streams are automatically sampled and analysed, both b grain counting and XRF. Laboratory facilities used include AAS, XRF, and heavy liquid separation.

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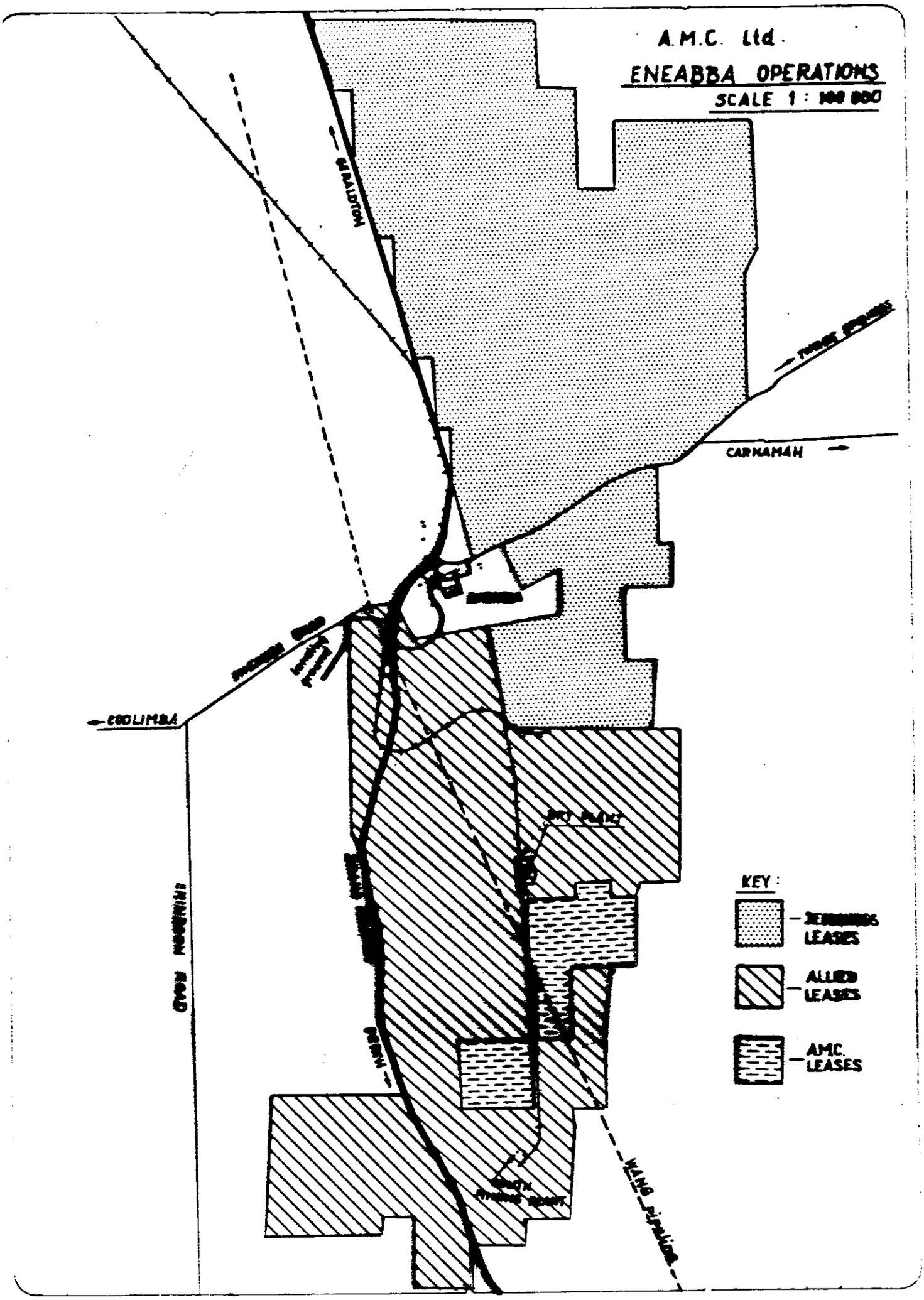
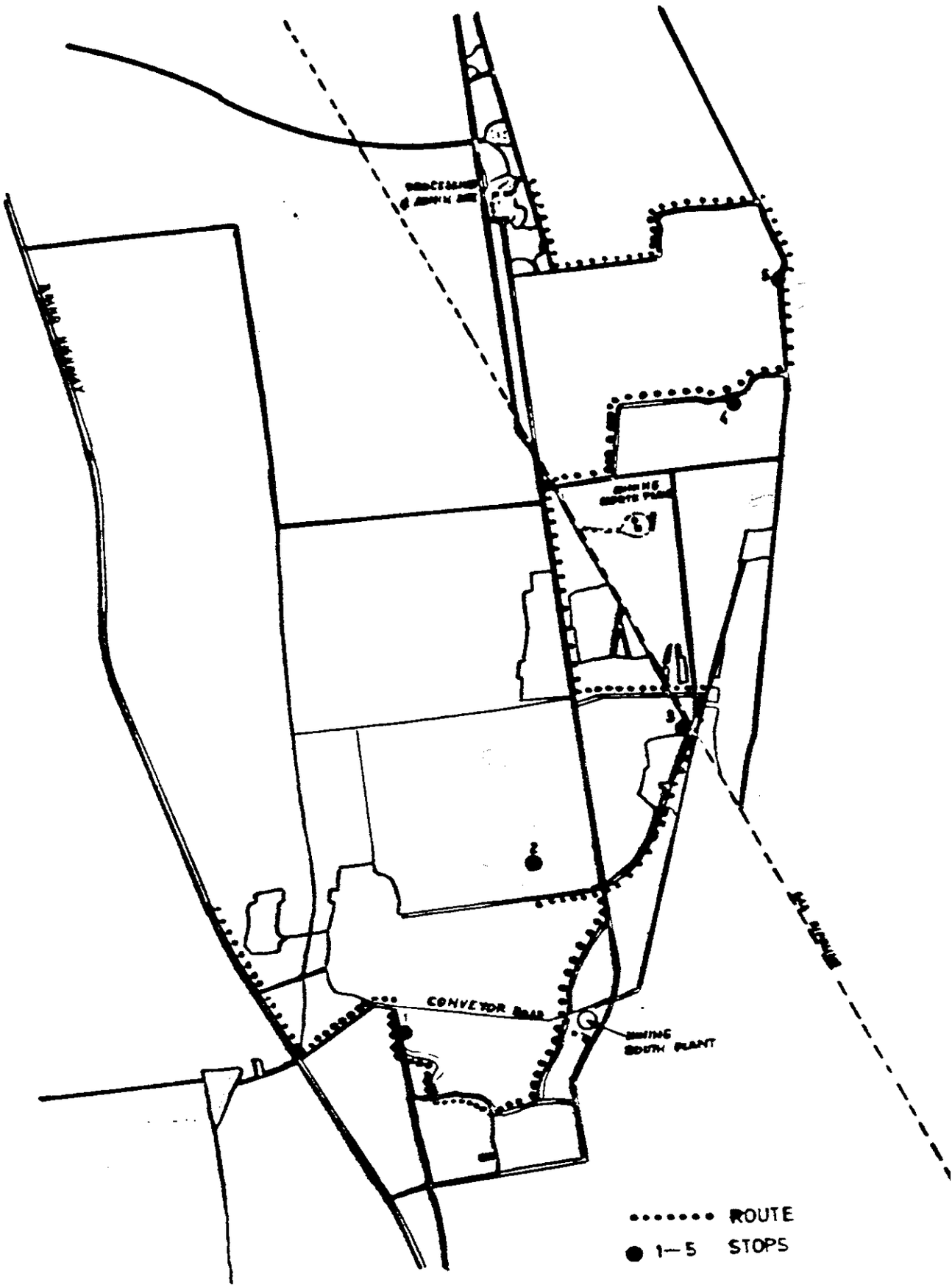
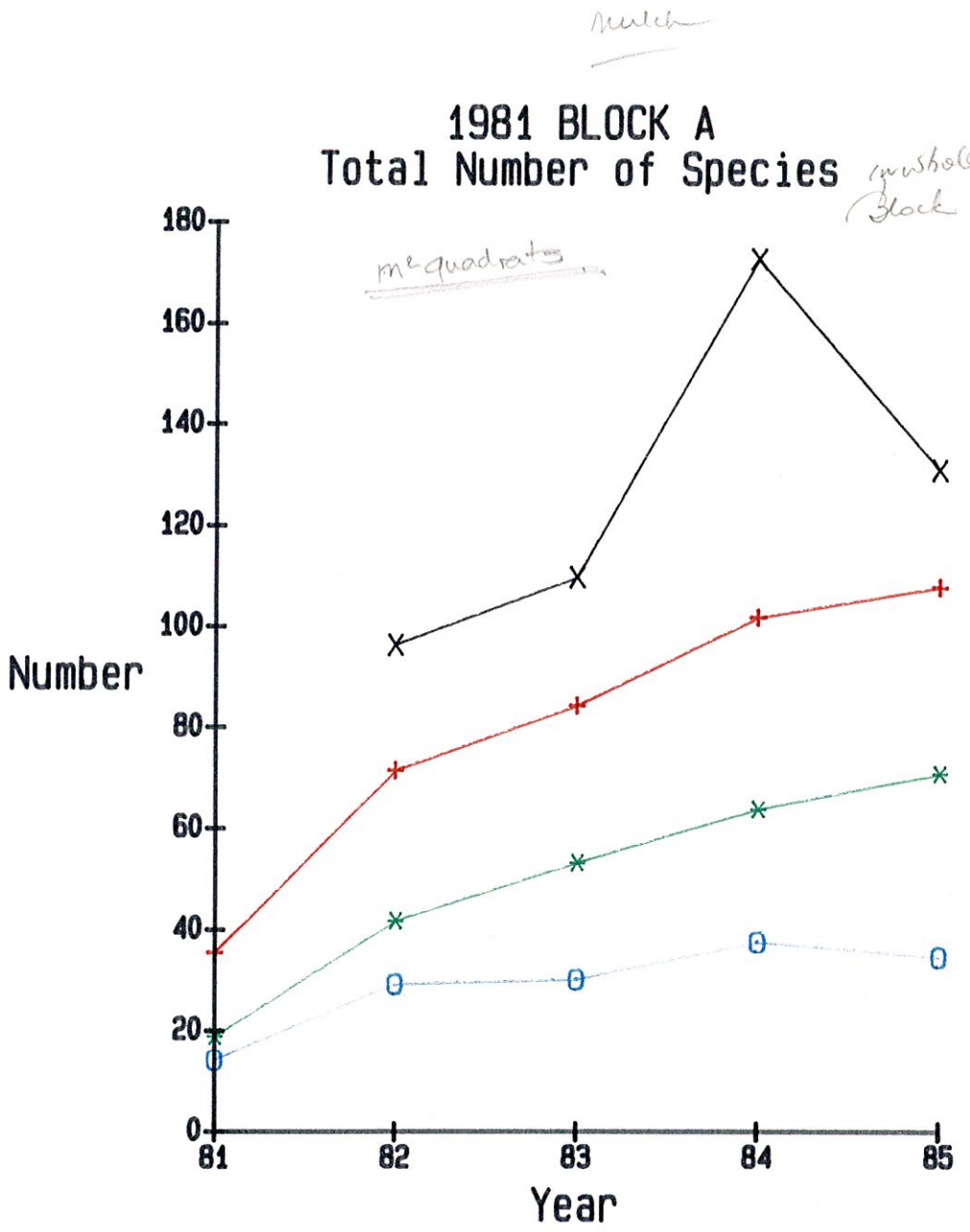

A.M.C. Ltd.
ENEABBA OPERATIONS
SCALE 1 : 100 000
CARNAMAH
COOLIMBA
KEY :
ALLIED LEASES
AMC LEASES

SCHEMATIC
ROUTE FOR E.P.A AND MSAROC VISITS

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Total Number of Species
Number
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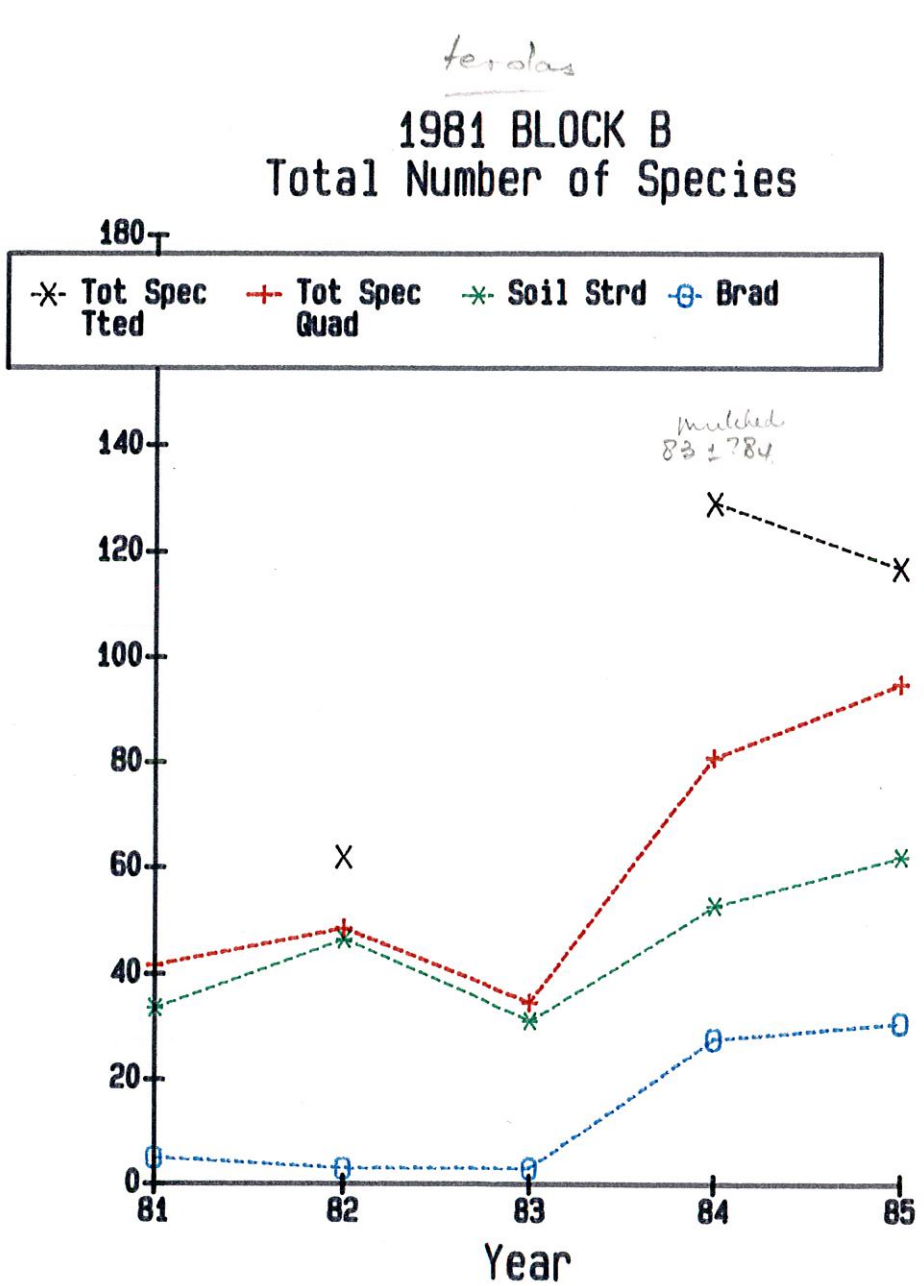
160
140
120
100
80
60
40
20
0
81
82
83
84
85
Year


1981 BLOCK B
Total Number of Species
Tot Spec Tted
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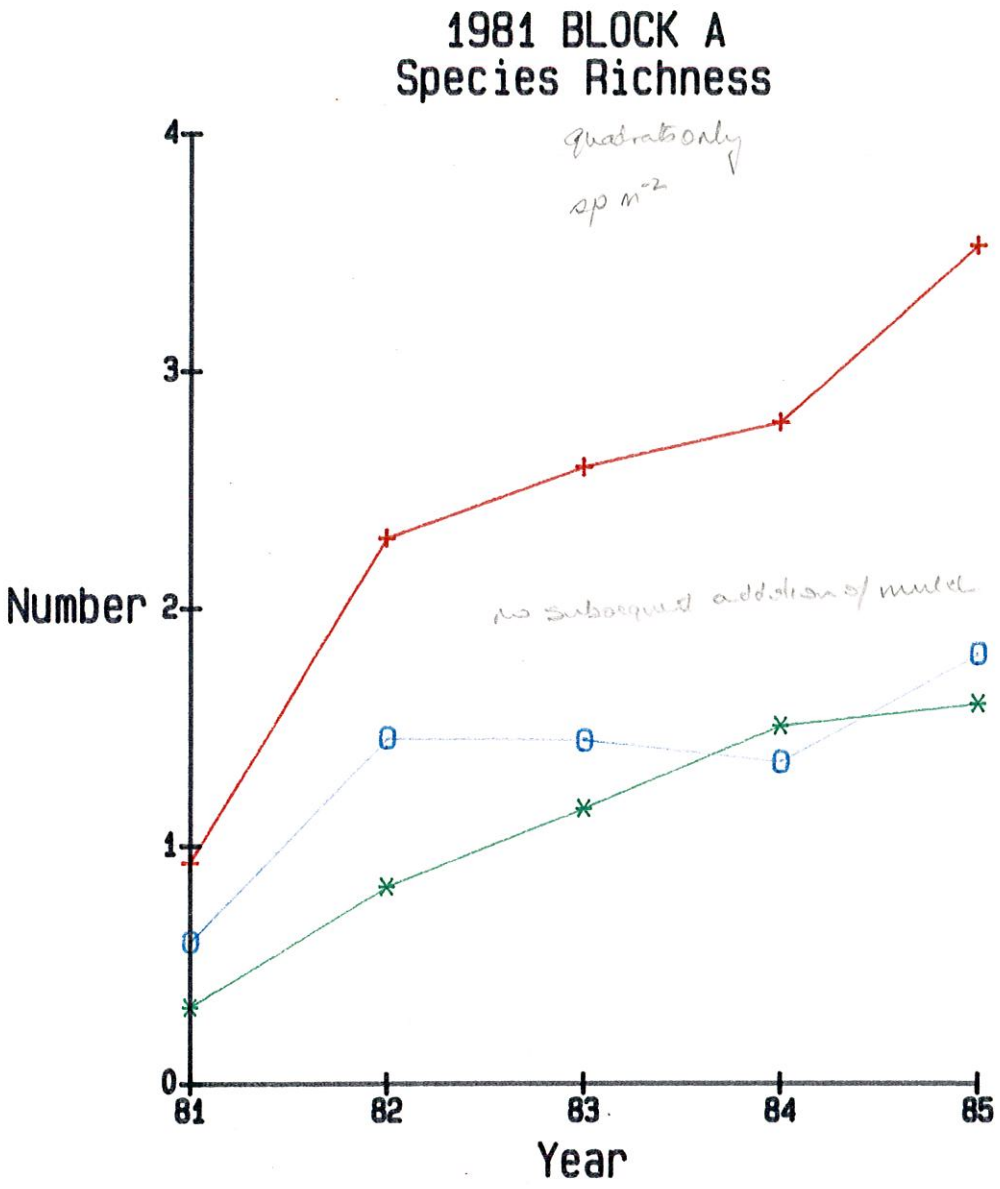
1981 BLOCK A
Species Richness
quadrats only
sp m⁻²
no subsequent additions/ removals
Number
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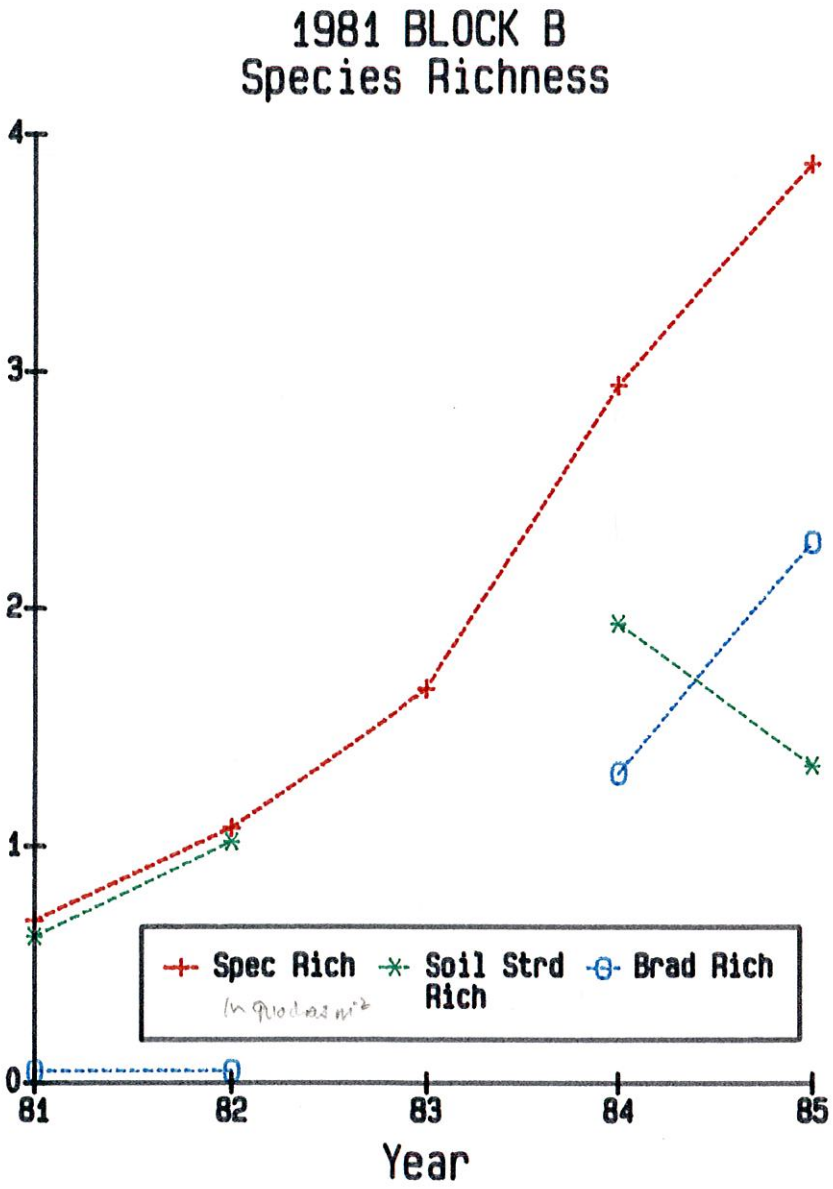
3
4
81
82
83
84
85
Year


1981 BLOCK B
Species Richness
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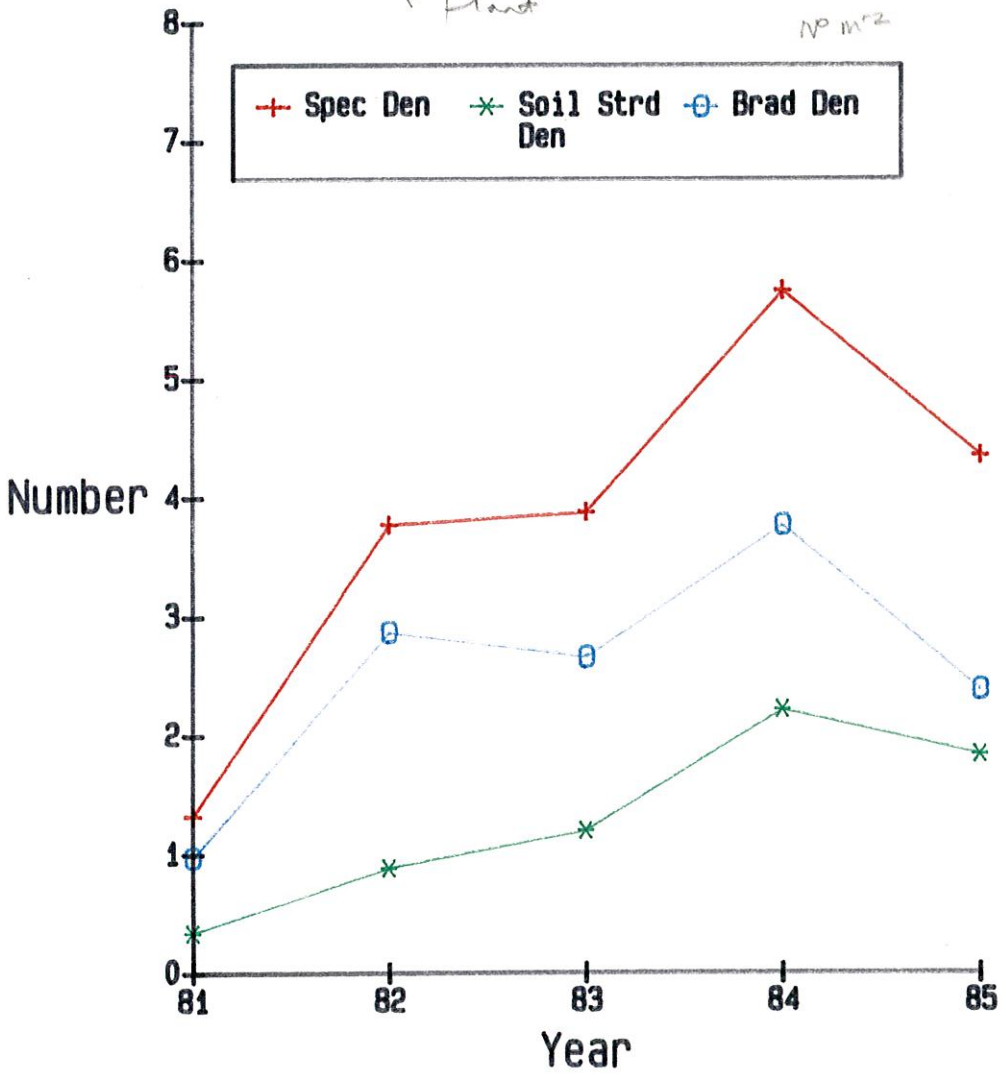
Year
Spec Rich
Soil Strd Rich
Brad Rich
in quadrats m⁻²


1981 BLOCK A
Species Density
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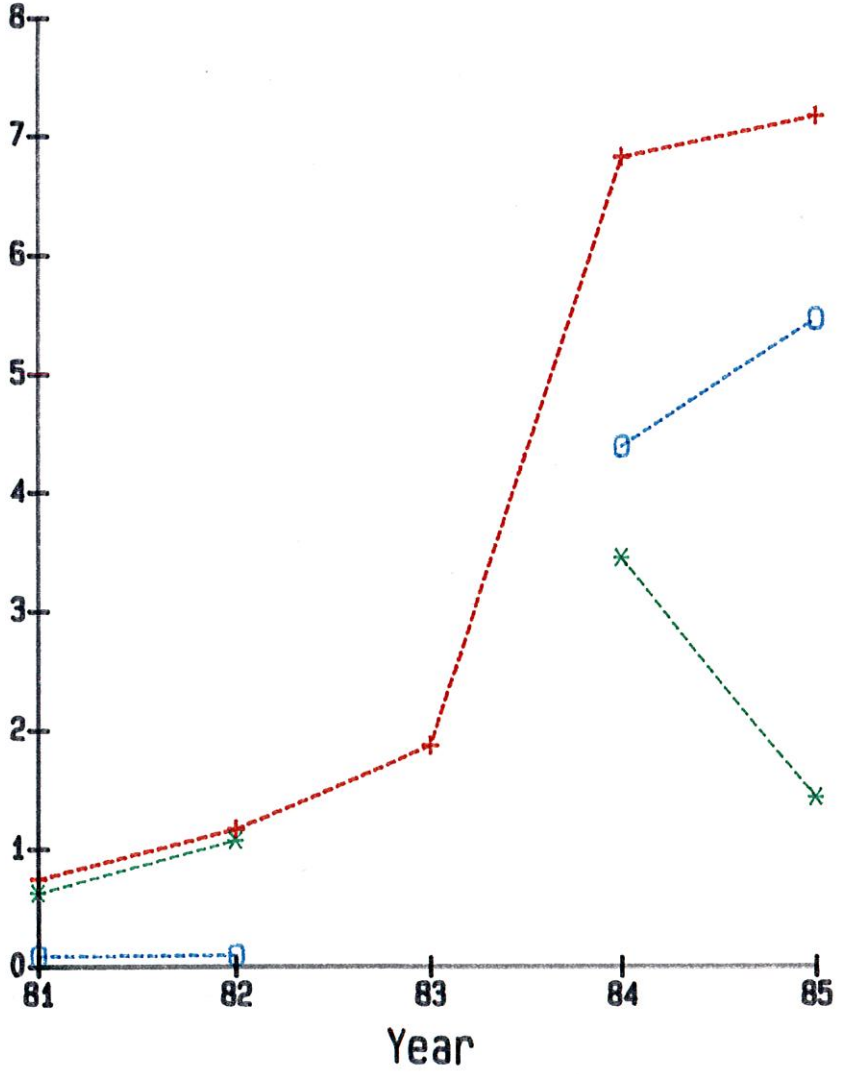
1981 BLOCK B
Species Density
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WILD 15/4 UAG
Nr.13021 152.91
6793
N ABBA H.L.
6792-6794
RUN 1
24.10.86
U.T.
N
7,620 m
A.S.L.
Kevron Aerial Surveys
Perth, W.A.