# FORAMINIFERAL ANALYSIS OF SUNFISH-2, GIPPSLAND BASIN

by

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PART-1

INTERPRETATIVE DATA

## INTRODUCTION

The datable marine sediments in Sunfish-2 range in age from Early Miocene (Zone G) to Late Miocene/earliest Pliocene (Zone Bl). The top of the Latrobe Group occurs at 1615.5m and is a significant unconformity (Early-Mid Eocene sediments overlain by Early Miocene). Late Miocene/Early Pliocene age sediments (Zones C to Bl) are well developed in the well, reaching a thickness of 318m.

Fifty-six sidewall cores were processed and examined.

## GEOLOGICAL COMMENTS

### (a) Top of the Latrobe Group

The boundary between the Latrobe Group and the Lakes Entrance Formation in Sunfish-2 is an unconformity surface. It is placed at the log break which occurs at 1615.5m.

The 30MA unconformity documented by Vail *et al*, usually sits within the basal part of the Lakes Entrance Formation, separating sediments of Early Miocene/Late Oligocene age from carbonates of earliest Oligocene/Late Eocene age. In this case the boundary between the Latrobe Group and the Lakes Entrance Formation is not an unconformity but a condensed interval represented by the greensands of the Gurnard Formation.

In Sunfish-2, however, the 30 MA unconformity has apparently cut down into and removed both the Gurnard Formation and the upper part of the Latrobe Group. This results in the Early Miocene zone G sediment immediately overlying the *P. asperopolus* age (Early Eocene) sediment.

### (b) Comparison with Sunfish-1

Comparisons between Sunfish-1 and 2 are almost impossible due to (1) poor sampling in Sunfish-1 and (2) the sparce, poorly preserved faunas obtained.

TABLE 1 - GEOLOGICAL SUMMARY

| AGE | FORMATION | ZONATION |
|---|---|---|
| | SEA FLOOR | |
| PLEISTOCENE | | |
| | | ? |
| PLIOCENE | | B1 |
| | | (950.5-1160.7) |
| | | B2 |
| | GIPPSLAND | |
| LATE | LIMESTONE | (1199.0-1234.0) |
| MIOCENE | | |
| | | C |
| | | (1251.0) |
| | | D1 |
| | | (1268.0-1409.8) |
| MID | | D2 |
| MIOCENE | 1457.5m | (1425.2-1477.7) |
| | LAKES | |
| | ENTRANCE | E2 |
| | FORMATION | (1514.5) |
| | | F |
| | | (1530.0-1590.0) |
| EARLY | | G |
| MIOCENE | | (1598.8-1613.9) |
| | 1615.5m | |
| EARLY/MID | LATROBE | (*P. asperopolus* |
| EOCENE | GROUP | (1615.7-1634.6) |
| | T.D. 2647.5m | |

TABLE 2 - SUNFISH-2 INTERPRETATIVE DATA

| SIDEWALL CORE NO. | DEPTH (M) | MICROFOSSIL YIELD | MICROFOSSIL PRESERVATION | PLANKTON DIVERSITY | ZONE | AGE |
|---|---|---|---|---|---|---|
| 141 | 810.0 | V. Low | Poor | Moderate | ? | Indeterminate |
| 140 | 821.0 | Moderate | Poor | Moderate | ? | Indeterminate |
| 139 | 831.0 | Moderate | Poor | Low | ? | Indeterminate |
| 138 | 840.1 | Low | Poor | Low | ? | Indeterminate |
| 137 | 850.5 | Low | V. Poor | Low | ? | Indeterminate |
| 136 | 860.7 | V. Low | V. Poor | Low | ? | Indeterminate |
| 135 | 870.5 | V. Low | V. Poor | Low | ? | Indeterminate |
| 134 | 881.2 | Barren | - | - | ? | Indeterminate |
| 133 | 890.6 | V. Low | V. Poor | Low | ? | Indeterminate |
| 132 | 903.0 | Low | V. Poor | Low | ? | Indeterminate |
| 131 | 925.7 | Low | V. Poor | Low | ? | Indeterminate |
| 130 | 950.3 | Moderate | Poor | Moderate | Bl | Late Miocene/Early Pliocene |
| 129 | 973.3 | Moderate | Moderate | Moderate | Bl | Late Miocene/Early Pliocene |
| 128 | 1007.4 | Moderate | Moderate | Poor/Mod | Bl | Late Miocene/Early Pliocene |
| 127 | 1039.1 | High | Good | High | Bl | Late Miocene/Early Pliocene |
| 126 | 1059.2 | High | Good | Moderate | Bl | Late Miocene/Early Pliocene |
| 125 | 1089.3 | Moderate | V. Poor | High | Bl | Late Miocene/Early Pliocene |
| 124 | 1118.3 | Moderate | V. Poor | Moderate | Bl | Late Miocene/Early Pliocene |
| 123 | 1139.3 | Moderate | Poor | High | Bl | Late Miocene/Early Pliocene |

| SIDEWALL CORE NO. | DEPTH (M) | MICROFOSSIL YIELD | MICROFOSSIL PRESERVATION | PLANKTON DIVERSITY | ZONE | AGE |
|---|---|---|---|---|---|---|
| 81 | 1160.7 | Moderate | V. Poor | High | B1 | Late Miocene/Early Pliocene |
| 79 | 1199.0 | High | Good | Moderate | B2 | Late Miocene |
| 78 | 1216.4 | Moderate | V. Poor | High | B2 | Late Miocene |
| 77 | 1234.0 | Moderate | Poor | High | B2 | Late Miocene |
| 76 | 1251.0 | Moderate | Poor | High | C | Late Miocene |
| 75 | 1268.0 | Moderate | Poor | High | D1 | Mid. Miocene |
| 74 | 1283.0 | Low | Poor | Moderate | D1 | Mid. Miocene |
| 73 | 1300.0 | Moderate | Poor | High | D1 | Mid. Miocene |
| 72 | 1314.9 | Low | Poor | Moderate | D1 | Mid. Miocene |
| 71 | 1330.2 | High | Good | High | D1 | Mid. Miocene |
| 70 | 1345.2 | High | Moderate | High | D1 | Mid. Miocene |
| 68 | 1369.9 | Moderate | Moderate | Moderate | D1 | Mid. Miocene |
| 122 | 1409.8 | Moderate | Good | High | D1 | Mid. Miocene |
| 121 | 1425/2 | Moderate | Good | High | D2 | Mid. Miocene |
| 120 | 1443..7 | Moderate | Good | High | D2 | Mid. Miocene |
| 119 | 1460.4 | High | Good | High | D2 | Mid. Miocene |
| 102 | 1477.7 | High | Moderate | Moderate | D2 | Mid. Miocene |
| 100 | 1514.5 | High | Moderate | High | D2 | Mid. Miocene |

| SIDEWALL CORE NO. | DEPTH (M) | MICROFOSSIL YIELD | MICROFOSSIL PRESERVATION | PLANKTON DIVERSITY | ZONE | AGE |
|---|---|---|---|---|---|---|
| 99 | 1530.0 | Moderate | Very Poor | Moderate | F | Early Miocene |
| 98 | 1500.4 | Low | Poor | Moderate | ? | Indeterminate |
| 97 | 1560.6 | Low | Poor | Moderate | F | Early Miocene |
| 96 | 1568.7 | Moderate | Poor | High | F | Early Miocene |
| 95 | 1581.1 | Moderate | Poor | Moderate | F | Early Miocene |
| 94 | 1590.0 | Moderate | Moderate | High | F | Early Miocene |
| 93 | 1598.8 | Moderate | Moderate | Moderate | G | Early Miocene |
| 92 | 1602.7 | Moderate | Moderate | Moderate | G | Early Miocene |
| 91 | 1607.5 | High | Moderate | Moderate | G | Early Miocene |
| 118 | 1608.8 | Moderate | Poor | Moderate | G | Early Miocene |
| 90 | 1610.0 | Moderate | Moderate | Moderate | G | Early Miocene |
| 88 | 1613.9 | Low | Poor | Low | G | Early Miocene |
| 87 | 1615.7 | Barren | - | - | ? | Indeterminate |
| 85 | 1618.8 | Barren | - | - | ? | Indeterminate |
| 117 | 1683.8 | Barren | - | - | ? | Indeterminate |
| 116 | 1699.6 | Barren | - | - | ? | Indeterminate |
| 114 | 1748.2 | Barren | - | - | ? | Indeterminate |
| 112 | 1784.2 | Barren | - | - | ? | Indeterminate |

BIOSTRATIGRAPHY

ZONE G: EARLY MIOCENE (1613.9m to 1598.8m)

The appearance of Globigerinoides quadrilobatus trilobus without Globigerinoides sicanus in the lowest sample from the Lakes Entrance Formation is indicative of an Early Miocene, Zone G age.

The assemblage obtained from this zone is fairly sparce with diversity increasing upsection with the addition of various species of Globorotalia notably mayeri and miozea.

Reworking of the Late Eocene-Early Oligocene species, Globigerina linaperta, and Globorotalia postcretacea occurs in the basal three samples from the zone SWC's 88, 90, 118, at 1613m, 1610.0m and 1608.8m respectively.

ZONE F: EARLY MIOCENE (1590.0m to 1530.0m)

The base of Zone F is marked by (a) the first appearance, upsection of Globigerinoides sicanus and (b) a sharp increase in species diversity. Although this relatively high level of species diversity decreases upsection it is always higher than in the preceeding zone. Coincident with this slight decrease in diversity is a rapid deterioration in the quality of preservation.

ZONE E2: MIDDLE MIOCENE 1514.5m

The presence of Praeorbulina glomerosa in SWC 100 at 1514.5m without either form of Oerbulina indicates a zone E2 age for the sample.

ZONE C: LATE MIOCENE 1251.0m

A single sample is assigned to Zone C on the basis of its containing Globorotalia miotumida miotumida without Globorotalia acostaensis. This sample may be from near the top of the zone since some specimens of Globorotalia mayenri are very close to the zone species.

ZONE B2: LATE MIOCENE 1234.0m to 1199.0m

The first appearance of Globorotalia acostaensis in SWC 77 at 1234.0m marks the base of Zone B2. Plankton diversity is moderate to high throughout the zone especially the globorotalids.

Reworking of Globorotalia mayeri occurs in the lowest sample.

ZONE B1: LATE MIOCENE/EARLY PLIOCENE 1160.7m to 950.5m

The appearance of Globorotalia miotumida conomiozea ss in sidewall core 81 at 1160.7m is regarded as the base of Zone B1. This zone attains a considerable thickness in Sunfish-2. Preservation and planktonic species diversity is variable but generally both deteriorate upsection. Globorotalia miotumida miotumida is reworked into the base of the zone.

The remaining sidewall cores (131 to 141; 925.7m to 810.0m respectively) contain no identifiable index species due to appalling preservation.

# MICROPALEONTOLOGICAL DATA SHEET

BASIN: GIPPSLAND ELEVATION: KB: 21.0 GL: 59.00

WELL NAME: SUNFISH-2 TOTAL DEPTH:

| AGE | | FORAM. ZONULES | HIGHEST DATA | | | | | LOWEST DATA | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Preferred Depth | Rtg | Alternate Depth | Rtg | Two Way Time | Preferred Depth | Rtg | Alternate Depth | Rtg | Two W Time |
| PLEISTOCENE | | $A_1$ | | | | | | | | | | |
| | | $A_2$ | | | | | | | | | | |
| PLIOCENE | | $A_3$ | | | | | | | | | | |
| | | $A_4$ | | | | | | | | | | |
| MIOCENE | LATE | $B_1$ | 950.3 | 2 | | | | 1160.7 | 1 | | | |
| | | $B_2$ | 1199.0 | 2 | | | | 1234.0 | 2 | | | |
| | MIDDLE | C | 1251.0 | 2 | | | | 1251.0 | 2 | | | |
| | | $D_1$ | 1268.0 | 1 | | | | 1409.8 | 2 | | | |
| | | $D_2$ | 1425.2 | 2 | | | | 1477.7 | 1 | | | |
| | | $E_1$ | | | | | | | | | | |
| | | $E_2$ | 1514.5 | 1 | | | | 1514.5 | 1 | | | |
| | EARLY | F | 1530.0 | 0 | | | | 1590.0 | 0 | | | |
| | | G | 1598.8 | 1 | | | | 1613.9 | 1 | | | |
| | | $H_1$ | | | | | | | | | | |
| OLIGOCENE | LATE | $H_2$ | | | | | | | | | | |
| | | $I_1$ | | | | | | | | | | |
| | | $I_2$ | | | | | | | | | | |
| | EARLY | $J_1$ | | | | | | | | | | |
| | | $J_2$ | | | | | | | | | | |
| EOCENE | | K | | | | | | | | | | |
| | | Pre-K | | | | | | | | | | |

COMMENTS: 1. The absence of Zone E1 is probably due to a sample gap.

2. Samples above 950.3m are indeterminate due to very poor preservation.

CONFIDENCE RATING:

- 0: SWC or Core - Complete assemblage (very high confidence).
- 1: SWC or Core - Almost complete assemblage (high confidence).
- 2: SWC or Core - Close to zonule change but able to interpret (low confidence).
- 3: Cuttings - Complete assemblage (low confidence).
- 4: Cuttings - Incomplete assemblage, next to uninterpretable or SWC with depth suspicion (very low confidence).

NOTE: If an entry is given a 3 or 4 confidence rating, an alternative depth with a better confidence rating should be entered, if possible. If a sample cannot be assigned to one particular zone, then no entry should be made, unless a range of zones is given where the highest possible limit will appear in one zone and the lowest possible limit in another.

DATA RECORDED BY: MICHAEL HANNAH DATE: 2/4/84

DATA REVISED BY: DATE:

PART-2 BASIC DATA

BASIC DATA

RANGE CHART

TABLE 3 - SUNFISH-2 BASIC DATA

| SIDEWALL CORE NO. | DEPTH (M) | MICROFOSSIL YIELD | MICROFOSSIL PRESERVATION | PLANKTON DIVERSITY |
|---|---|---|---|---|
| 141 | 810.0 | V. Low | Poor | Moderate |
| 140 | 821.0 | Moderate | Poor | Moderate |
| 139 | 831.0 | Moderate | Poor | Low |
| 138 | 840.1 | Low | Poor | Low |
| 137 | 850.5 | Low | V. Poor | Low |
| 136 | 860.7 | V. Low | V. Poor | Low |
| 135 | 870.5 | V. Low | V. Poor | Low |
| 134 | 881.2 | Barren | - | - |
| 133 | 890.6 | V. Low | V. Poor | Low |
| 132 | 903.0 | Low | V. Poor | Low |
| 131 | 925.7 | Low | V. Poor | Low |
| 130 | 950.3 | Moderate | Poor | Moderate |
| 129 | 973.3 | Moderate | Moderate | Moderate |
| 128 | 1007.4 | Moderate | Moderate | Poor/Mod |
| 127 | 1039.1 | High | Good | High |
| 126 | 1059.2 | High | Good | Moderate |
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|---|---|---|---|---|
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| 79 | 1199.0 | High | Good | Moderate |
| 78 | 1216.4 | Moderate | V. Poor | High |
| 77 | 1234.0 | Moderate | Poor | High |
| 76 | 1251.0 | Moderate | Poor | High |
| 75 | 1268.0 | Moderate | Poor | High |
| 74 | 1283.0 | Low | Poore | Moderate |
| 73 | 1300.0 | Moderate | Poor | High |
| 72 | 1314.9 | Low | Poor | Moderate |
| 71 | 1330.2 | High | Good | High |
| 70 | 1345.2 | High | Moderate | High |
| | 1369.9 | Moderate | Moderate | Moderate |
| 122 | 1409.8 | Moderate | Good | High |
| 121 | 1425/2 | Moderate | Good | High |
| 120 | 1443..7 | Moderate | Good | High |
| 119 | 1460.4 | High | Good | High |
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| 100 | 1514.5 | High | Moderate | High |

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| 95 | 1581.1 | Moderate | Poor | Moderate |
| 94 | 1590.0 | Moderate | Moderate | High |
| 93 | 1598.8 | Moderate | Moderate | Moderate |
| 92 | 1602.7 | Moderate | Moderate | Moderate |
| 91 | 1607.5 | High | Moderate | Moderate |
| 118 | 1608.8 | Moderate | Poor | Moderate |
| 90 | 1610.0 | Moderate | Moderate | Moderate |
| 88 | 1613.9 | Low | Poor | Low |
| 87 | 1615.7 | Barren | - | - |
| 85 | 1618.8 | Barren | - | - |
| 117 | 1683.8 | Barren | - | - |
| 116 | 1699.6 | Barren | - | - |
| 114 | 17428.2 | Barren | - | - |
| 112 | 1784.2 | Barren | - | - |