New Palynological Analyses from the Latrobe and Golden Beach Groups in Colliers Hill-1, Dutson Downs-1, Golden Beach West-1 and Merriman-1 from Onshore Gippsland Basin.

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Results of palynological analysis of 34 samples from four wells in the onshore Gippsland Basin are presented. The key findings of this study are:

- Section time equivalent to both the upper and lower parts of the Golden Beach Group extend into the onshore Gippsland Basin on the southern side of the Rosedale Monocline. The group is demonstrated to have been fully penetrated in Dutson Downs-1 where it has a thickness of ~350 metres and thickens to over 600 metres in Golden Beach West-1 where it has not been fully penetrated.

- The lower Golden Beach Group is Turonian in age belonging to the lower part of the *P. mawsonii* Zone and contains rare traces of the distinctive endemic algal cysts found in the large and deep fresh water lakes represented by the thick Kipper Shale found in the offshore portion of the basin.

- The upper Golden Beach Group, equivalent to the Chimaera Sandstone (Lowry & Longley, 1991), is Santonian to early Campanian in age belonging to the *T. apoxyexinus* and *N. senectus* Zones. This upper section lacks the distinctive lacustrine algal cysts of the lower unit, but can be correlated using the spore-pollen zones with the first marine microplankton incursion into the eastern margin of the offshore basin (Marshall, 1988).

- A major unconformity is believe to separate the upper and lower parts of the Golden Beach Group based on recent work on equivalent age sections in the Otway Basin (Partridge, 1996). Unfortunately the spore-pollen assemblages recorded from the lower part of the Golden Beach Group in this study lack sufficient diversity to recognise the new subdivisions of the *P. mawsonii* Zone currently under development (Partridge, in prep.).

- The top of the Golden Beach Group is also marked by a significant unconformity at which the late Campanian and nearly all of the Maastrichtian is missing. Whilst the commencement of this unconformity may correlate with the 80 Ma sequence boundary, as proposed by Lowry & Longley (1991), in this western part of the basin it also seems to have involved erosion at the subsequent major sequence boundaries at 75 Ma, and 71 Ma and possibly 68 Ma (Haq *et al.* 1987, 1988).

- The Upper *T. longus* Zone assemblages found immediately above the unconformity (Macphail, 1988a, b) seem to correlate best with the maximum Cretaceous marine transgression into the basin associated with the Cretaceous/Tertiary boundary shale.

- The eleven samples from the Latrobe Group analysed in this report are unfortunately too widely spaced to provide adequate subdivision or correlation within the Latrobe Group. They do however compliment the results and discussion provided in the other report (Partridge & Macphail, 1996). Early Eocene section is recorded caved species in older cuttings in Dutson Downs-1 and Merriman-1 and in situ in cuttings between 1106-1520m in Golden Beach West-1 (Macphail, 1988a).

Introduction

This study is the second of two reports aiming to improve the age dating of the Latrobe and Golden Beach Groups in the onshore portion of the Gippsland Basin as a precursor to a regional sequence stratigraphic analysis of the well logs and seismic data. The four wells studied in this report were drilled between 1963 and 1970 and were originally recognised to contain the Golden Beach Formation (now Group) by Haskell (1972). Surprisingly they remain the most recent wells drilled in onshore Gippsland Basin to have intersected the Golden Beach Group. As the knowledge and understanding of the Golden Beach Group in the offshore portion of the basin has advanced significantly in recent years (Marshall, 1989; Lowry & Longley, 1991; Sloan *et al.*, 1992) it is necessary to upgrade the available palynology in these old wells to improve correlations and aid in the development of new exploration plays.

The report provides results on new preparations from 5 cuttings samples, 6 conventional core and 23 sidewall core samples from the four wells. The samples were collected from the Energy and Minerals Victoria core store on the 29 May and 14 June 1996 and the palynological processing performed by Laola Pty Ltd. Initial results of the study were provided in provisional reports issued on the 18 and 21 June 1996.

Colliers Hill-1 (spudded 1970) is the most northern deep well located on the Rosedale Monocline to have intersected the Golden Beach Group. Although no conventional cores were cut, 29 sidewall cores were recovered from the Golden Beach and Latrobe Groups, seven of which are analysed in this report. Previous palynological work consists of a report by Dettmann (1970) on 11 sidewall cores. The deepest sidewall core analysed herein was found to contain members of the distinctive lacustrine algal cysts described by Marshall (1989) which define the

Rimosicysta Superzone. The well at its T.D. of 1710m is still within the Golden Beach Group which has a thickness >450 metres. It is possible the group may extend in the subsurface for 10-15 kms west of the Colliers Hill-1 location as there are no wells or bore in that area deep enough to have penetrated the unit.

Dutson Downs-1 (spudded 1966) is also located on the Rosedale Monocline 6 kms east of Colliers Hill-1 and 5.5 kms north of Golden Beach West-1. No previous palynological analysis is currently available for this well even though seven conventional cores and 27 sidewall cores were recovered. Most of the sidewall cores were shot in the Golden Beach Group. Six sidewall cores from this unit and two conventional core and three cuttings samples from the Latrobe Group are analysed in this report. The deepest sidewall core at 1834.9m confirms the well at T.D. has penetrated the Strzelecki Group. The overlying Golden Beach Group is ~350 metres thick and it is speculated the lower part of this unit has thinned relative to Colliers Hill–1 and Golden Beach West–1 located to the west and south respectively.

Golden Beach West-1 (spudded 1965) contains the thickest known onshore Latrobe section at ~1000 metres and thickest penetration of the underlying Golden Beach Group at ~600 metres. Although there are a number of previous palynological studies of this well the data is still sparse and difficult to interpret (Dettmann, 1966; Stover & Evans, 1969; Traill, 1968; Haskell, 1972). The more recent and comprehensive report by Macphail (1988a) was made available after the commencement of this project by the senior author. The new samples analysed consist of 10 sidewall cores and two conventional cores. The results confirm for the presence of the *Rimosicysta* Superzone based on the lacustrine endemic algal cysts described by Marshall (1989). The top for the Golden Beach Group is also moved from 1776m to the shallower horizon of 1684m to correspond to a log break representing a substantial unconformity between the Upper *T. longus* and *N. senectus* Zones at which the intervening Lower *T. longus* and *T. lilliei* Zones are missing.

Merriman-1 (spudded 1963) is the most southerly onshore petroleum well reported to have intersected the Golden Beach Group. It was examined to confirm and improve on the limited palynological data available (Dettmann, 1966, Stover & Evans, 1969; Traill, 1968; Haskell, 1972; Macphail 1988b). The well also has three conventional cores and most of the 24 recovered sidewall cores located in the Golden Beach Group. Unfortunately, on inspection the cores were found to have mostly sampled sandy lithologies which were considered unsuitable for palynology. Therefore, only one core and two cuttings samples were selected for analysis. Although these gave poor assemblages they nevertheless provide a confident confirmation in the well of the presence of the Golden Beach Group and the important *Rimosicysta* Superzone.

The palynological zonation and ages of the samples and comparison between the wells are summarised on Table-1. Interpretative data on individual samples examined including key species and Confidence Ratings are recorded in Tables-2 to 5. Basic data on residue yields, palynomorph concentration on the slides, preservation and species diversity are recorded on Tables-6 to 13. Results of the assemblage counts and other selected species recorded are provided on Tables-14 to 21.

Table-1: Palynological Summary.

Spore-pollen Zones (Microplankton zones) and Ages	**Colliers Hill-1**	**Dutson Downs-1**	**Golden Beach West-1**	**Merriman-1**
P. tuberculatus **Oligocene**	545.6-548m	Not sampled	719-805m*	Not sampled
Upper *N. asperus* **basal Oligocene**	571.8m	Not sampled	Not sampled	722m*
Middle *N. asperus* (*G. extensa*) **Late Eocene**	Not sampled	914.4m (914.4m)	976.9m	890-960m* (890-960m*)
Lower *N. asperus* **Middle Eocene**	925.1m	1115.6-1194.8m	1005.8-1036.3m	1090m*
P. asperopolus to *M. diversus* **Early Eocene**	Not sampled	Present in cuttings	1106-1520m*	Present in cuttings
L. balmei **Paleocene**	1246.6m‡	1319.8m	1530.7m*	1140-1377.7m*
Upper *T. longus* **Maastrichtian**	Not present	Not present?	1648.4-1653m*	1411-1437m*
N. senectus **Early Campanian**	1283.2m or older	1466.4-1543.2m	1706.9-1770.9m	Not present
T. apoxyextnus **Santonian**	Not sampled?	Not sampled?	1828.8-1947.4m	Not present?
P. mawsonii (*Rimosicysta* Superzone) **Turonian**	1689.2m (1689.2m)	1729.1-1786.7m	2089.7-2288.4m (2090m)	1546.9-1820m (1725m)
C. striatus **Early Albian**	Not reached	1834.9	Not reached	Not reached

‡ Dettmann (1970)
* Macphail (1988a, b)

Geological Comments

Stratigraphic Nomenclature. In the following discussion the term Latrobe Group or Latrobe facies is applied to all fluviatile and coastal plain sands and coal measures facies underlying the open marine facies of the Seaspray Group and overlying the lacustrine to fluviatile facies of the Golden Beach Group. The Latrobe Group is distinguished from the Seaspray Group in being non-calcareous even though it may show evidence of marine influence particularly in the upper part of the section. Although the terms Latrobe Valley Group and Latrobe Valley Coal Measures (Hocking, 1976; Abele *et al.*, 1988) have legitimate priority over Latrobe Group the latter term is so entrenched in the petroleum industry literature it is unrealistic to expect the former names to gain ascendancy. Instead we follow the recommendation and discussion in Partridge & Macphail (1996) and restrict the term Latrobe Valley Group to the coal measures facies developed within the Latrobe Valley. In this report we also avoid the use of the term Traralgon Formation, preferring to restrict the name to its original usage as the Traralgon Seam (see Partridge & Macphail, 1996).

The Golden Beach Formation was originally proposed by Haskell (1972) and subsequently formally raised to the rank of a group and subdivided into two formations by Lowry & Longley (1991). Lithologically the sands within the group are characterised by more abundant lithic fragments and more kaolinitic cement (Sloan *et al.*, 1992, p.3), and overall there is less coal than found in the Latrobe Group. Both marine and lacustrine organic walled microplankton have been recorded from the Golden Beach Group (Marshall, 1988, 1989). The marine microplankton are found in the Chimera Sandstone which lies within the *T. apoxyexinus* to *N. senectus* Zones in its type locality in the Kipper-1 well (Lowry & Longley, 1991). The lacustrine microplankton are typical of the Kipper Shale and associated sands which all lie within the *P. mawsonii* Zone. Age equivalents of both formation can be recognised in the four wells analysed in this reports, but as yet possible lithological distinctions between the two units onshore have not been established, and are beyond the scope of this report.

Geological comments on the individual wells are:

Colliers Hill-1 did not fully penetrate the Golden Beach Group and only has age control at the top of the group and near T.D. of well. The intervening 406 metres of section lacked suitable sidewall samples, and, if further palynological age dating is required, it will need to be based on cuttings. The deepest sample from the Golden Beach Group did however contain a limited diversity microplankton suite belonging to the *Rimosicysta* Superzone.

The species lists provided by Dettmann (1970) for the sidewall core at 1246.6m suggests the Maastrichtian Upper *T. longus* Zone assemblage found in Golden Beach West-1, Merriman-1 and Wonga Binda-1 (Macphail, 1988a,b; Partridge & Macphail, 1996) is absent. If correct, the unconformity at the top of the Golden Beach Group has a longer duration at the Colliers Hill-1 location relative to Dutson Downs-1 just 6 kms to the east.

Only two widely spaced samples were analysed from the Latrobe Group, at 571.8m and 925.1m, and both gave ages consistent with the other wells examined in this study. The two shallowest samples analysed, at 545.6m (a glauconitic marl) and 548m (a glauconitic sandstone), are considered to belong to the Seaspray Group based on lithology, abundance of microplankton and age.

Dutson Downs-1 at T.D. penetrates the Strzelecki Group based on a good Early Albian *C. striatus* Zone assemblage recovered from the deepest sidewall core at 1834.9m. This zone is overlain by an interval assigned to the Turonian to early Campanian Golden Beach Group. Missing at the unconformity between the groups is the most of the Albian and Cenomanian (*C. paradoxa* to *A. distocarinatus* Zones).

Only the *P. mawsonii* and *N. senectus* Zones are identified within the Golden Beach Group at Dutson Downs-1. The *T. apoxyexinus* Zone is either missing or not sampled in a 180+ metres sampling gap. As the *N. senectus* Zone has a similar thickness and character to that found in Golden Beach West-1, it is suggested that the thinning of the Golden Beach Group from >600 metres in the latter well to only 350 metres in Dutson Downs-1 has to occur in the older section representing the *P. mawsonii* and *T. apoxyexinus* Zones.

On current sampling the Golden Beach Group is overlain by the Paleocene *L. balmei* Zone although there is a 145 metre sampling gap which allows sufficient room for the thin section of Maastrichtian Upper *T. longus* Zone as found in Golden Beach West-1 (Macphail, 1988a).

The occurrence of Early Eocene index species (e.g. *Myrtaceidites tenuis*) in the cuttings assigned to the *L. balmei* Zone at 1319.8m confirm the presence of the Upper *M. diversus* to *P. asperopolus* Zone interval in the Latrobe Group Formation in Dutson Downs-1.

Palynological sampling between 914.4 m to 1194.8m in the upper part of the Latrobe Group confirm the presence of a thick Middle to Late Eocene *N. asperus* Zone. This is consistent with the more detailed analysis available from Burong-1

(Partridge & Macphail, 1996). Only the shallowest sample shows any sign of marine influence.

Golden Beach West-1 currently contains the thickest drilled onshore section for both the Latrobe and Golden Beach Groups. Relative to the other wells analysed, additional section seem to occur within the Santonian *T. apoxyexinus* Zone and Early Eocene *P. asperopolus* to *M. diversus* Zones (Table-1; Macphail, 1988a). The combined sample control in this well clearly establishes that the unconformity between the Golden Beach and Latrobe Groups in the onshore portion of the basin extends from late Campanian into the late Maastrichtian. In the offshore this unconformity was placed within the *N. senectus* Zone at about 80 Ma (Lowry, 1987; Lowry & Longley, 1991). Although the latter authors suggested this unconformity is correlated with the start of spreading in the Tasman Sea, it also could correlate with the major 80 Ma sequence boundary (Haq *et al.*, 1987; 1988). The effects of the sequence boundary may have accentuated the effects of the tectonic event or visa versa. The longer duration of the unconformity in the onshore wells suggests in this area the unconformity also encompasses the major sequence boundaries at 75 Ma, 71 Ma and possibly 68 Ma. Whether there is erosion associated with each of these sequence boundary unconformities in not resolvable on current data.

The three sidewall cores analysed from the Latrobe Group are clustered over a thin interval. Whilst they complement previous work they do not provide significant new information.

Merriman-1 has limited productive samples but seems to contain only the lower part of the Golden Beach Group belonging to the *P. mawsonii* Zone. The cuttings sample from the middle of the section confirm the presence of algal cysts belonging to the lacustrine *Rimosicysta* Superzone. This is the most westerly occurrence of this zone in the onshore basin. It is located only 3kms east and 30kms north of the offshore well Tommyruff-1 which contains the most westerly occurrence of these algal cysts as well as the Golden Beach Group in the offshore Gippsland Basin (see Macphail, 1990). It is not possible to demonstrated in Merriman-1 whether the overlying *T. apoxyexinus* and *N. senectus* Zones were never deposited or have been removed by later erosion. Palynological age control on the younger age Latrobe Group is provided by Macphail (1988b).

Biostratigraphy

Zone and age determinations are based on the spore-pollen zonation scheme proposed by Stover & Partridge (1973), subsequently modified by Stover & Partridge (1982) and Helby, Morgan & Partridge (1987). The microplankton zonation scheme referred to has only been published in outline by Partridge (1975, 1976). Other modifications and refinements to both zonation schemes can be found in the many palynological reports on wells drilled in the Gippsland Basin and analysed by the authors.

Author citations for most spore-pollen species can be sourced from Dettmann (1963), Helby, Morgan & Partridge (1987), Stover & Partridge (1973, 1982), or other references cited herein. Author citations for microplankton can be found in the indexes of Lentin & Williams (1993) and Fensome *et al.* (1990). Species names followed by "ms" are unpublished manuscript names.

***Proteacidites tuberculatus* spore–pollen Zone**
Age: Early Oligocene to Early Miocene
In Colliers Hill-1 two sidewall cores at 545.6m and 548.0m yielded abundant (22%-56%) marine dinoflagellates typical of the Oligo-Miocene *Operculodinium* microplankton Superzone. The spore-pollen component is dominated by *Nothofagidites* spp. (31%-66%), with both assemblages including specimens of the zone index species *Cyatheacidites annulatus*.

Upper *Nothofagidites asperus* spore–pollen Zone
Age: Basal Oligocene
This zone was only recorded from a single sidewall core in Colliers Hill-1 at 571.8 m. The sample, a coal, is reliably dated as Upper *N. asperus* Zone, based on occurrences of *Stereisporites* (*Tripunctisporis*) sp., *Granodiporites nebulosus* and *Dryadopollis retequetrus* in a *Nothofagidites* spp. dominated (67%) assemblage. The single marine dinoflagellate cyst recorded is almost certainly due to mud contamination.

Middle *Nothofagidites asperus* spore-pollen Zone
and
***Gippslandica extensa* microplankton Zone**
Age: Late Eocene
These zones are confidently recorded in Dutson Downs-1, from the core sample at 914.4m which contained index pollen *Triorites magnificus* and index dinoflagellates *Corrudinium incompositum*, and *Gippslandica extensa*. The sample contained abundant spore-pollen, dominated by *Nothofagidites* spp. (84%), and only low numbers (<1%) of marine dinoflagellates. The spore-pollen zone was also tentatively identified in a coal at 976.9m from Golden Beach West-1 based on the occurrence of *Dryadopollis retequetrus*.

Lower *Nothofagidites asperus* spore-pollen Zone

Age: Middle Eocene

The Lower *N. asperus* Zone is identified in three wells based on dominance of *Nothofagidites* spp. and lack of younger index species, whilst index species which range no older than the Lower *N. asperus* Zone are relatively rare.

In Colliers Hill-1 the sidewall core shot in a coal at 925.1m contains an assemblage that is dominated by *Phyllocladidites mawsonii* (44%), *Nothofagidites* spp. values are quite low at only 9.5% although significantly greater than *Haloragacidites harrisii* at <3%. Key index species present are *Tricolpites simatus*, *Proteacidites reflexus* and *P. recavus* although the last may range lower. The sample also contains *Phyllocladidites reticulosaccatus* which usually ranges no higher than the *L. balmei* Zone in the Gippsland Basin but can re-appears as a rare element in Lower *N. asperus* coals.

In Dutson Downs-1 the shallower of two coaly cuttings samples at 1115.6m is dominated by *Phyllocladidites mawsonii* (44%) with more abundant *Nothofagidites* spp. (9%) than *Haloragacidites harrisii* at <3% but lacks any age diagnostic index species. In the deeper sample at 1194.8m, the abundance of *Nothofagidites* spp. (8%) drops below *Haloragacidites harrisii* (21%) and the assemblage is dominated by spores of the *Gleicheniidites/Clavifera* complex. Whilst this composition gives the sample a older appearance it still the lacks index species restricted to the older zones. The\only index species of the Lower *N. asperus* zone recorded is *Tricolporites leuros*.

In Golden Beach West-1 the two sidewall core samples assigned to this zone contain moderate diversity assemblages with skewed compositions. The coal at 1005.8m is dominated by *Haloragacidites harrisii* (43%) while the claystone at 1036.3m is dominated by *P. mawsonii* (30%) with a secondary dominance of *H. harrisii* (20%). Both samples contain *P. recavus*, with *T. leuros* recorded from the shallower sample while *Tricolpites simatus* and *Proteacidites reflexus* are recorded in the deeper sample.

Upper *Lygistepollenites balmei* spore-pollen Zone

Interval: 1319.8 metres

Age: Paleocene

Cuttings at 1319.8 m in Dutson Downs-1 are dated as Upper *L. balmei* Zone, based on the highest occurrence of *Lygistepollenites balmei* and *Australopollis obscurus* associated with several specimens of *Proteacidites incurvatus* not known to range below this zone. Overall the assemblage is dominated by caved taxa from the overlying *N. asperus* Zones but does contain rare species more characteristic of the *M. diversus* to *P. asperopolus* Zones such as *Myrtaceidites tenuis* and

Proteacidites grandis. Core-3 lying just 26 metres above this cuttings may also lie in this zone. Unfortunately the sample collected from that core gave an *N. senectus* Zone age and it is now realised it was wrongly taken from either core 4 or 5 owing to poor labelling of the core boxes.

Nothofagidites senectus **spore–pollen Zone**
Interval: 1466.4-1501.2 metres
Age: Early Campanian

The *N. senectus* Zone is confidently identified in the eastern wells Dutson Downs–1 and Golden Beach West–1, is possibly present in Colliers Hill-1 and appears to be absent in Merriman-1. In these wells the oldest or first appearance of *Forcipites sabulosus* is considered to be a more reliable indicator rather than the first appearance of *Nothofagidites senectus*. This is in agreement with recent work revising the zone definitions in the Otway Basin (Partridge, in prep).

In Dutson Downs-1 the zone is identified in three sidewall cores and the out-of-place sample from core-3 by the sporadic presence of the eponymous species and frequent to common *F. sabulosus* (5%-16%; average 10%). The assemblages are dominated by gymnosperm pollen (average 44%) and spores (average 34%). Angiosperm values are mostly lower (average 22%). The first appearance of *Gambierina rudata* in the shallowest sample at 1466.4m is taken as the index species for the upper part of the *N. senectus* Zone. The deepest sample at 1543.2m is unusual in yielding abundant (~50%) fungal spores and hyphae.

The three sidewall cores from Golden Beach West-1 are characterised by common to abundant *F. sabulosus* (8%-30%; average 18%) with very rare *N. senectus*. Specimens of *Forcipites sabulosus* in the deepest sample are unusual in being very coarsely ornamented. Other conspicuous elements in the assemblages are *Podocarpidites* spp. (average 22%) and *Proteacidites* spp. (average 11%). The deepest sample at 1770.9m yielded the youngest known occurrences of the megaspore *Balmeisporites glenelgensis*.

The single sidewall core sample at 1283.2m in Colliers Hill-1 is more problematical in that it contains *N. senectus* (which may be caved) but lacks the common *F. sabulosus* seen in the other two wells. In other respects the sample resembles those assigned to the underlying *T. apoxyexinus* Zone.

Tricolpites apoxyexinus **spore–pollen Zone**
Interval: 1707.8 metres
Age: Santonian

The identification of the *T. apoxyexinus* Zone, which was original established in the Otway Basin (Dettmann & Playford, 1969; Helby *et al.*, 1987), continues to be problematical in the Gippsland Basin because of the rarity of either the eponymous species or the next most reliable indicator species *Ornamentifera sentosa*. In this study the zone is only confidently recorded in Golden Beach West-1 where all three samples lack both *T. apoxyexinus* and *O. sentosa*. Instead, the zone is identified on the FADs for *Latrobosporites ohaiensis* at 1947.4m, confident *Peninsulapollis gillii* at 1920.2m and *Latrobosporites amplus* at 1828.8m and lack of younger index species. Other diagnostic species for the zone are uncertain but the FAD for *Stereisporites viriosus* and the LAD of consistent *Balmeisporites glenelgensis* support the zone assignment according to the ranges in Dettmann & Playford (1969, table 9:4). Compared to the *N. senectus* Zone the assemblage composition shows a marked drop in the abundance of angiosperm pollen to an average of <4%, with the most common type being *Proteacidites* spp.

***Phyllocladidites mawsonii* spore–pollen Zone**
and
***Rimosicysta* microplankton Superzone**
Age: Turonian

The *P. mawsonii* Zone is identified in all four wells and is associated with the endemic lacustrine algal cysts of the *Rimosicysta* Superzone in three of the wells.

The *P. mawsonii* Zone is identified in most samples by the presence of the eponymous species and lack of younger or older index species. Other species used elsewhere to support the zone assignment are disappointingly rare. Instead, greater confidence is gained in the zone assignment from the composition of the assemblages which are characterised by the abundance of *Dilwynites* pollen (particularly the small *D. pusillus* ms), *Podocarpidites* pollen and presence of rare but consistent angiosperm pollen. Specimens of *Appendicisporites distocarinatus*, *Hoegisporis trinalis* ms or *Clavifera vultuosus* ms were not recorded in any sample. The absence of these and associated species implies that only the middle part of the *P. mawsonii* Zone is present (or has been sampled) in these onshore wells. While it can be argued the lower part of the zone may not have been penetrated, the absence of clear evidence for the upper part of the zone is taken as evidence of an unconformity at which the section approximately equivalent in age to the Coniacian Stage is missing. The possibility that many of the key spore-pollen species are missing due to facies problems is discounted because of the presence of the *Rimosicysta* algal microflora. The latter indicate that the widespread lacustrine environments identified in offshore wells (Partridge, 1990; 1995) did extend into the onshore portion of the basin, and there is no obvious reason that the same terrestrial spore-pollen should not be associated with the algal microflora. The absence of *A. distocarinatus*, and *H. trinalis* ms is therefore consistent with the sections analysed being younger based on ranges recorded in the offshore wells.

The *Rimosicysta* Superzone is identified in three samples on the presence of several species of *Rimosicysta* and *Micrhystridium* sp. A of Marshall, 1989. The *Rimosicysta* species in Golden Beach West-1 at 2089.7m and Merriman-1 at 1725.2m are the same while those from Colliers Hill-1 at 1689.2m are distinct. Unfortunately not enough is known of the ranges of *Rimosicysta* species to say which of the assemblages is younger or older.

***Crybelosporites striatus* spore-pollen Zone**
Age: Early Albian
The deepest sample in Dutson Downs-1 at 1834.9m is the only sample from the Strzelecki Group analysed in this study. As is typical of Early Cretaceous assemblages, the sample was dominated by spores with *Baculatisporites*/ *Osmundacidites* (27%), *Cyathidites* (12%), and *Retitriletes* (7%) the dominant taxa. More significant are the secondary abundances of *Cicatricosisporites* (~5%) and *Foraminisporis* (9%) which make the sample quite distinct from the younger assemblages in the Golden Beach Group. Index species in the sample include *Crybelosporites striatus*, *C. berberoides*, *Foraminisporis asymmetricus*, *F. wonthaggiensis* and *Pilosisporites parispinosum*.

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Table-2: Interpretative Palynological Data for Colliers Hill-1

Sample Type	Depth Metres	Feet	Spore-Pollen Zone (Microplankton Zones and Subzone)	*CR	Comments and Key Species Present
SWC 30	545.6	1790	*P. tuberculatus* (*Operculodinium* Superzone)	B4 B2	Microplankton 56% of total count. *Spiniferites* spp. 50% of MP count. *Nothofagidites* at 31% dominate S-P.
SWC 29	548.0	1798	*P. tuberculatus*	B1	Microplankton 22% of total. *Spiniferites spp.* 74% of MP. *Nothofagidites* spp. 66% of S-P. FAD *Cyatheacidites annulatus.*
SWC 24	571.8	1876	Upper *N. asperus*	B1	Coal sample dominated by *Nothofagidites* spp. 67%.
SWC 22	925.1	3035	Lower *N. asperus*	B4	Coal sample dominated by *Phyllocladidites mawsonii* at 44%.
SWC 17	1283.2	4210	*N. senectus to T. apoxyexinus*	B4	*Podocarpidites* spp. 25%. *Proteacidites* spp. 12%. *Nothofagidites senectus* recorded but possibly caved or contamination.
SWC 07	1642.9	5390	Indeterminate		Low yield sample with most recorded specimens regarded as contaminants.
SWC 04	1689.2	5542	*P. mawsonii* (*Rimosicysta* Superzone)	B4 B3	Microplankton ~3% Spore-pollen assigned to zone on abundance of *Dilwynites* spp. at 24%. Microplankton low diversity with *Rimosicysta* spp. and *Micrhystridium* sp. A, Marshall 1989.

e*CR = Confidence Ratings
FAD = First Appearance Datum

Table–3: Interpretative Palynological Data for Dutson Downs–1

Sample Type	Depth Metres	Depth Feet	Spore-Pollen Zone (Microplankton Zones and Subzone)	*CR	Comments and Key Species present
Core-2	914.4	3000	Middle *N. asperus* (*G. extensa*)	A1 A3	Microplankton <1%. *Nothofagidites* spp. 84%. *Triorites magnificus* present.
Cuttings	1115.6	3660	Lower *N. asperus*	D4	Coaly sample dominated by *Phyllocladidites mawsonii* >40%. *Proteacidites rugulatus* present.
Cuttings	1194.8	3920	Lower *N. asperus* or older	D4	Spore-pollen dominated by *Gleicheniidites/Clavifera* spp. 28% and *Haloragacidites harrisii* 21% with *Nothofagidites* spp. only 8%. Lacks key index species.
Core-3	1293.9	4245	*N. senectus*	A2	*Forcipites sabulosus* 11% *Nothofagidites senectus* <1%. Sample out of place mis-collected from cores 4 or 5.
Cuttings	1319.8	4330	Upper *L. balmei*	D1	LAD for *Lygistepollenites balmei* and *Australopollis obscurus* in heavily caved assemblage. Record of caved *Myrtaceidites tenuis* indicates presence of Early Eocene interval in overlying section.
SWC 26	1466.4	4811	Upper *N. senectus*	B2	FAD *Gambierina rudata* with *Forcipites sabulosus* 16% and *Nothofagidites senectus* ~1.5%.
SWC 22	1501.4	4926	*N. senectus*	B2	*Forcipites sabulosus* ~5%. S-P dominated by *Podocarpidites* spp. at 31%. Fungal spores/hyphae 11%.
SWC 18	1543.2	5063	*N. senectus*	B2	*F. sabulosus* 8%. *N. senectus* 1.6%. *Podocarpidites* spp. 22%. Assemblage dominated by fungal spores & hyphae at >50% of total count.
SWC 12	1707.8	5603	Indeterminate		Most fossils recorded appear to be caved which is consistent with mud penetration of fine grained sandstone lithology.
Core 6	1729.1	5673	*P. mawsonii*	A5	Assemblage dominated by small *Cyathidites* spp. ~40% without any key index species.
SWC 03	1786.7	5862	*P. mawsonii*	B4	FAD *Phyllocladidites mawsonii* in sample with abundant *Dilwynites* spp. ~21%.
SWC 01	1834.9	6020	*C. striatus*	B1	Good Strzelecki Group assemblage with abundant *Osmundacidites/ Baculatisporites* at 27%: *Cyathidites* spp. at 12% and several index species including *Crybelosporites striatus*.

*CR = Confidence Ratings
LAD = First Appearance Datum
FAD = First Appearance Datum

Table–4: Interpetative Palynological Data for Golden Beach West-1

Sample Type	Depth Metres	Feet	Spore-Pollen Zone (Microplankton Zones and Subzone)	*CR	Comments and Key Species Present
SWC 29	976.9	3205	*N. asperus* probably Middle	B4	Coal with abundant *Nothofagidites* spp. >62% and rarer index species. Presence of single specimen of *Dryadopollis retequestrus* suggests Middle subzone.
SWC 24	1005.8	3300	Lower *N. asperus*	B4	Coal with low concentration of palynomorphs. Presence of *Proteacidites recavus* suggest Lower subzone.
SWC 23	1036.3	3400	Lower *N. asperus*	B4	Sandy claystone with only low concentration of palynomorphs. *Proteacidites recavus* and *P. reflexus* key index species.
SWC 30B	1706.9	5600	*N. senectus*	B2	*Forcipites sabulosus* 30%. *Nothofagidites senectus* 3% is poorly preserved assemblage.
SWC 27B	1752.6	5750	*N. senectus*	B2	*F. sabulosus* ~9% in assemblage dominated by *Podocarpidites* spp. at 40%.
SWC 26B	1770.9	5810	*N. senectus*	B3	*F. sabulosus* 16% present in poorly preserved assemblage.
SWC 20B	1828.8	6000	*T. apoxyexinus*	B4	Low yielding sample with FAD *Latrobosporites amplus* and LAD *Balmeisporites glenelgensis.*
SWC 16B	1920.2	6300	*T. apoxyexinus*	B4	*Peninsulapollis gillii* present in assemblage dominated by *Podocarpidites* spp. ~25% and *Triporoletes reticulatus* ~21%.
Core 6	1947.4	6389	*T. apoxyexinus*	A4	*Podocarpidites* spp. 20%; *Araucariacites australis* 19%; and *Proteacidites* spp. 3.5%. FAD *Latrobosporites ohiaensis*.
Core-7	2089.7 - 2090.0	6856-6857	*P. mawsonii* (*Rimosicysta* Superzone)	A2 A3	Microplankton <1%. Spore-pollen dominated by *Dilwynites* spp. at 50%. *P. mawsonii* and *Coptospora pileolus* ms and microplankton *Rimosicysta asperus* and *R. concava*
SWC 06B	2231.1	7320	Indeterminate		Grey-brown claystone gave only very low yield with few fossils which are not zone diagnostic.
SWC 02B	2288.4	7508	*P. mawsonii* or younger	B4	Younger than Strzelecki Group based on assemblage composition but key zone species not recorded. *Microcachryidites antarcticus* at 64% and *Podocarpidites* spp. at 23% dominate assemblage.

*CR = Confidence Ratings
LAD = First Appearance Datum
FAD = First Appearance Datum

Table-5: Interpetative Palynological Data for Merriman-1

Sample Type	Depth Metres	Feet	Spore-Pollen Zone (Microplankton Zones and Subzone)	*CR	Comments and Key Species Present
Core-4	1546.9-1548.7	5075-81	*P. mawsonii*	A1	Assemblage dominated by *Cyathidites* spp. 22% and *Proteacidites* spp. 20% with *Phyllocladidites mawsonii, Coptospora pileolus* ms and *Rugulatisporites admirabilis* ms. key species recorded. Approximately 15% of assemblage comprised of reworked Permo-Triassic.
Cuttings	1725.2-1728.2	5660-5670	*P. mawsonii* (*Rimosicysta* Superzone)	D3 D3	>50% of assemblage caved. Insitu spore-pollen dominated by *Dilwynites* spp. Microplankton *Rimosicysta aspera* and *R. concava* key species.
Cuttings	1816.6-1819.7	5960-70	No older than *P. mawsonii*		Over 50% of assemblage caved. In situ spore-pollen distinguished by poorer preservation not particularly diagnostic, but dominated by *Dilwynites* spp.

*CR = Confidence Ratings

Confidence Ratings

The Confidence Ratings assigned to the zone identifications on Tables-2 to 5 are quality codes used in the STRATDAT relational database developed by the Australian Geological Survey Organisation (AGSO) as a National Database for interpretive biostratigraphic data. Their purpose is to provide a simple relative comparison of the quality of the zone assignments. The alpha and numeric components of the codes have been assigned the following meanings:

Alpha codes: Linked to sample type

A	Core
B	Sidewall core
C	Coal cuttings
D	Ditch cuttings
E	Junk basket
F	Miscellaneous/unknown
G	Outcrop

Numeric codes: Linked to fossil assemblage

1	**Excellent confidence:**	High diversity assemblage recorded with key zone species.
2	**Good confidence:**	Moderately diverse assemblage recorded with key zone species.
3	**Fair confidence:**	Low diversity assemblage recorded with key zone species.
4	**Poor confidence:**	Moderate to high diversity assemblage recorded without key zone species.
5	**Very low confidence:**	Low diversity assemblage recorded without key zone species.

BASIC DATA

Table–6: Basic Sample Data for Colliers Hill–1

Sample Type	Depth Metres	Depth Feet	Lithology	Sample Wt (g)	Residue Yield
SWC 30	545.6	1790	Light greenish grey marl with ~ 5% glauconite pellets.	9.1	Very low
SWC 29	548.0	1798	Medium brownish-greenish grey medium g. sst with clay and glauconite? matrix.	9.8	Low
SWC 24	571.8	1876	Light brown-tan fine grained sst with carb. claystone laminae ~2mm.	6.5	High
SWC 22	925.1	3035	Brown coal.	3.5	High
SWC 17	1283.2	4210	Light grey homogeneous claystone.	9	Low
SWC 07	1642.9	5390	Medium brown claystone with carbonaceous partings.	8	Moderate
SWC 04	1689.2	5542	Medium grey claystone.	8.4	Moderate
			Average:	**7.8**	

Table–7: Basic Palynomorph Data for Colliers Hill–1

Sample Type	Depth Metres	Depth Feet	Palynomorph Concentration	Palynomorph Preservation	Number S-P spp*	Microplankton Abundance	MP %	Number MP spp*
SWC 30	545.6	1790	High	Fair-good	26+	Very abundant	56%	7+
SWC 29	548.0	1798	High	Good	25+	Abundant	22%	5+
SWC 24	571.8	1876	Very high	Fair-good	40+	Very rare	<1%	1
SWC 22	925.1	3035	Moderate	Good	38+	NR		
SWC 17	1283.2	4210	High	Poor	29+	Very rare	<1%	2?
SWC 07	1642.9	5390	Very low	Poor	3+	Very rare	NA	1
SWC 04	1689.2	5542	Moderate	Poor-fair	23+	Frequent	2%	1
				Average Diversity:	**26+**			

***Diversity:**
Very low = 1–5 species
Low = 6–10 species
Moderate = 11–25 species
High = 26-74 species
Very high = 75+ species

Note: Spore-pollen and microplankton diversity excludes any reworked Permian species and some of the caved species

Table–8: Basic Sample Data for Dutson Downs–1

Sample Type	Depth Metres	Depth Feet	Lithology	Sample Wt (g)	Residue Yield
Core 2	914.4-918.1	3000-3012	Medium grey carbonaceous micaceous siltstone with light grey fine grained sandstone laminae and some bioturbation.	15.4	High
Cuttings	1115.6-1118.6	3660-3670	Carbonaceous siltstone to coal.	4.2	High
Cuttings	1194.8-1197.9	3920-3930	50% coarse quartz sandstone; 50% carbonaceous shale–black-dark grey.	10.9	High
Core 3	1293.9-1297.8	4245-4258	Medium grey massive-faintly laminated mudstone with rare (<1%) carbonaceous flecks.	13.6	Moderate
Cuttings	1319.8-1322.8	4330-4340	75% coarse grey-black carbonaceous shale to coal.	20.5	High
SWC 26	1466.4	4811	Medium grey brown brittle claystone with rare small carbonaceous flecks.	10.2	High
SWC 22	1501.4	4926	Light grey claystone with fine laminae <1mm with white siltstone.	8.7	High
SWC 18	1543.2	5063	Finely mottled medium grey fine grained sandstone and claystone.	10.1	High
SWC 12	1707.8	5603	Light grey fine grained sandstone with mud penetration.	7.8	Moderate
Core 6	1729.1	5673	Medium grey carbonaceous siltstone	15.5	High
SWC 03	1786.7	5862	Medium gredy homogeneous brittle claystone - mud penetrated.	7.5	High
SWC 01	1834.9	6020	Medium brown-grey siltstone.	7.8	Low
			Average:	**12.0**	

Table–9: Basic Palynomorph Data for Dutson Downs–1

Sample Type	Depth Metres	Feet	Palynomorph Concentration	Palynomorph Preservation	Number S-P Spp*	Microplankton Abundance	MP %	Number MP Spp*
Core 2	914.4-918.1	3000-3012	High	Good	45+	Very rare	<1%	3+
Cuttings	1115.6-1118.6	3660-3670	Moderate	Good	20+	NR		
Cuttings	1194.8-1197.9	3920-3930	Low	Good	24+	NR		
Core 3	1293.9-1297.8	4245-4258	Low	Poor	23+	NR		
Cuttings	1319.8-1322.8	4330-4340	Moderate	Good	30+	NR		
SWC 26	1466.4	4811	High	Good	20+	Frequent	2%	1
SWC 22	1501.4	4926	Moderate	Fair	24+	NR		
SWC 18	1543.2	5063	Moderate	Fair	21+	NR		
SWC 12	1707.8	5603	Low	Poor-fair	11+	NR		
Core 6	1729.1	5673	Moderate	Poor-fair	20+	Rare	<2%	1
SWC 03	1786.7	5862	High	Fair	17+	Frequent	5%	2+
SWC 01	1834.9	6020	High	Fair-good	32+	Very rare	<1%	2?
				Average Diversity:	**23+**			

***Diversity:**

Very low	=	1–5 species
Low	=	6–10 species
Moderate	=	11–25 species
High	=	26-74 species
Very high	=	75+ species

Note: Spore-pollen and microplankton diversity excludes any reworked Permian species and some of the caved species

Table-10: Interpretative Palynological Data for Golden Beach West-1

Sample Type	Depth Metres	Depth Feet	Lithology	Sample Wt (g)	Residue Yield
SWC 29	976.9	3205	Coal.	3.9	High
SWC 24	1005.8	3300	Coal.	2.4	High
SWC 23	1036.3	3400	Medium brown grey sandy claystone.	4.9	High
SWC 30B	1706.9	5600	Light grey claystone with faint wavy laminae.	8.4	Moderate
SWC 27B	1752.6	5750	Light grey fine-medium sandstone with white clay matrix and layer of grey claystone to side of SWC.	5.8	Moderate
SWC 26B	1770.9	5810	Light grey medium sandstone and medium grey carbonaceous siltstone. Laminae 5-15mm.	9.8	Moderate
SWC 20B	1828.8	6000	Light grey fine sandstone with fine <1mm carbonaceous siltstone laminae.	9.9	Moderate
SWC 16B	1920.2	6300	Light grey brittle claystone with rare carbonaceous flecks.	7.4	Moderate
CORE 6	1947.4	6389	Medium grey claystone.	15.1	High
CORE 7	2089.7-2090.0	6856-6857	Dark grey homogeneous claystone.	13.8	High
SWC 06B	2231.1	7320	Light grey-brown claystone.	4.2	Very low
SWC 02B	2288.4	7508	Brown brittle claystone with carbonaceous flecks.	7.1	High
			Average:	**8.4**	

Table-11: Basic Palynomorph Data for Golden Beach West-1

Sample Type	Depth Metres	Depth Feet	Palynomorph Concentration	Palynomorph Preservation	Number S-P spp*	Microplankton Abundance	MP %	Number MP spp*
SWC 29	976.9	3205	High	Fair	38+	NR		
SWC 24	1005.8	3300	Low	Fair	23+	NR		
SWC 23	1036.3	3400	Very low	Fair	22+	NR		
SWC 30B	1706.9	5600	Moderate	Poor	21+	Rare	<1%	1
SWC 27B	1752.6	5750	Moderate	Poor	24+	NR		
SWC 26B	1770.9	5810	Low	Poor	15+	NR		
SWC 20B	1828.8	6000	Low	Poor	13+	NR		
SWC 16B	1920.2	6300	Moderate	Very poor	27+	NR		
Core 6	1947.4	6389	Moderate	Poor	27+	Rare	<1%	1
Core 7	2089.7-2090.0	6856-6857	Moderate	Poor-fair	25+	Rare	<1%	3+
SWC 06B	2231.1	7320	Very low	Poor	5+	NR		
SWC 02B	2288.4	7508	High	Poor	11+	NR		
				Average Diversity:	**20+**			

***Diversity:**
Very low = 1–5 species
Low = 6–10 species
Moderate = 11–25 species
High = 26-74 species
Very high = 75+ species

Note: Spore-pollen and microplankton diversity excludes any reworked Permian species and some of the caved species

Table–12: Basic Sample Data for Merriman–1

Sample Type	Depth Metres	Depth Feet	Lithology	Sample Wt (g)	Residue Yield
Core-4	1546.9-1548.7	5075-5081	Medium-grey homogeneous mudstone with concoidal fracture.	16.5	High
Cuttings	1725.2-1728.2	5660-5670	Medium grey mudstone.	15.0	High
Cuttings	1816.6-1819.7	5960-5970	Light-medium grey irregularly fractured homogeneous mudstone with minor siltstone <5%.	15.6	Moderate
			Average:	**15.7**	

Table–13: Basic Palynomorph Data for Merriman–1

Sample Type	Depth Metres	Depth Feet	Palynomorph Concentration	Palynomorph Preservation	Number S-P spp*	Microplankton Abundance	MP %	Number MP spp*
Core-4	1546.9-1548.7	5075-5081	Moderate	Poor	30+	NR		
Cuttings	1725.2-1728.2	5660-5670	Moderate	Poor-good	17+	Common	15%	3+
Cuttings	1816.6-1819.7	5960-5970	Moderate	Poor-fair	10+	NR		
				Average Diversity:	**19+**			

***Diversity:**
Very low = 1–5 species
Low = 6–10 species
Moderate = 11–25 species
High = 26-74 species
Very high = 75+ species

Note: Spore-pollen and microplankton diversity excludes any reworked Permian species and some of the caved species

Table-14: Selected Palynomorph Abundance Data for Colliers Hill-1

Sample Type:	SWC 30	SWC 29	SWC 24	SWC 22	SWC 17	SWC 07	SWC 04
Depth in metres:	545.6	548.0	571.8	925.1	1283.2	1642.9	1689.2
Depth in feet:	1790	1798	1876	3035	4210	5390	5542
TRILETE SPORES undiff.	4.6%		1.5%	1.7%	5.3%		3.4%
Baculatisporites spp.					7.1%	9.1%	3.4%
Cicatricosisporites spp.					1.2%		
Cyathidites spp. large >40μm					2.4%		3.4%
Cyathidites spp. small <40μm	1.3%	2.7%	1.5%	1.7%	8.3%	9.1%	5.0%
Dictyophyllidites spp.			0.5%			9.1%	
Gleicheniidites/Clavifera spp.	1.3%			3.4%	0.6%		
Herkosporites elliottii		1.1%			1.2%		0.8%
Osmundacidites spp.					1.8%		4.2%
Perotrilites spp.					0.6%		
Retitriletes spp.					1.2%		2.5%
Stereisporites spp.	2.0%	0.5%	1.0%		0.6%		0.8%
MONOLETES SPORES undiff.					0.6%		
Laevigatosporites spp.					0.6%	9.1%	
Marratisporites scabratus					0.6%		
\ Total Spores:	**9%**	**4%**	**5%**	**7%**	**32%**	**36%**	**24%**
GYMNOSPERMS			0.5%				
Araucariacites australis	3.3%	0.5%	1.5%		5.9%		7.6%
Corollina spp.							6.7%
Cupressacites sp.							0.8%
Dilwynites spp.	7.8%	1.6%	1.0%	1.7%	5.3%		11.8%
Dilwynites pusillus					4.7%		11.8%
Lygistepollenites florinii	1.3%	1.1%	1.0%	2.6%			
Microcachyridites antarticus				1.7%	3.6%		5.9%
Phyllocladidites mawsonii	14.4%	10.9%	5.6%	44.0%	3.6%	9.1%	
Podocarpidites spp.	5.2%	4.3%	5.1%	12.1%	24.9%	9.1%	28.6%
Podosporites microsaccatus		1.1%		0.9%	4.1%		0.8%
Vitreisporites signatus					1.2%		1.7%
Total Gymnosperms:	**32%**	**20%**	**15%**	**63%**	**53%**	**18%**	**76%**
ANGIOSPERM POLLEN	1.3%	0.5%		0.9%	0.6%	18.2%	
Casuarina (H. harrisii)	19.0%	7.1%	10.3%	3.4%			
Forcipites spp.							0.8%

Table-14: Selected Palynomorph Abundance Data for Colliers Hill-1							
Sample Type:	**SWC 30**	**SWC 29**	**SWC 24**	**SWC 22**	**SWC 17**	**SWC 07**	**SWC 04**
Depth in metres:	**545.6**	**548.0**	**571.8**	**925.1**	**1283.2**	**1642.9**	**1689.2**
Depth in feet:	**1790**	**1798**	**1876**	**3035**	**4210**	**5390**	**5542**
Ilexpollenites spp.	0.7%	1.6%					
Malvacipollis spp.			0.5%	3.4%			
Nothofagidites asperus/goniatus	0.7%	0.5%	4.1%				
N. brachyspinulosus/flemingii	0.7%	2.2%	1.0%				
N. deminutus/vansteenisii	1.3%	8.7%	10.8%	0.9%			
N. emarcidus/heterus/falcatus	28.1%	54.3%	51.3%	8.6%			
Periporopollenites spp.	0.7%	1.1%	2.1%	0.9%			
Proteacidites spp.	5.2%			7.8%	11.8%	27.3%	
Proteacidites annularis	0.7%		0.5%	1.7%			
Proteacidites recavus				0.9%			
Tricolp(or)ates spp.	0.7%			1.7%	2.4%		
Total Angiosperms:	**59%**	**76%**	**81%**	**30%**	**15%**	**45%**	**1%**
Total Spore-Pollen Count	**153**	**184**	**195**	**116**	**169**	**11**	**119**
MICROPLANKTON							
Dinoflagellates undiff:	5%	4%					
Deflandrea spp.		2%					
Circulisporites parvus						100%	
Hystrichokolpoma rigaudae	15%						
Lingulodinium machaerophorum	3%	9%					
Micrhystridium sp. A							100%
Operculodinium centrocarpum	27%	11%					
Spiniferites spp.	50%	74%					
Microplankton % of total count:	**56%**	**22%**				**8.3%**	**2.5%**
TOTAL COUNT SP + MP	**347**	**237**	**195**	**116**	**169**	**12**	**122**
FUNGAL fruiting bodies							1%
FUNGAL hypae		1%		2%	1%	6%	4%
FUNGAL spores		0%	1%	1%			1%
Reworked Spore-Pollen						24%	4%
TOTAL all palynomorphs:	**347**	**240**	**196**	**119**	**170**	**17**	**134**

Table-15:
Selected Palynomorph Distribution Data for Colliers Hill-1

Sample Type:	SWC 30	SWC 29	SWC 24	SWC 22	SWC 17	SWC 07	SWC 04
Depth in metres:	545.6	548.0	571.8	925.1	1283.2	1642.9	1689.2
Depth in feet:	1790	1798	1876	3035	4210	5390	5542
SPORE-POLLEN							
Alisporites similis							X
Aratrisporites spp. RW							RW
Araucariacites australis*	X	X	X		X		X
Baculatisporites spp.		X	X		X	CV	X
Beaupreaidites elegansiformis		X	X				
Beaupreaidites trigonalis ms				X			
Bluffopollis scabratus	X						
Callialasporites dampieri							RW
Ceratosporites equalis					X		X
Cicatricosisporites australiensis					X		X
Clavifera triplex				X			
Coptospora striata					RW		
Corollina torosa							X
Cupressacites sp.							X
Cyatheacidites annulatus	X	X					
Cyathidites australis					X		X
Cyathidites minor					X	X	X
Cyathidites paleospora	X	X	X	X			
Dacrycarpidites australiensis			X				
Dictyophyllidites spp.			X				
Dictyotosporites speciosus							RW
Dilwynites granulatus	X	X	X	X	X		X
Dilwynites pusillus ms (sm.var.)					X		X
Dilwynites tuberculatus			X				
Dryadopollis retequetrus			X				
Ericipites crassiexinus	X		X				
Falcisporites australis RW							RW
Foraminisporis asymmetricus							X
Foraminisporis dailyi					X		
Forcipites sp.							cf
Gleicheniidites circinidites				X	X		
Granodiporites nebulosus			X				
Haloragacidites harrisii	X	X	X	X			
Herkosporites elliottii*	X				X		X
Ilexpollenites spp.	X		X				
Ischyosporites irregularis ms			X	X			
Laevigatosporites major			X				

Table-15:
Selected Palynomorph Distribution Data for Colliers Hill-1

Sample Type:	SWC 30	SWC 29	SWC 24	SWC 22	SWC 17	SWC 07	SWC 04
Depth in metres:	545.6	548.0	571.8	925.1	1283.2	1642.9	1689.2
Depth in feet:	1790	1798	1876	3035	4210	5390	5542
Laevigatosporites ovatus		X	X		X	X	
Latrobosporites amplus					X		
Leptolepidites verrucosus					RW		X
Lygistepollenites florinii	X	X	X	X			
Malvacipollis subtilis		X		X			
Marratisporites scabratus					X		
Matonisporites ornamentalis			X				
Microcachryidites antarticus				X	X		X
Myrtaceidites verrucosus			X				
Neoraistrickia truncata							X
Nothofagidites asperus	X	X	X	X			
Nothofagidites deminutus		X	X	X			
Nothofagidites emarcidus/heterus	X	X	X	X		CV	CV
Nothofagidites falcatus	X	X	X				
Nothofagidites flemingii	X	X	X	X		CV	
Nothofagidites goniatus	X		X				
Nothofagidites senectus					X?		
Nothofagidites vansteenisii		X	X	X		CV	
Osmundacidites wellmanii					X		X
Parvisaccatus catastus				X			
Peninsulapollis gillii					X		
Periporopollenites demarcatus		X	X	X			
Periporopollenites polyoratus			X	X			
Periporopollenites vesicus	X		X				
Peromonolites vellosus			X				
Perotrilites majus					X		
Phyllocladidites mawsonii	X	X	X	X	X	CV	
Phyllocladiidites reticulosaccatus				X			
Pilosisporites parvispinosum RW					RW		
Plicatipollenites spp. RW							RW
Podocarpidites spp.	X	X	X	X	X	X	X
Podosporites microsaccatus			X	X	X		X
Polycolpites simplex ms			X				
Proteacidites spp.	X	X	X	X	X	CV	
Proteacidites adenanthoides	X			X			
Proteacidites annularis	X	X	X	X			
Proteacidites crassus				X			
Proteacidites differentipollis				X			

Table-15:
Selected Palynomorph Distribution Data for Colliers Hill-1

Sample Type:	**SWC 30**	**SWC 29**	**SWC 24**	**SWC 22**	**SWC 17**	**SWC 07**	**SWC 04**
Depth in metres:	**545.6**	**548.0**	**571.8**	**925.1**	**1283.2**	**1642.9**	**1689.2**
Depth in feet:	**1790**	**1798**	**1876**	**3035**	**4210**	**5390**	**5542**
Proteacidites pseudomoides			X				
Proteacidites obscurus			X	X			
Proteacidites recavus	X			X			
Proteacidites reflexus				X			
Proteacidites stipplatus	X						
Protohaploxypinus spp. RW							RW
Pseudowinterapollis couperi		X					
Retitriletes spp.			X	X	X		X
Retitriletes eminulus					X		X
Retitriletes facetus							X
Retitriletes nodosus							X
Santalumidites cainozoicus				X		CV	
Stereisporites antiquisporites	X		X		X		X
Stereisporites australis		X	X				
Stereisporites viriosus					X		
Stereisporites (Tripunctisporis) sp.			X				
Tricolp(or)ites spp.	X	X	X	X	X		
Tricolpites simatus				X			
Tricolporites adelaidensis	X	X	X	X			
Tricolporites leuros			X				
Triporoletes reticulatus					X		X
Triporopollenites ambiguus				X			
Tuberculatosporites sp. A B80					X		X
Verrucosisporites cristatus			X				
Verrucosisporites kopukuensis			X	X			
Vitreisporites pallidus							X
MICROPLANKTON							
Botryococcus sp.	X	X					
Circulosporites parvus					X	X	
Cyclopsiella vieta	X						
Deflandrea phosphoritica		X					
Hystrichokolpoma rigaudae	X						
Lingulodinium machaerophorum	X	X					
Microfasta evansii					RW		
Micrhystridium sp. A. Marshall 1989							X
Operculodinium centrocarpum			X				
Rimosicysta cucullata							X

Table-15: Selected Palynomorph Distribution Data for Colliers Hill-1							
Sample Type:	SWC 30	SWC 29	SWC 24	SWC 22	SWC 17	SWC 07	SWC 04
Depth in metres:	545.6	548.0	571.8	925.1	1283.2	1642.9	1689.2
Depth in feet:	1790	1798	1876	3035	4210	5390	5542
Rimosicysta eversa							X
Rimosicysta kipperii							X
Operculodinium centrocarpum	X	X					
Protoellipsodinium simplex ms	X	cf					
Spiniferites spp.	X	X					
Systematophora placacanthum	X						
Tectatodinium pellitum		X					
X = Present							
RW = Reworked species							
CV = Caved species							
cf = Compared with							

Table-16: Selected Palynomorph Abundance Data for Dutson Downs-1

Sample Type:	Core-2	Cts	Cts	Core-3	Cts	SWC 26	SWC 22	SWC 18	SWC 12	Core 6	SWC 03	SWC 01
Depth in metres:	914.4	1115.6	1194.8	1293.9	1319.8	1466.4	1501.4	1543.2	1707.8	1729.1	1786.7	1834.9
Depth in feet:	3000	3660	3920	4245	4330	4811	4926	5063	5603	5673	5862	6020
TRILETE SPORES undiff.	0.5%	0.9%	0.7%	4.4%		1.5%	1.6%	1.6%	4.0%	2.0%	6.4%	5.6%
Baculatisporites spp.			0.7%	11.4%		4.0%	3.1%	4.1%	4.0%	2.0%	9.2%	17.7%
Cicatricosisporites spp.				1.8%		0.5%			4.0%		0.9%	4.7%
Crybelosporites spp.												0.5%
Cyathidites spp. large >40μm		0.9%		3.5%			5.4%	2.4%	12.0%			1.4%
Cyathidites spp. small <40μm		0.9%	2.8%	11.4%		3.0%	9.3%	8.9%		38.6%	4.6%	11.2%
Dictyophyllidites spp.			4.9%							1.0%	0.9%	0.9%
Foraminisporis asymmetricus												5.6%
Foraminisporis wonthaggiensis												3.3%
Gleicheniidites/Clavifera spp.	1.1%		28.5%	1.8%		0.5%		2.4%				0.5%
Herkosporites elliottii				5.3%			1.6%	3.3%				
Osmundacidites spp.								2.4%		3.0%	4.6%	9.8%
Retitriletes spp.				8.8%			1.6%	1.6%		1.0%		7.0%
Stereisporites spp.							3.1%				3.7%	0.5%
MONOLETES SPORES undiff.				0.9%			0.8%					
Laevigatosporites spp.			3.5%	3.5%		11.5%	0.8%	4.9%	28.0%	1.0%	1.8%	0.5%
Marratisporites scabratus										1.0%		
Peromonolites spp.						0.5%						
HILATE SPORES											0.9%	0.5%
Aequitriradites spp.						1.0%	0.8%			4.0%		0.5%
Triporoletes reticulatus												1.4%
Total Spores:	**2%**	**3%**	**41%**	**53%**		**23%**	**28%**	**32%**	**52%**	**53%**	**33%**	**71%**
GYMNOSPERMS								0.8%			4.6%	
Araucariacites australis	0.5%			1.8%		4.5%	7.8%	5.7%		3.0%	2.8%	4.2%
Cupressacites sp.							1.6%			1.0%	1.8%	
Dilwynites spp.	0.5%	0.9%	4.9%	0.9%			6.2%	2.4%		3.0%	17.4%	
Dilwynites pusillus						3.5%	3.1%	7.3%		18.8%	3.7%	
Lygistepollenites florinii	2.1%	2.7%	2.1%									
Microcachyridites antarticus	0.5%		0.7%	1.8%		1.5%	3.1%	4.1%		2.0%	6.4%	14.9%
Phyllocladidites eunuchus								0.8%	4.0%			
Phyllocladidites mawsonii	12.7%	44%	1.4%	2.6%		2.0%	2.3%	2.4%			0.9%	
Podocarpidites spp.	3.7%	3.5%	0.7%	11.4%		27%	31%	22.8%	32%	14.9%	28.4%	8.8%
Podosporites microsaccatus	0.5%					11.5%	1.6%	4.9%		3.0%	0.9%	0.9%
Total Gymnosperms:	**21%**	**51%**	**10%**	**18%**		**50%**	**57%**	**51%**	**36%**	**46%**	**67%**	**29%**
ANGIOSPERM POLLEN	0.5%		1.4%	4.4%				0.8%				
Casuarina (H. harrisii)	5.3%	9.7%	20.8%									
Forcipites sabulosus				11.4%		15.5%	5.4%	8.1%				
Forcipites spp.							0.8%					
Gambierina rudata						0.5%						
Ilexpollenites spp.	1.1%											
Liliacidites spp.	0.5%											
Malvacipollis spp.	1.6%	5.3%	4.2%									
N. asperus/goniatus	2%		1%									
N. brachyspinulosus/flemingii	1%	4%										
N. deminutus/vansteenisii	9%	2%	1%									
N. emarcidus/heterus/falcatus	53%	17%	7%									
N. senectus				2%		2%		2%				

Table-16: Selected Palynomorph Abundance Data for Dutson Downs-1

Sample Type:	Core-2	Cts	Cts	Core-3	Cts	SWC 26	SWC 22	SWC 18	SWC 12	Core 6	SWC 03	SWC 01
Depth in metres:	914.4	1115.6	1194.8	1293.9	1319.8	1466.4	1501.4	1543.2	1707.8	1729.1	1786.7	1834.9
Depth in feet:	3000	3660	3920	4245	4330	4811	4926	5063	5603	5673	5862	6020
Peninsulapollis gillii				4.4%		7.0%	0.8%					
Periporopollenites spp.	1.6%											
Proteacidites spp.	0.5%	5.3%	11.1%	7.0%		1.5%	6.2%	5.7%	8.0%	1.0%		
Proteacidites annularis		1.8%										
Proteacidites obscurus	1.6%		1.4%									
Tricolpites confessus						0.5%		0.8%	4.0%			
Tricolp(or)ates spp.	1.1%	0.9%	2.1%			1.0%	1.6%					
Triporopollenites spp.							0.8%					
Total Angiosperms:	**78%**	**46%**	**49%**	**29%**		**28%**	**16%**	**17%**	**12%**	**1%**		
Total Spore-Pollen Count	**189**	**113**	**144**	**114**		**200**	**129**	**123**	**25**	**101**	**109**	**215**
MICROPLANKTON												
Dinoflagellates undiff:	1%											
Circulisporites parvus						2%				2%	4%	
Gippslandica extensa	1%											
Microplankton % of total count:	**1%**					**2%**				**2%**	**4%**	
TOTAL COUNT SP + MP	**191**	**113**	**144**	**114**		**204**	**129**	**123**	**25**	**103**	**114**	**215**
FUNGAL fruiting bodies							1%					
FUNGAL hypae	1%	3%	1%			1%	6%	34%		7%	4%	
FUNGAL spores	1%	2%	1%			0.5%	4%	15%		20%	2%	
Reworked Spore-Pollen									19%		1%	
TOTAL all palynomorphs:	**193**	**118**	**146**	**114**		**208**	**145**	**242**	**31**	**142**	**122**	**215**

Table–17: Selected Palynomoprh Distribution for Dutson Downs–1

Sample Type:	Core-2	Cts	Cts	Core-3	Cts	SWC 26	SWC 22	SWC 18	SWC 12	Core 6	SWC 03	SWC 01
Depth in metres:	914.4	1115.6	1194.8	1293.9	1319.8	1466.4	1501.4	1543.2	1707.8	1729.1	1786.7	1834.9
Depth in feet:	3000	3660	3920	4245	4330	4811	4926	5063	5603	5673	5862	6020
SPORE-POLLEN												
Aequitriradites spinulosus				X		X	X			X		X
Aratrisporites spp. RW											RW	
Araucariacites australis*	X			X		X	X	X		X	X	X
Australopollis obscurus					X							
Baculatisporites spp.			X	X	X	X	X	X	X	X	X	X
Banksieaeidites elongatus	X											
Beaupreaidites elegansiformis	X											
Beaupreaidites trigonalis ms	X											
Bluffopollis scabratus	X											
Ceratosporites equalis										X		X
Cicatricosisporites spp.						X	X		X	X	X	X
Cicatricosisporites australiensis				X			X					X
Clavifera triplex			X		X							
Corollina torosa							X	X			X	X
Crybelosporites berberioides												X
Crybelosporites striatus												X
Cupressacites sp.							X			X	X	
Cyathidites australis				X			X			X		X
Cyathidites minor						X	X	X		X	X	X
Cyathidites paleospora	X	X										
Cyathidites splendens		X			X							
Cyperacceaepollis neogenicus	X											
Dacrycarpites australiensis	X											
Dicotetradites clavatus			X		X							
Dictyophyllidites spp.			X				X	X		X	X	X
Dictyotosporites complex				RW								
Dictyotosporites speciosus												X
Dilwynites granulatus	X	X	X	X	X	X	X	X		X	X	
Dilwynites pusillus ms (sm.var.)						X	X	X		X	X	
Dryadopollis retequetrus	X											
Ericipites scabratus	X											
Foraminisporis asymmetricus												X
Foraminisporis dailyi												X
Foraminisporis wonthaggiensis												X
Forcipites sabulosus				X		X	X	X				
Foveosporites cannalis												X
Gambierina rudata						X	cf	cf				
Gleicheniidites circinidites	X		X	X	X	X						X
Haloragacidites harrisii	X	X	X		X		CV	CV			CV	
Herkosporites elliottii*				X	X	X	X	X				
Horriditriletes ramosus RW											RW	
Ilexpollenites spp.	X				X							

Table-17: Selected Palynomoprh Distribution for Dutson Downs-1

Sample Type:	Core-2	Cts	Cts	Core-3	Cts	SWC 26	SWC 22	SWC 18	SWC 12	Core 6	SWC 03	SWC 01
Depth in metres:	914.4	1115.6	1194.8	1293.9	1319.8	1466.4	1501.4	1543.2	1707.8	1729.1	1786.7	1834.9
Depth in feet:	3000	3660	3920	4245	4330	4811	4926	5063	5603	5673	5862	6020
Laevigatosporites ovatus	X		X	X	X	X	X	X	X	X	X	X
Latrobosporites amplus				X			X					
Latrobosporites marginatus	X											
Leptolepidites verrucosus				RW								X
Liliacidites spp.	X											
Lygistepollenites balmei					X			X	CV			
Lygistepollenites florinii	X	X	X				cf					
Malvacipollis robustus ms	X											
Malvacipollis subtilis	X	X	X					CV				
Marratisporites scabratus										X		
Microcachryidites antarticus			X	X	X	X	X	X		X	X	X
Myrtaceidites tenuis					CV							
Neoraistrickia truncata												X
Nothofagidites asperus	X		X									
Nothofagidites deminutus		X	X									
Nothofagidites emarcidus/heterus	X	X	X		X			CV			X	
Nothofagidites falcatus	X		X									
Nothofagidites flemingii	X	X										
Nothofagidites goniatus	X				X							
Nothofagidites senectus				cf		X	X	CV				
Nothofagidites vansteenisii	X	X	X									
Osmundacidites wellmanii								X		X	X	X
Parvisaaccatus catastus					X							
Peninsulapollis gillii				X		X	X	X				
Periporopollenites demarcatus	X		X		X							
Periporopollenites polyoratus					X							
Periporopollenites vesicus	X											
Peromonolites bowenii					X							
Perotrilites linearis												X
Perotrilites majus				X								cf
Phyllocladidites eunuchus ms								X	X			
Phyllocladidites mawsonii	X	X	X	X	X	X	X	X			X	
Pilosisporites parvispinosus												X
Podocarpidites spp.	X	X	X	X	X	X	X	X	X	X	X	X
Podosporites microsaccatus	X		X			X	X	X		X	X	X
Proteacidites spp.	X	X	X	X	X	X	X	X	X	X		
Proteacidites adenanthoides	X		X		X							
Proteacidites annularis	X	X				CV						
Proteacidites asperopolus			X									
Proteacidites crassus	X	X										
Proteacidites grandis			cf		X							
Proteacidites incurvatus					X							
Proteacidites pachypolus	X											
Proteacidites obscurus	X	X	X									

Table–17: Selected Palynomoprh Distribution for Dutson Downs-1

Sample Type:	Core-2	Cts	Cts	Core-3	Cts	SWC 26	SWC 22	SWC 18	SWC 12	Core 6	SWC 03	SWC 01
Depth in metres:	914.4	1115.6	1194.8	1293.9	1319.8	1466.4	1501.4	1543.2	1707.8	1729.1	1786.7	1834.9
Depth in feet:	3000	3660	3920	4245	4330	4811	4926	5063	5603	5673	5862	6020
Proteacidites rugulatus	cf	X										
Retitriletes spp.	X				X		X	X		X		X
Retitriletes austroclavatidites												X
Retitriletes eminulus												X
Santalumidites cainozoicus	X											
Stereisporites antiquisporites				X		X	X				X	X
Tricolp(or)ites spp.	X	X	X			X	X	X	X			
Tricolpites confessus						X						
Tricolpites simatus	X											
Tricolporites adelaidensis	X	X	X		X							
Tricolporites leuros			X									
Tricolporites sphaerica	X		X		X							
Triorites magnificus	X											
Triporoletes reticulatus						X	X					X
Verrucosisporties cristatus	X											
Verrucosisporties kopukuensis	X		X									
Vitreisporites pallidus								X				
MICROPLANKTON												
Circulosporites parvus						X				X	X	
Corrudinium incompositum	X											
Gippslandica extensa	X				CV							
Micrhystridium sp. A. Marshall 1989											X	
X = Present												
RW = Reworked species												
CV = Caved species												
cf = Compared with												

Table-18: Selected Palynomorph Abundance Data for Golden Beach West-1

Sample Type:	SWC 29	SWC 24	SWC 23	SWC 30B	SWC 27B	SWC 26B	SWC 20B	SWC 16B	CORE 6	CORE 7	SWC 6B	SWC 2B
Depth in metres:	976.9	1005.8	1036.3	1706.9	1752.6	1770.9	1828.8	1920.2	1947.4	2089.7	2231.1	2288.4
Depth in feet:	3205	3300	3400	5600	5750	5810	6000	6300	6389	6856	7320	7508
TRILETE SPORES undiff.	1.2%			1.6%		3.0%	4.5%	7.9%	2.6%	0.9%		0.6%
Baculatisporites spp.				7.1%	0.7%	5.1%	8.3%	4.4%	9.6%	3.5%		
Cicatricosisporites spp.					0.7%	1.0%	2.3%		0.9%		14.3%	0.6%
Cyathidites spp. large >40μm				0.8%		10.1%	18.0%	4.4%	3.5%	2.6%	14.3%	
Cyathidites spp. small <40μm	0.6%		0.9%	4.7%	2.2%	5.1%	8.3%	14.0%	3.5%	5.3%	14.3%	1.2%
Dictyophyllidites spp.				0.8%			0.8%	0.9%	0.9%			
Gleicheniidites/Clavifera spp.					0.7%	2.0%	0.8%			0.9%		
Herkosporites elliottii				3.1%	0.7%	2.0%	0.8%	2.6%	1.7%			
Osmundacidites spp.							0.8%		3.5%			
Perotrilites spp.									0.9%	0.9%		
Retitriletes spp.				2.4%		2.0%	3.8%	0.9%	0.9%			0.6%
Stereisporites spp.						1.0%				0.9%		
Verrucosisporites kopukuensis	1.2%	1.2%										
MONOLETES SPORES undiff.		1.2%										
Laevigatosporites spp.	2.4%			1.6%	1.4%	3.0%	0.8%		2.6%	0.9%	28.6%	
HILATE SPORES												
Triporoletes reticulatus						1.0%	0.8%	21.1%		0.9%		0.6%
MEGASPORES						1.0%	0.8%	0.9%				
Total Spores:	**5%**	**2%**	**1%**	**22%**	**6%**	**36%**	**50%**	**57%**	**30%**	**17%**	**71%**	**4%**
GYMNOSPERMS			0.9%									
Araucariacites australis	0.6%			1.6%	1.4%	8.1%	6.8%	0.9%	18.3%	7.9%		2.5%
Cupressacites sp.						1.0%			1.7%	0.9%		
Dilwynites spp.				1.6%	10.1%	4.0%	6.8%	2.6%	12.2%	40.4%		5.0%
Dilwynites pusillus						1.0%	2.3%	1.8%	3.5%	9.6%		0.6%
Lygistepollenites florinii	1.8%	1.9%	0.9%									
Microcachyridites antarticus					14.4%	1.0%	4.5%	6.1%	2.6%	8.8%		64.0%
Phyllocladidites eunuchus							0.8%					
Phyllocladidites mawsonii	4.1%	2.5%	29.8%	7.1%	3.6%	3.0%	3.0%	1.8%		0.9%		
Podocarpidites spp.	2.4%	1.9%	4.4%	16.5%	36.7%	12.1%	20.3%	25.4%	19.1%	11.4%	28.6%	23.0%
Podosporites microsaccatus		0.6%			2.9%	1.0%	0.8%	3.5%	3.5%	0.9%		1.2%
Vitreisporites signatus									1.7%			
Total Gymnosperms:	**9%**	**7%**	**36%**	**27%**	**69%**	**31%**	**45%**	**42%**	**63%**	**81%**	**29%**	**96%**
ANGIOSPERM POLLEN	1.2%	3.1%										
Casuarina (H. harrisii)	9.4%	43.2%	18.4%									
Dicotetradites clavatus	2.4%	0.6%	0.9%									
Forcipites sabulosus				29.9%	7.9%							
Forcipites spp.				2.4%		16.2%						
Ilexpollenites spp.	0.6%											
Malvacipollis spp.	0.6%	3.7%	7.9%									
N. brachyspinulosus/flemingii	0.6%	2.5%	0.9%									
N. deminutus/vansteenisii	2.9%	2.5%										
N. emarcidus/heterus/falcatus	58.8%	14.2%	4.4%									
N. senectus				3.1%								
Peninsulapollis gillii				3.9%	3.6%	3.0%						

Table-18: Selected Palynomorph Abundance Data for Golden Beach West-1

Sample Type:	SWC 29	SWC 24	SWC 23	SWC 30B	SWC 27B	SWC 26B	SWC 20B	SWC 16B	CORE 6	CORE 7	SWC 6B	SWC 2B
Depth in metres:	976.9	1005.8	1036.3	1706.9	1752.6	1770.9	1828.8	1920.2	1947.4	2089.7	2231.1	2288.4
Depth in feet:	3205	3300	3400	5600	5750	5810	6000	6300	6389	6856	7320	7508
Proteacidites spp.	2.4%	17.3%	22.8%	11.0%	9.4%	13.1%	4.5%		3.5%	0.9%		
Proteacidites recavus			5.3%									
Tricolp(or)ates spp.	7.1%	3.7%	2.6%					0.9%	3.5%	1.8%		
Triporopollenites spp.				0.8%	3.6%							
Total Angiosperms:	**86%**	**91%**	**63%**	**51%**	**24%**	**32%**	**5%**	**1%**	**7%**	**3%**		
Total Spore-Pollen Count	**170**	**162**	**114**	**127**	**139**	**99**	**133**	**114**	**115**	**114**	**7**	**161**
MICROPLANKTON												
Dinoflagellates undiff:	100%					100%						
Deflandrea spp.												
Circulisporites parvus				100%			100%		100%			
Micrhystridium sp. A										100%		
Microplankton % of total count:	**1%**			**1%**		**1%**	**1%**		**1%**	**1%**		
TOTAL COUNT SP + MP	**171**	**162**	**114**	**128**	**139**	**100**	**134**	**114**	**116**	**115**	**7**	**161**
FUNGAL fruiting bodies										1%		
FUNGAL hypae	2%		1%		7%		1%	2%	13%	9%		
FUNGAL spores	3%	1%	1%	1%	3%	3%	1%		4%	3%		
Reworked Spore-Pollen									1%			1%
TOTAL all palynomorphs:	**180**	**163**	**116**	**129**	**153**	**103**	**137**	**116**	**141**	**132**	**7**	**163**

Table-19:

Selected Palynomorph distribution Data for Golden Beach West-1

Sample Type:	SWC 29	SWC 24	SWC 23	SWC 30B	SWC 27B	SWC 26B	SWC 20B	SWC 16B	CORE 6	CORE 7	SWC 6B	SWC 2B
Depth in metres:	976.9	1005.8	1036.3	1706.9	1752.6	1770.9	1828.8	1920.2	1947.4	2089.7	2231.1	2288.4
Depth in feet:	3205	3300	3400	5600	5750	5810	6000	6300	6389	6856	7320	7508
SPORE-POLLEN												
Aequitriradites spinulosus								X				
Alisporites simplis										X		
Araucariacites australis*	X			X	X	X	X	X	X	X		X
Baculatisporites spp.				X	X	X	X	X	X	X		
Balmeisporites glenelgensis						X	X	X		X		
Balmeisporites holodictyus								X				
Beaupreaidites trigonalis ms	X											
Ceratosporites equalis						X	X	X	X			
Cicatricosisporites spp.						X	X		X		X	X
Cicatricosisporites australiensis						X	X	X				
Cicatricosisporites cuneiformis												X
Coptospora pileolus ms										X		
Crybelosporites brennerii								X				
Cupanieidites orthoteichus	X											
Cupressacites sp.						X			X	X		
Cyatheacidites tectifera									X			
Cyathidites asper										X		
Cyathidites australis						X	X	X	X	X	X	X
Cyathidites minor					X	X	X	X	X	X	X	X
Cyathidites paleospora	X		X	X								
Cyathidites splendens	X											
Cyclosporites hughesii									RW			
Dacrycarpites australiensis	X		X		X							
Dicotetradites clavatus	X	X	X									
Dictyophyllidites spp.				X			X	X			X	
Dictyotosporites speciosus										RW		
Dilwynites granulatus				X	X	X	X	X	X	X		X
Dilwynites pusillus ms (sm.var.)							X	X	X	X		X
Dryadopollis retequetrus	X											
Ericipites crassiexinus	X											
Forcipites sabulosus				X	X	X						
Gemmatricolporites divaricatus	X											
Gleicheniidites circinidites						X	X	X		X		
Haloragacidites harrisii	X	X	X				cf				CV	CV
Herkosporites elliottii*								X				
Ilexpollenites spp.	X											
Ischyosporites punctatus							X					
Laevigatosporites major	X											
Laevigatosporites ovatus	X			X	X	X	X	X	X	X		
Latrobosporites amplus							X					
Latrobosporites ohaiensis									X			

Table-19:

Selected Palynomorph distribution Data for Golden Beach West-1

Sample Type:	SWC 29	SWC 24	SWC 23	SWC 30B	SWC 27B	SWC 26B	SWC 20B	SWC 16B	CORE 6	CORE 7	SWC 6B	SWC 2B
Depth in metres:	976.9	1005.8	1036.3	1706.9	1752.6	1770.9	1828.8	1920.2	1947.4	2089.7	2231.1	2288.4
Depth in feet:	3205	3300	3400	5600	5750	5810	6000	6300	6389	6856	7320	7508
Leptolepidites verrucosus							X					
Liliacidites spp.	X											
Lygistepollenites florinii	X	X	X									
Malvacipollis subtilis	X	X	X									
Microcachryidites antarticus					X		X	X	X	X		X
Myrtaceidites parvus/mesonesus	X											
Neoraistrickia truncata							X					
Nothofagidites deminutus	X											
Nothofagidites emarcidus/heterus	X	X	X							CV	CV	
Nothofagidites falcatus	X											
Nothofagidites flemingii	X	X	X									
Nothofagidites senectus				X								
Nothofagidites vansteenisii	X	X										
Osmundacidites wellmanii							X		X			
Peninsulapollis gillii				X	X	X		X	cf			
Periporopollenites demarcatus	X	X										
Perotrilites majus				X						X		
Phyllocladidites eunuchus ms							X			X		
Phyllocladidites mawsonii	X	X	X	X	X	X	X	X	X	X		
Phyllocladiidites reticulosaccatus			X		X							
Podocarpidites spp.	X	X	X	X	X	X	X	X	X	X	X	X
Podosporites microsaccatus		X			X	X	X	X	X	X		X
Polycolpites esobalteus	X											
Proteacidites spp.	X	X	X	X	X	X	X	X	X	X		
Proteacidites adenanthoides	X	X	X									
Proteacidites annularis	X	X	X									
Proteacidites latrobensis			X									
Proteacidites nasus		X										
Proteacidites obscurus	X	X	X									
Proteacidites pachypolus	X											
Proteacidites recavus		X	X									
Proteacidites reflexus			X									
Proteacidites rugulatus			cf									
Retitriletes spp.				X		X	X	X	X	X		X
Retitriletes austroclavatidites							X					
Retitriletes circolumenus									X			
Retitriletes eminulus									X			
Retitriletes nodosus							X	X				
Rugulatisporites admirabilis ms								cf				
Santalumidites cainozoicus	X											
Sapotaceoidaepollenites rotundus		X										
Schizocolpus rarus ms	X											

Table–19:

Selected Palynomorph distribution Data for Golden Beach West–1

Sample Type:	SWC 29	SWC 24	SWC 23	SWC 30B	SWC 27B	SWC 26B	SWC 20B	SWC 16B	CORE 6	CORE 7	SWC 6B	SWC 2B
Depth in metres:	976.9	1005.8	1036.3	1706.9	1752.6	1770.9	1828.8	1920.2	1947.4	2089.7	2231.1	2288.4
Depth in feet:	3205	3300	3400	5600	5750	5810	6000	6300	6389	6856	7320	7508
Stereisporites antiquisporites						X				X		
Stereisporites viriosus								X				
Tetracolporites multistrixus												
Tricolp(or)ites spp.	X		X					X	X	X		
Tricolpites simatus	X		X									
Tricolpites thomasii	cf											
Tricolporites adelaidensis	X	X										
Tricolporites gestus	X											
Tricolporites leuros		X										
Tricolporites moultonii ms			X									
Tricolporites scabratus	X											
Triporoletes reticulatus						X	X	X		X		X
Triporopollenites spp.				X	X							
Verrucosisporties kopukuensis	X	X										
Vitreisporites pallidus									X			
MICROPLANKTON												
Circulosporites parvus				X			X		X			
Luxadinium lingulatum Marshall 1989										X		
Micrhystridium sp. A, Marshall 1989										X		
Rimosicysta aspera										X		
Rimosicysta concava										X		
X = Present												
RW = Reworked species												
CV = Caved species												
cf = Compared with												

Table-20:			
Selected Palynomorph Abundance Data for Merriman-1			
Sample Type:	CORE 4	CUTTINGS	CUTTINGS
Depth in metres:	1546.9	1725.2	1816.6
Depth in feet:	5075	5660	5960
TRILETE SPORES undiff.	9.7%	8.6%	
Baculatisporites spp.	6.7%	5.4%	
Cicatricosisporites spp.		1.1%	
Cyathidites spp. large >40μm	9.0%	6.5%	4.5%
Cyathidites spp. small <40μm	13.4%		
Dictyophyllidites spp.	0.7%	1.1%	
Gleicheniidites/Clavifera spp.	2.2%		
Herkosporites elliottii	2.2%		
Osmundacidites spp.	3.0%	2.2%	
Retitriletes spp.	3.0%	4.3%	
Laevigatosporites spp.	2.2%		
Peromonolites spp.	0.7%		
HILATE SPORES			
Aequitriradites spp.	0.7%		
Total Spores:	54%	29%	5%
GYMNOSPERMS			
Araucariacites australis	5.2%	4.3%	18.2%
Corollina spp.	4.5%	4.3%	
Cupressacites sp.	0.7%	4.3%	
Dilwynites spp.	1.5%	22.6%	13.6%
Dilwynites pusillus	4.5%	16.1%	27.3%
Microcachyridites antarticus	4.5%	3.2%	9.1%
Phyllocladidites eunuchus	0.7%		
Phyllocladidites mawsonii	0.7%		
Podocarpidites spp.	20.1%	14.0%	18.2%
Podosporites microsaccatus	2.2%		9.1%
Vitreisporites signatus	0.7%	1.1%	
Total Gymnosperms:	46%	70%	95%
ANGIOSPERM POLLEN			
Proteacidites spp.	0.7%		
Tricolp(or)ates spp.		1.1%	
Total Angiosperms:	1%	1%	
Total Spore-Pollen Count	134	93	22
MICROPLANKTON			
Micrhystridium sp. A		2%	
Rimosicysta spp.		13%	
Microplankton % of total count:		15%	
TOTAL COUNT SP + MP	134	109	22
FUNGAL fruiting bodies	1%	0%	
FUNGAL hypae	10%	1%	
FUNGAL spores	3%	2%	
Caved spore-pollen		50%	55%
TOTAL all palynomorphs:	155	232	49

Table-21:			
Selected Palynomorph Abundance Data for Merriman-1			
Sample Type:	**CORE 4**	**CUTTINGS**	**CUTTINGS**
Depth in metres:	**1546.9**	**1725.2**	**1816.6**
Depth in feet:	**5075**	**5660**	**5960**
SPORE-POLLEN			
Aequitriradites sp.	X		
Aglaoreidia qualumis		CV	
Annulispora microannulata RW			RW
Araucariacites australis*	X	X	X
Baculatisporites spp.	X	X	
Balmeisporites glenelgensis	MED		
Cicatricosisporites spp.	X	X	X
Clavifera triplex		CV	
Coptospora pileolus ms	X		
Corollina simplex	X		
Corollina torosa	X	X	
Cupressacites sp.		X	
Cyathidites australis	X	X	X
Cyathidites minor	X		
Dictyophyllidites spp.	X	X	
Dictyotosporites speciosus			X
Dilwynites granulatus	X	X	X
Dilwynites pusillus ms (sm.var.)	X	X	X
Falcisporites australis	RW		
Foraminisporis asymmetricus		X	
Gleicheniidites circinidites	X	CV	
Granulatisporites trisinus RW	RW		
Haloragacidites harrisii		CV	CV
Herkosporites elliottii*	X		
Horriditriletes ramosus RW	RW		
Laevigatosporites ovatus	X		
Leptolepidites verrucosus	X		
Microbaculispora spp. RW	RW		
Microcachryidites antarticus	X	X	X
Myrtaceidites tenuis	CV		
Neoraistrickia truncata	X		
Nothofagidites emarcidus/heterus	CV	CV	CV
Osmundacidites wellmanii	X	X	
Perotrilites jubatus		X	
Perotrilites majus	X		

Table-21:			
Selected Palynomorph Abundance Data for Merriman-1			
Sample Type:	CORE 4	CUTTINGS	CUTTINGS
Depth in metres:	1546.9	1725.2	1816.6
Depth in feet:	5075	5660	5960
Phyllocladidites eunuchus ms	X		
Phyllocladidites mawsonii	X	CV	CV
Podocarpidites spp.	X	X	X
Podosporites microsaccatus	X	CV	X
Proteacidites spp.	X	CV	CV
Proteacidites obscurus			CV
Proteacidites stipplatus			CV
Protohaploxypinus spp.	RW		
Pseudoreticulatispora pseudoreticulata	RW		
Retitriletes spp.	X	X	X
Retitriletes nodosus	X		X
Rugulatisporites admirabilis ms	X		
Tricolp(or)ites spp.		X	CV
Triporoletes reticulatus	X		
Vitreisporites pallidus	X	X	
MICROPLANKTON			
Micrhystridium sp. A, Marshall 1989		X	
Rimosicysta aspera		X	
Rimosicysta concava		X	
Spiniferites spp.			CV
X = Present			
RW = Reworked species			
CV = Caved species			
cf = Compared with			
MED = Dettmann (1966)			