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Airphotograph Study of Coastal Changes - Southeast Queensland

by

C.J. Simpson

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AIRPHOTOGRAPH STUDY OF COASTAL CHANGES - SOUTHEAST QUEENSLAND

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AIRPHOTOGRAPH STUDY OF COASTAL CHANGES - SOUTHEAST QUEENSLAND

SUMMARY

The coast and offshore islands between Porpoise Point and Noosa Head, South Queensland, were studied on all available aerial photography flown between 1940 and 1969, to detect erosional or depositional changes. The only potential problem area which could be identified is on the north end of Bribie Island at Caloundra.

INTRODUCTION

The photogeological study was made to assist the BMR Engineering Geophysics Group investigations into coastal erosion in southeast Queensland.

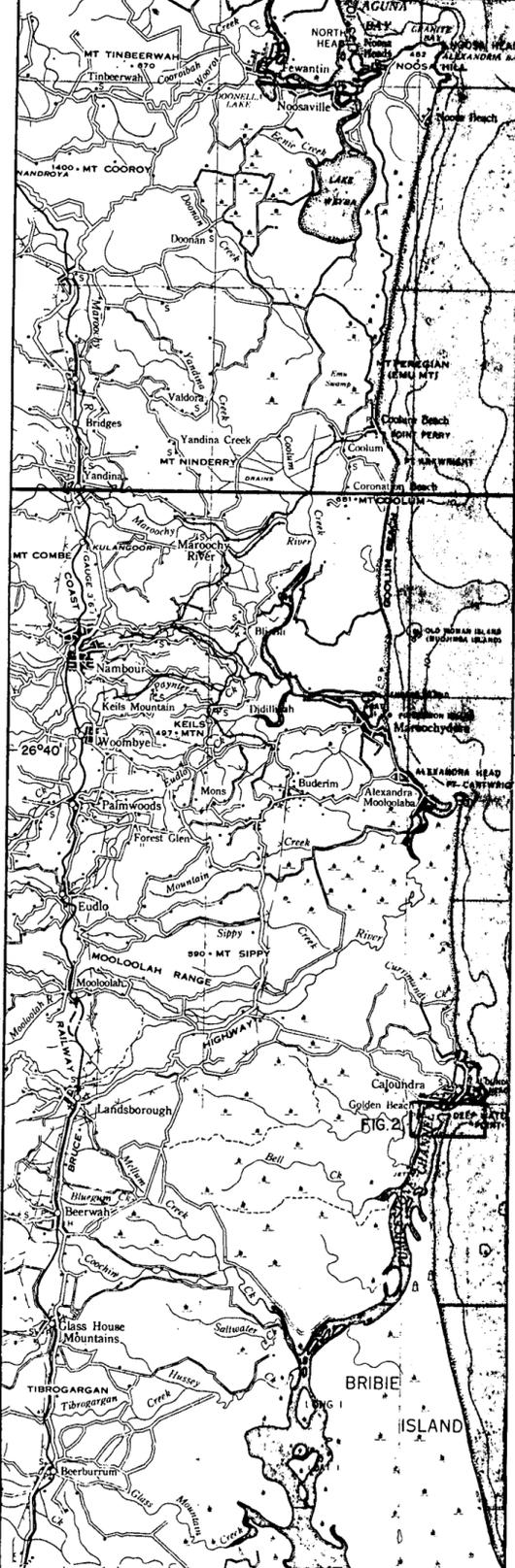
PHOTOINTERPRETATION

The aim of the study was to detect areas of coastal erosion, or deposition, over the section of coastline and islands between Porpoise Point $27^{\circ}56'S$, $152^{\circ}25'18"E$ on South Stradbroke Island and Noosa Head $26^{\circ}22'36"S$, $153^{\circ}7'E$ (Fig. 1). All available vertical airphotographs were studied as time sequential records showing shoreline changes between photographs of different dates. Photographs studied (Appendix) vary in dates from 1940 to 1969 but normally no more than three useful dates of photography were available over any one area.

The coast consists of headlands of indurated Mesozoic rocks separated by Pleistocene? to Recent unconsolidated alluvial and aeolian deposits (Hails, 1964). Only the unconsolidated deposits have been considered in this study and these have been broadly classified into stabilized or mobile material. Areas of alluvium or soil which, at the time of photography, supported mature trees or shrubs are classified as stabilized. Areas of loose material (beaches, spits, bars) which at the time of photography were in a state of mobilization, or capable of being easily mobilized by water or wind action, are classified as mobile. Photographs were studied to detect measurable changes in the position of the boundary between stabilized and mobile material. Where significant changes were noted the position of the boundary on each date of photography was annotated, then replotted at a common scale.

SOUTH-EAST QUEENSLAND

Showing coastline covered in survey

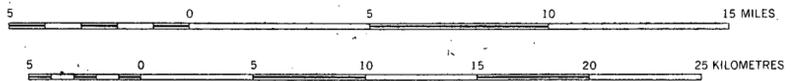


Reference

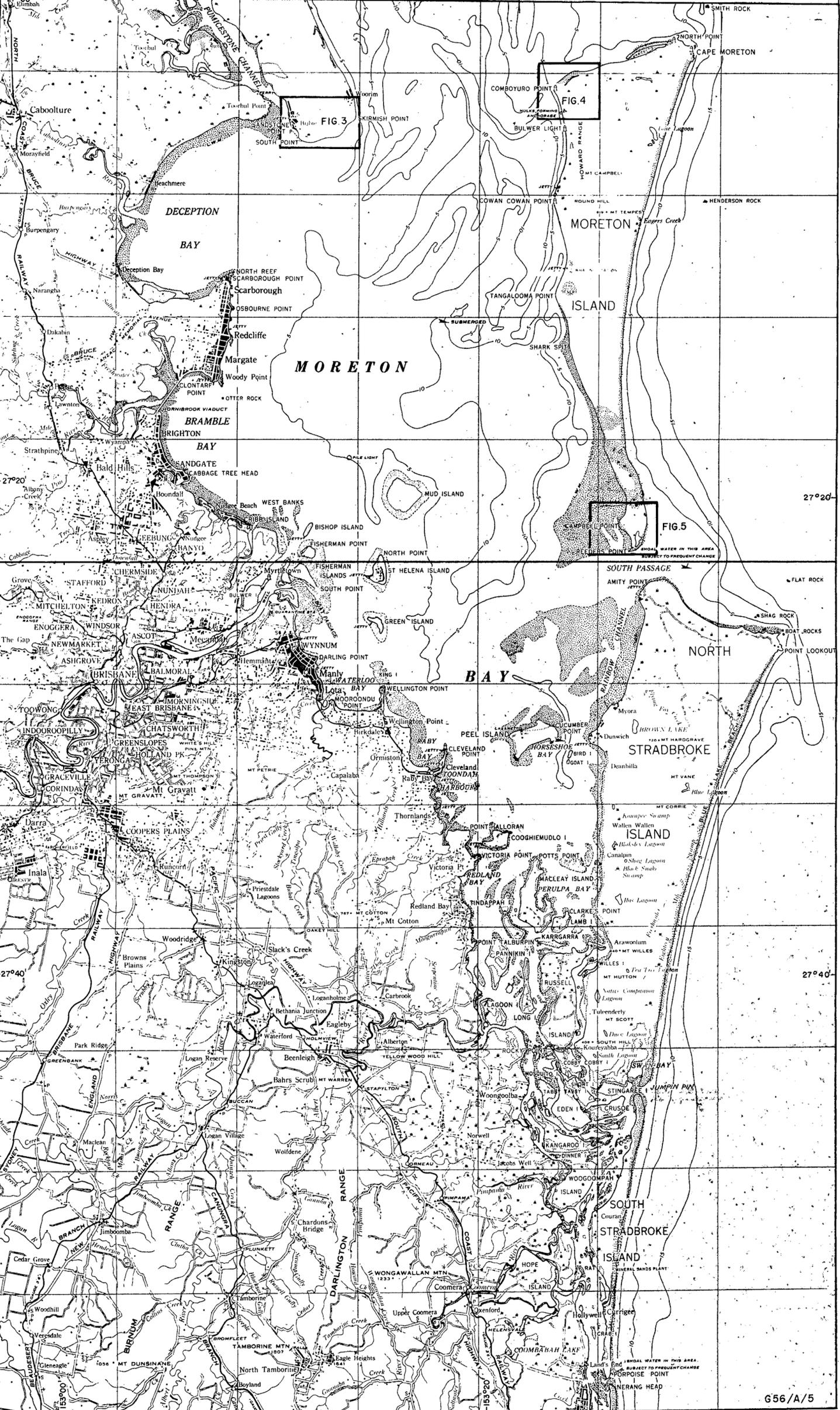
Roads	Highway or First class	=====
	Main connecting or Second class	-----
	Minor or Third class	-----
	Fourth class	-----
Track, foot or pack	-----	-----
Railway with station	-----	-----
Railway with tunnel	-----	-----
Tramway	-----	-----
Electric transmission line, along road	-----	-----
	across country	-----
Spot height	• 821	
Wireless mast, Lighthouse	▲	
Buildings, Church	+	
School, Post Office, Hotel	• S • P • H	
Pier or wharf, Breakwater	-----	
River or stream	-----	
Canal, channel or drain	-----	
Swamp or marsh	-----	
Wreck, Rocks	-----	
Coral reef	-----	
Mud, Sand (Mobile deposits)	-----	
Mangroves	-----	

Compiled from Royal Australian Army Survey Corps 1:250,000 topographical sheets, Brisbane and Gympie Transverse Mercator Projection

Scale 1:250,000



To accompany Record 1970/55



RESULTS

Results are discussed under three area subdivisions:

1. Noosa Head to Skirmish Point
2. Moreton Bay
3. Moreton and Stradbroke Islands

The accompanying Figures 2, 3, 4, 5 show the position of the boundary between stabilized and mobile material at the date indicated.

Noosa Head to Skirmish Point

Maximum time interval for photographs over this section is 27 years. With the exception of the north end of Bribie Island at Caloundra (discussed below) there have been virtually no measurable changes in the coastline.

This section of coastline is open to the Pacific Ocean and is subject to north-flowing longshore currents. Localized eddy currents form at the headlands at Noosa, Point Cartwright and Caloundra. The active longshore current operates between 180-220 m offshore from the waterline. All photographs show that rip currents (centred between 250-300 m apart) are continually active between the longshore current and the waterline.

The prevailing SE winds (Hails, 1964) cause blowouts (Bird, 1968) in sections of the coastal foredune. Since 1940 there has been gradual increase in the density of natural vegetation on the foredune. This has resulted in stabilization of the aeolian sand, and an overall increase in the foredune height in these areas.

No measurable advance or retreat in the position of the stabilized alluvium - mobile alluvium boundary is apparent. The overall change between 1940 and 1967 has been an increase in the size and density of vegetation on the stabilized alluvium. Past geological processes in this area have caused a general seaward advance of deposited alluvium. It appears that this process is still slowly continuing.

North end of Bribie Island - Caloundra Head

The north end of Bribie Island has undergone considerable change between 1940 and 1967. About 550 m of stabilized material has been removed from the northern tip of the island and approximately 50 m from the Pumicestone Channel side (Fig. 2). Erosion has occurred during migration of the main channel - within Pumicestone Channel - where it meets the open ocean. If the stabilized material was removed down to point X on fig. 2, or if the stabilized material was breached in the vicinity of X then the main Pumicestone Channel may maintain a permanent exit there. This could result in complete and probably permanent silting of Caloundra Harbour.

MORETON BAY

The rates of erosion and deposition within Moreton Bay are much slower than in areas open to the ocean.

Two areas at the southern end of Bribie Island are undergoing active sediment deposition, and stabilization by vegetation (Fig. 3). At South Point a strip up to 200 m wide has been stabilized between 1944 and 1969. On the projection between south Point and Skirmish Point a strip of sediment over 125 m wide has been stabilized. Sediment deposition is continuing in both these areas, however this is not expected to cause any major problems.

A large sand bar exists in the naturally protected area between Shark Spit and Reeders Point at the southern end of Moreton Island. This occupies approximately 35 sq. km at low water (Fig. 1). Although the area could not be accurately studied - due to insufficient photograph coverage - it appears that this deposit has not appreciably increased or decreased since 1944. Since 1944 mangrove (Fig. 5) has established itself and reclaimed approximately 1 sq km of this area. The rate of vegetation expansion appears to be faster here than in any other part of the bay. If the conditions which have operated here since 1944 continue then all of this sand bar will eventually be reclaimed and stabilized by vegetation.

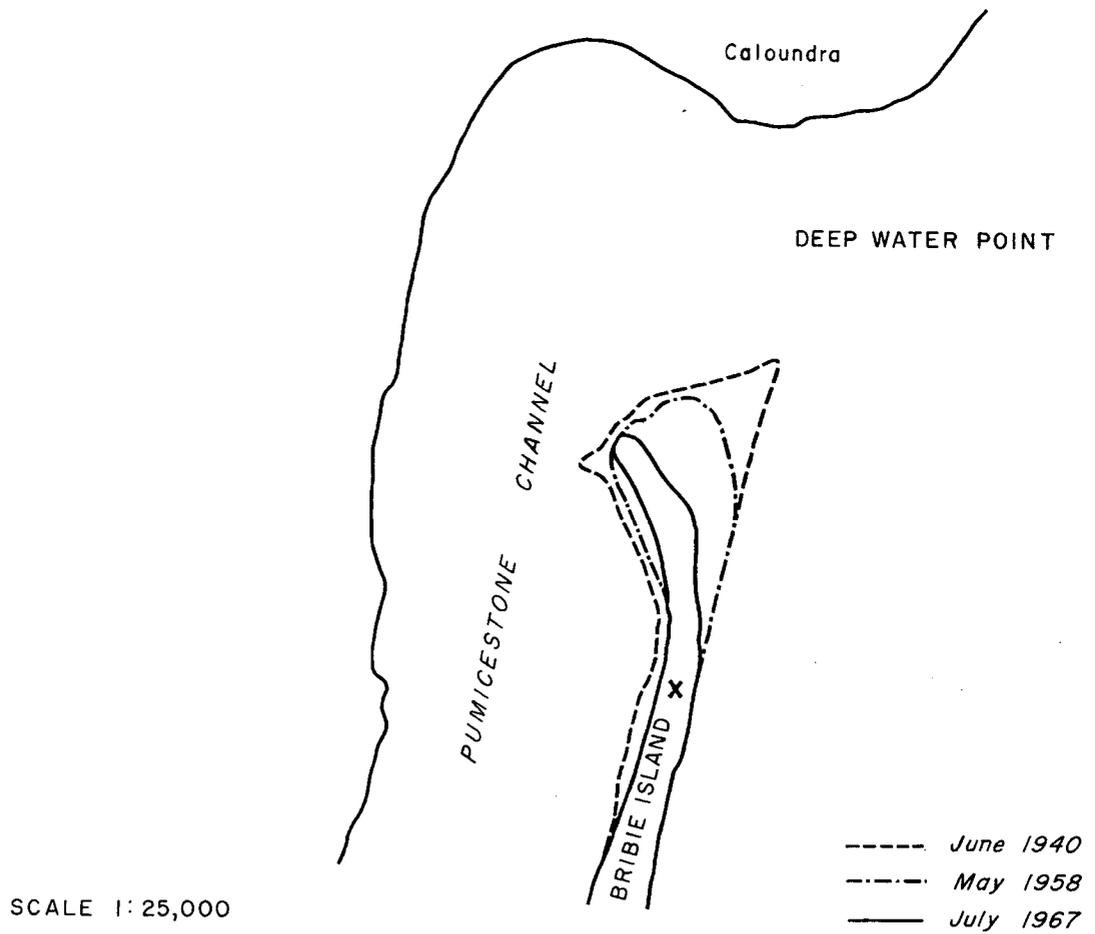


FIG.2 NORTH END BRIBIE ISLAND — Caloundra

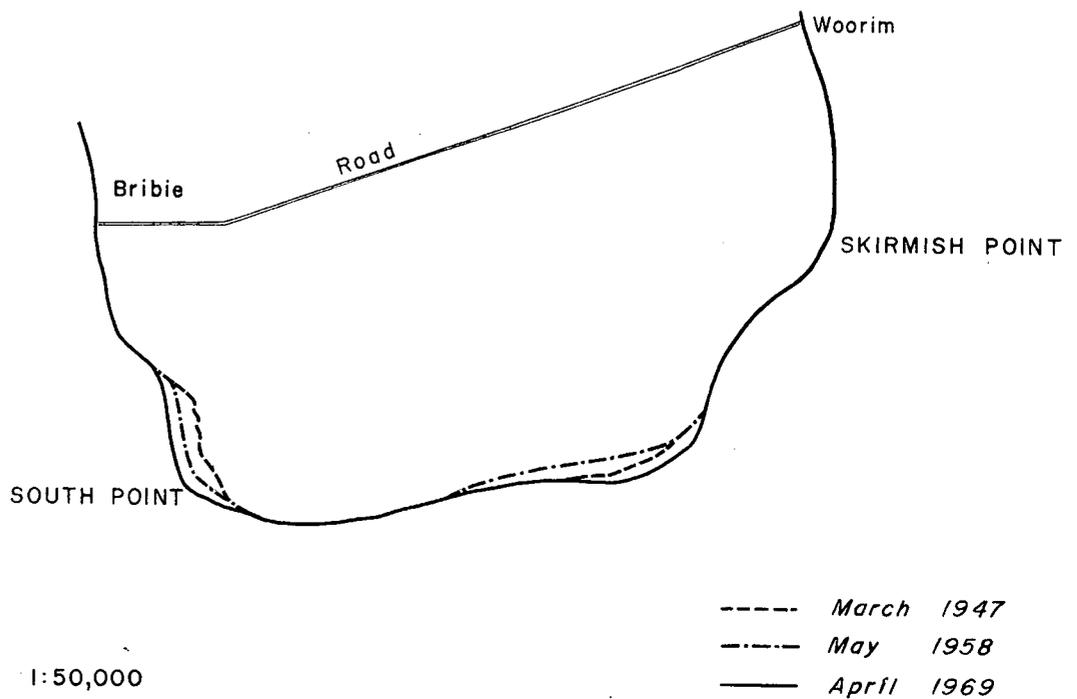


FIG.3 SOUTH BRIBIE ISLAND

No obvious changes have occurred in the positions of channels, or bars, around the islands between North Stradbroke Island and the Mainland (Fig. 1). The only noticeable change has been slight increase in vegetation on some of the bars against existing islands (as distinct from mid-channel bars).

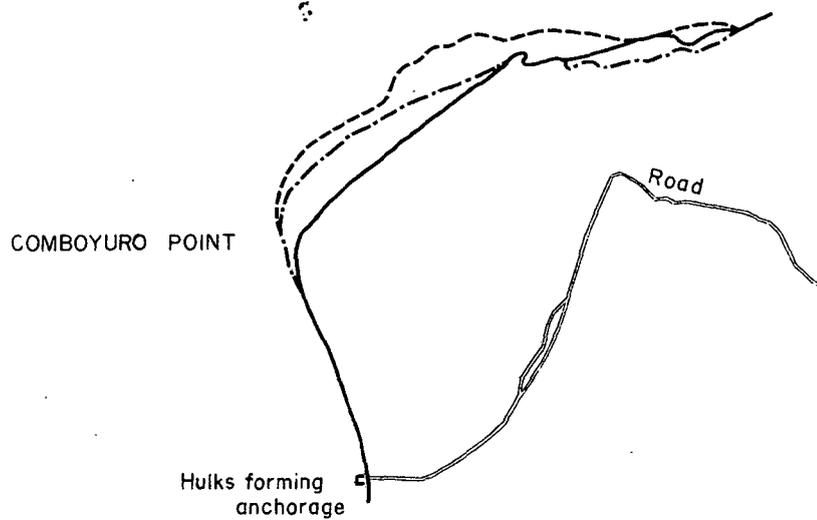
Planned reclamation is being carried out at the mouth of the Brisbane River. Long term effects or changes to currents resulting from this cannot be predicted at this stage. Bishop Island opposite the river mouth is increasing in size but it is not known if this is due to natural processes.

Moreton Island and Stradbroke Island

The barrier islands of Moreton, North Stradbroke and South Stradbroke are subjected to north flowing longshore drift on their eastern (open ocean) side. Stabilized and mobile deposits on their eastern sides have not appreciably advanced or retreated over the period of photography available (1944-1969).

The mobile deposits at Jumpin Pin (Fig. 1) outlet and between Porpoise Head and Nerang Head are subject to frequent change. For example, in 1944 two passages were present between North and South Stradbroke Island. One passage occurred opposite the channel between Stingaree and Crusoe Islands, (in the position of Jumpin Pin) and the other opposite the channel on the south side of Crusoe Island. By 1955 the southernmost passage had closed and Jumpin Pin Passage had deepened.

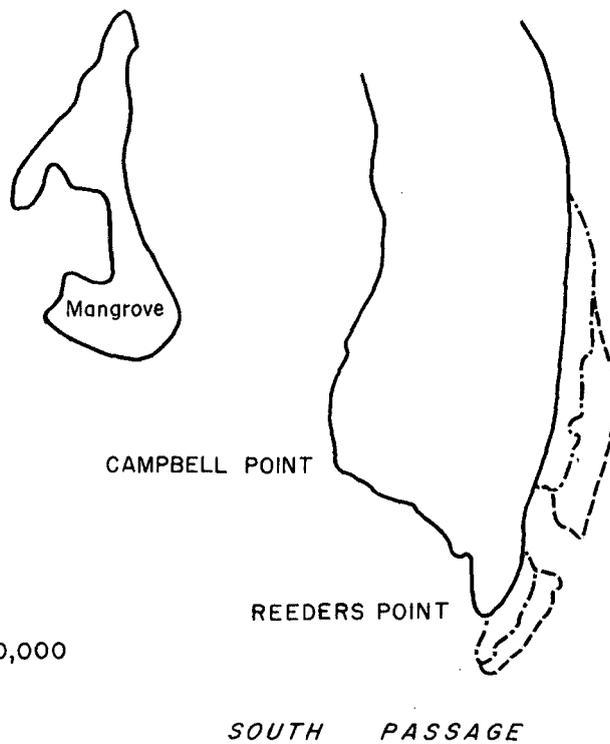
Comboyuro Point on the northwest of Moreton Island (Fig. 4) has been eroded over the period 1944 to 1969. A strip up to 336 m wide has been removed from originally stabilized material. This appears to have been caused by a westerly flowing current from North Point past Comboyuro Point. The mobile material over this area is subject to frequent change. The westerly projecting spit (mobile) shown on Fig. 1, had been removed by 1958 but there has been increased beach deposition approximately midway between Comboyuro Point and North Point.



SCALE 1:50,000

----- September 1944
 - . - . - . May 1958
 _____ April 1969

FIG. 4 COMBOYURO POINT — Moreton Island



SCALE 1:50,000

----- September 1944
 - . - . - . May 1958
 _____ April 1969

FIG. 5 REEDERS POINT — Moreton Island

The southern tip of Moreton Island has also undergone erosion. A strip up to 370 m wide has been removed from the island east of Reeders Point (Fig. 5). This has been caused by a slow westward migration of Rainbow Channel where it exists through South Passage.

Discussion

Within the relatively short time span of the photographs studied only five areas have undergone measurable changes, spasmodic erosion is occurring at Comboyuro Point and continual erosion at Reeders Point on Moreton Island. Periodic erosion due to the random migration of Pumicestone Channel is occurring on the north end of Bribie Island. Continual deposition is occurring on the south end of Bribie Island. Vegetation stabilization is active near the south end of Moreton Island.

Apart from these noticeable changes the coastline and offshore islands between Porpoise Point and Noosa Head give the impression of being stable with respect to erosion or deposition.

Recent geological history-interpreted from such features as accumulating beach ridges - indicates that depositional processes are more active than erosional. This situation should continue under the apparently stable weather conditions which may have prevailed since the Pleistocene (Hails, 1964). Because the coast is primarily composed of unconsolidated deposits it is susceptible to rapid erosion and change by abnormal, short-lived, weather conditions (e.g. cyclones).

The results of the study do not indicate any areas which may constitute problems - either from erosion or deposition - which would require immediate action. However, a predictable problem area exists at Caloundra, where, if through the erosion of stabilized material Pumicestone Channel cuts the northern extremity of Bribie Island, then the harbour will silt up.

It should be emphasized that because of the limited photographic coverage, and nature of the study only the relatively long term effects of erosion or deposition have been detected. The effects of localized short lived abnormal weather conditions have not been measured, nor can they be predicted.

REFERENCES

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HAILS, J.B., 1964 - The coastal depositional features of South-Eastern Queensland. Aust. Geogr., 9 (4). p 207-217.

Additional literature examined

EL-ASHRY, M.R., WANLESS, H.R., 1967 - Shoreline features and their changes. Photogrammetric Eng., 33 (2). p 184-189.

EL-ASHRY, M.R., WANLESS, H.R., 1968 - Photointerpretation of Shoreline Changes between Capes Hatteras and Fear (North Carolina) Marine Geology, 6 (5). p 347-379.

APPENDIX

Photographs studied in the coastal erosion project

<u>Area</u>	<u>Runs</u>	<u>Nominal Scale</u>	<u>Date of Photography</u>
Laguna Bay	8-14	1:19,000	9 July, 1940
Maroochydore	16-18, 20-22	1:18,500	8, 9 July, 1940
Caloundra	1A	1:18,200	20 June, 1940
	1B	1:18,200	16 June, 1940
	1C, 1D	1:18,500	12 July, 1940
	1-6A	1:18,200	20 June, 1940
	7, 8	"	8 June, 1940
	9-11	"	31 March, 1940
Maroochydore	Coast tie	1:48,500	16 July, 1967
Redcliffe	1, 5, 6	1:30,000	27 May, 1947
	2, 3	"	27 March, 1947
Laguna Bay	4-8	1:25,000	6, 18 May, 1958
Maroochydore	1-7	"	5, 16 May, 1958
Caloundra	1-8	"	5, 18 May, 1958
Redcliffe	1-8	"	16, 4 May, 1958
Redcliffe-Moreton Is.	1-7	"	4 May, 1958
Brisbane-Moreton Is.	1	"	16 May, 1958
Brisbane	1-4, 6	"	24, 16 May, 1958
	5	"	17 April, 1958
Moreton Is.	1, 2	1:34,000	10 September, 1944
Moreton Bay	1	1:48,500	10 August, 1967
and adjoining	2, 3	"	11 July, 1967
Mainland	4	"	30 June, 1967
Brisbane	1-8	1:86,000	20, 21, 22 April, 1969
	Coast tie 1, 2	"	"
Brisbane-North	1-4	1:25,000	16 May, 1958
Stradbroke Is.			
Beenleigh	1-7	1:25,000	27, 30 July, 1955
Beenleigh	Mixed numbers	1:34,000	27 April, 1944
Tamborine	1-5	1:25,000	30 July, 1955
	6	"	1 August, 1955
	2, 2A	1:86,000	14 November, 1966