COMMONWEALTH OF AUSTRALIA

BUREAU OF METEOROLOGY

DEPARTMENT OF THE INTERIOR

REPORT BY DIRECTOR OF METEOROLOGY ON CYCLONE "ADA"

Issued by direction of
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Commonwealth Director of Meteorology
under the authority of
The Hon. PETER NIXON, M.P.
Minister for the Interior
JUNE 1970

COMMONWEALTH BUREAU OF METEOROLOGY

DEPARTMENT OF THE INTERIOR

The Honourable P. J Nixon, MP.,
Minister of State for the Interior,
Commonwealth of Australia

This report on Cyclone "Ada", prepared in accordance with your instructions, is the result of an exhaustive examination of the circumstances surrounding the occurrence of this cyclone and follows discussions with representatives of residents on the Queensland coast, with police officers, local government officials and representatives of press, radio and television.

The history of the cyclone and its impact on the community has been traced, along with the accuracy and timeliness of the forecasts and warnings which were issued.

The study of the effectiveness and operation of the Bureau's Tropical Cyclone Warning System during the life of Cyclone "Ada" will enable improvements to be made to the system.

The main conclusion from our study is that we must improve public awareness in three subjects - the nature of cyclones, the warning system and individual action which should be taken. This added knowledge coupled with the local disaster plans which I understand are being brought up to date in the light of the experience with "Ada", should minimize disruption of community services, enable more effective protection of property and reduce the likelihood of injury and loss of life.

W. J. Gibbs.

(W. J. GIBBS)
Director of Meteorology

10 June, 1970.

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Cover Photograph
Damage caused by Cyclone ‘Ada’
at Daydream Island
(Photograph by courtesy of Brisbane Courier Mail)

FIGURES

* Photographs by courtesy of Brisbane Courier Mail

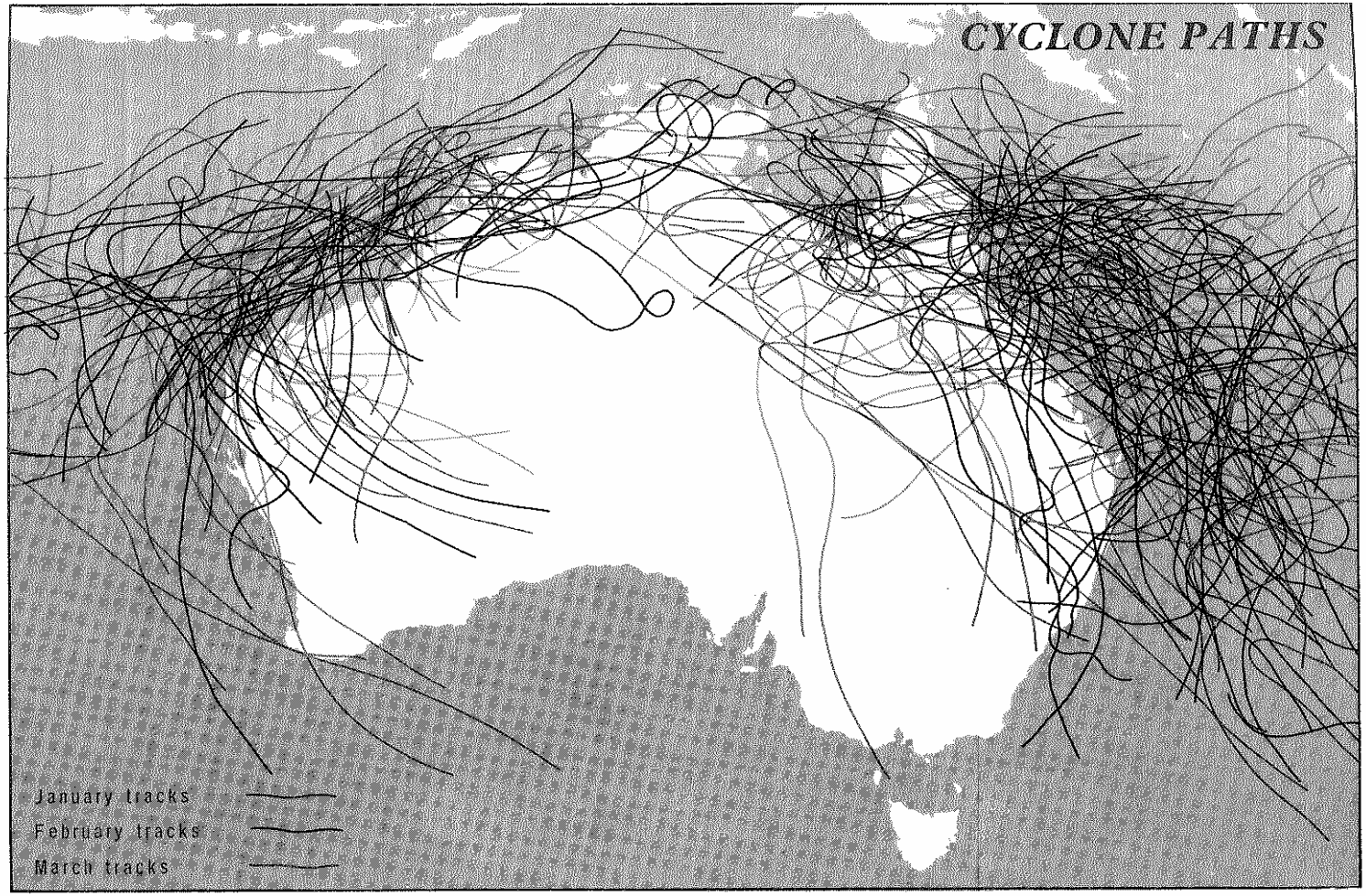

Fig. 1 This map shows all tropical cyclones which affected Australia in January, February and March during the years 1910 – 1969 (north–east coast) and 1930 – 1969 (north–west coast).

REPORT BY DIRECTOR OF METEOROLOGY ON CYCLONE “ADA”

INTRODUCTION

In most years tropical cyclones occur over the Coral Sea and some of these affect the Queensland Coast. However, a particular locality can expect to experience severe cyclonic effects with an average frequency of once in three years in the coastal strip between Cooktown and Townsville, once in five years between Bowen and Mackay and once in eight years between Rockhampton and Brisbane.

During mid January 1970 one such cyclone, code named “ADA” affected a portion of the Central Coast of Queensland.

As is normal practice every opportunity was taken following this occurrence to :

- Study the characteristics of the cyclone
- Examine closely all phases of the organisation associated with the detection, reporting and forecasting of cyclones
- Investigate the effectiveness of arrangements for dissemination of information about cyclones.

Cyclone “ADA”, due no doubt to the accident of its passage over a major tourist area, aroused remarkable public interest and in addition to the usual investigations conducted in the Bureau’s Central, Regional and Field Offices a detailed on-the-spot examination of the affected area was conducted by Director of Meteorology and Regional Director for Queensland and Territory of Papua and New Guinea.

This report embodies the findings as they have been revealed to date and proposals for the future development of the tropical cyclone warning system.

HISTORY OF CYCLONE “ADA”

Cyclone “Ada” an intense tropical storm of remarkably small dimensions moved towards Queensland from the coral Sea in Mid-January 1970.

After its detection as a suspected tropical disturbance far out in the Coral Sea on 5 January, the cyclone developed slowly and followed a general west-south-westerly course. It began to intensify early on Saturday 17 in the vicinity of Marion Reef, about 300 miles east of Bowen. It crossed the Whitsunday Island group and the coast near Shute Harbour and Proserpine late on Saturday 17 and during Sunday 18 January causing considerable damage from the high winds and subsequent flooding. The cyclone eventually lost intensity after moving inland beyond Proserpine and degenerated into a weak depression on the evening of Monday 19 January.

The damage which “Ada” wrought hs been conservatively estimated at $12 million and the cyclone was responsible for the loss of thirteen lives. The brunt of the cyclone’s fury was borne by Hayman, Daydream, Long, South Molle and Hook Islands, and the area from Airlie Beach to Cannonvale, Proserpine, Calen and Shute Harbour. Heavy rains and flooding brought havoc and dislocation of traffic and communications in the coastal strip between Bowen and Mackay.

The following paragraphs give the detailed history of Cyclone “Ada” and the texts of warnings issued by the Brisbane Tropical Cyclone Warning Centre at critical times.

Figure 2 on the following page shows the reconstructed track of the cyclone from Thursday 15 January until it dissipated on the evening of Monday 19 January.

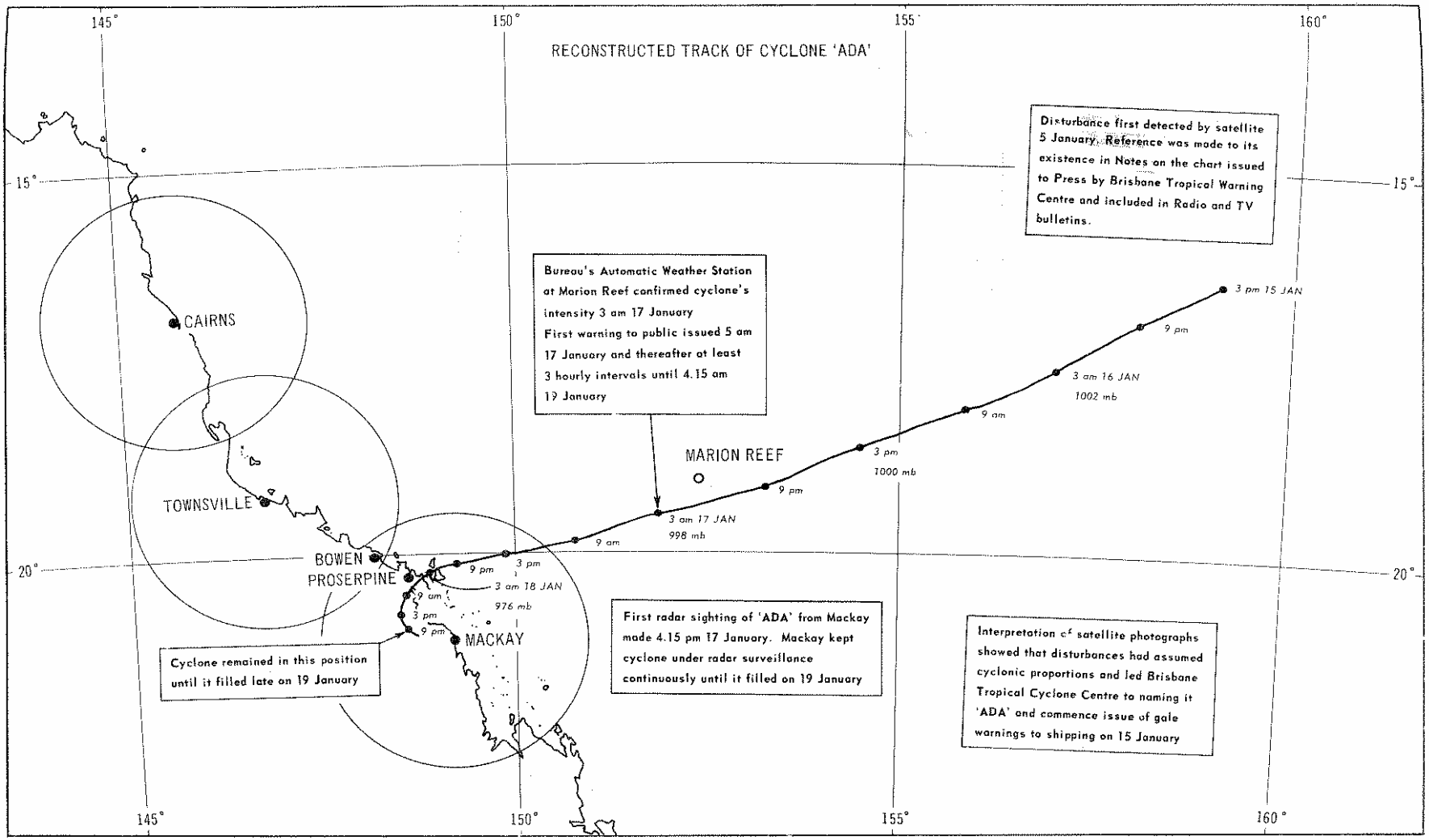
RECONSTRUCTED TRACK OF CYCLONE 'ADA'
145°
150°
155°
160°
15°
20°
CAIRNS
TOWNSVILLE
BOWEN
PROSERPINE
MACKAY
MARION REEF
Disturbance first detected by satellite 5 January. Reference was made to its existence in Notes on the chart issued to Press by Brisbane Tropical Warning Centre and included in Radio and TV bulletins.
Bureau's Automatic Weather Station at Marion Reef confirmed cyclone's intensity 3 am 17 January
First warning to public issued 5 am 17 January and thereafter at least 3 hourly intervals until 4.15 am 19 January
3 pm 15 JAN
9 pm
3 am 16 JAN
1002 mb
9 am
3 pm
1000 mb
9 pm
3 am 17 JAN
998 mb
9 am
3 pm
9 pm
3 am 18 JAN
976 mb
9 am
3 pm
9 pm
Cyclone remained in this position until it filled late on 19 January
First radar sighting of 'ADA' from Mackay made 4.15 pm 17 January. Mackay kept cyclone under radar surveillance continuously until it filled on 19 January
Interpretation of satellite photographs showed that disturbances had assumed cyclonic proportions and led Brisbane Tropical Cyclone Centre to naming it 'ADA' and commence issue of gale warnings to shipping on 15 January

Fig. 2

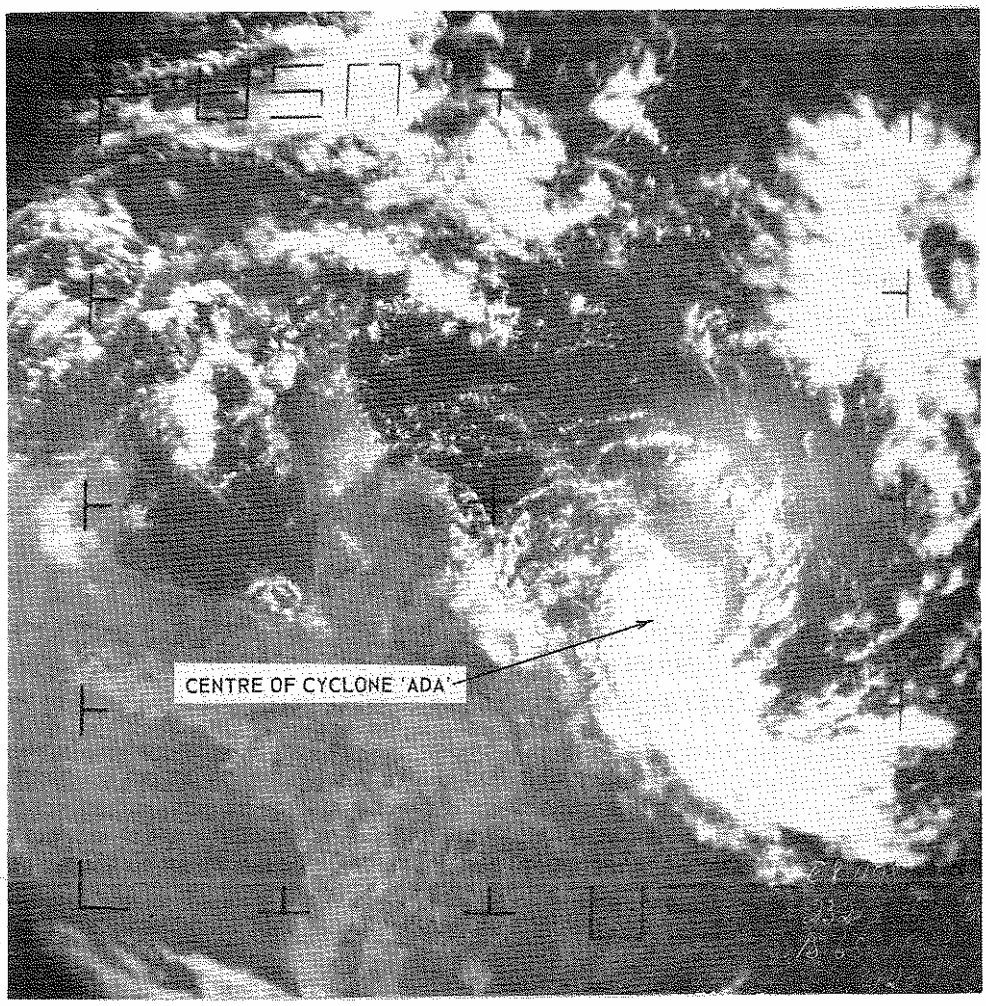

Fig. 3 A photograph taken on 17th January by United States of America weather satellite ESSA 8 from a height of 900 miles showing cyclone 'Ada' centred northeast of Mackay. The ocean appears black, in strong contrast to the white cloud masses. Note the cloud bands spiralling towards the cyclone centre and also the well defined northern coastline of Queensland.

Monday 5 January

The existence of a disturbance over the eastern Coral Sea was deduced from satellite cloud photographs. The satellite data were not conclusive but it was considered that at that stage the disturbance did not have cyclonic characteristics. There were no ships within 300 miles of the disturbed area but the diagnosis of the disturbance as a weak tropical depression and not a cyclone was supported by sparse surface reports from surrounding areas indicating barometric pressures rather above normal. These later reports would not have been inconsistent with the existence of a ‘small’ cyclone over the open ocean but the weight of evidence indicates that “Ada” developed after Monday 5 January.

Monday 5 to Thursday 15 January

During this period the disturbance was tracked entirely on the evidence of satellite cloud photographs. Mention was made of it in routine bulletins and advices issued to shipping, press and radio. The disturbance moved from the eastern Coral Sea to south of the Solomon Islands and returned to the Coral Sea. It was not possible to get accurate measurements of central pressure, wind speeds or movement of the disturbance during this period.

Thursday 15 and Friday 16 January

Although evidence was still inconclusive, satellite observations examined in the Brisbane Tropical Cyclone Warning Centre on Thursday 15 January gave a sufficient indication of cyclonic activity to warrant the issue of a warning to shipping, and the cyclone was given the code name “Ada”. The position and intensity of “Ada” were included in “Notes on the Chart” published in the press and broadcast over television and radio, but in keeping with usual practice warnings were not issued to the public until the cyclone centre approached to within 500 miles of the Queensland Coast.

The text of the first cyclone warning issued to shipping at 4.00 p.m. on 15 January was as follows:

"Cyclone "Ada" 996 millibars centred at 150200 GMT 16 South 159 East moving southwest 9 knots. Position fair. Winds to force 8 near centre. Force 7 within 100 miles of centre. Central pressure is expected to fall to 994 millibars with maximum wind force 8 to 9. Expected positions 151400 GMT near 17.5 South 157.5 East. All ships in area 10 South to 20 South please send to WHR Essendon weather and radar reports every three hours."

Note: In the Beaufort scale, Force 7 corresponds to wind speeds of 28-33 knots (32-38 mph). Force 8 to 34-40 knots (39-46 mph) and Force 9 to 41-47 knots (47-54 mph). 996 millibars = 29.413 inches.

The gale warning to shipping was renewed at 7.45 p.m. on Thursday 15 January and these warnings were continued at regular six hourly intervals until the cyclone moved inland.

Saturday 17 January

Reports received from the Bureau's automatic weather station at Marion Reef (Lat. 19.1°S, Long. 152.5°E) on Saturday 17 January provided the first direct confirmation of the cyclonic activity which had been deduced form satellite data. The automatic station reported a wind 200 degrees 50 knots (58 mph)., barometer 1001.5 mb (29.576 inches) at 1.00 a.m. on the 17th changing at 4.00 a.m. to 360 degrees 25 knots (29 mph), barometer 1007.0 mb (29.738 inches).

The first public Flash Cyclone Warning was issued at 5.00 a.m. on Saturday 17 January with the following text:

"Small tropical cyclone "ADA" 29.5 inches centred at 3.00 a.m. about 200 miles northeast of Mackay moving west southwest at 17 miles per hour closer to the coast. Wind gusts to 60 miles per hour near centre. Gales extend to 100 miles off the coast between Bowen and

St. Lawrence. Centre expected to be 100 miles northeast of Mackay at 9 a.m. today with wind gusts to 40 miles per hour on coast between Bowen and St. Lawrence. Cyclone expected to cross the coast between Bowen and Mackay late this afternoon with gusts to 60 miles per hour. Areas of heavy rain chiefly south of centre."

The flash cyclone warning was lodged with P.M.G. Brisbane at 5.15 a.m. by urgent telegram for distribution to the following addresses:

Radio Stations	ABC,	Brisbane
	4QN,	Townsville
	4TO,	Townsville
	4AY,	Townsville
	4QA,	Mackay
	4MK,	Mackay
	4RK,	Rockhampton
	4RO,	Rockhampton
	VIT,	Townsville
Television Stations	ABC,	Brisbane
	ABTQ,	Townsville
	TNQ,	Townsville
	ABRQ,	Rockhampton
	RTQ,	Rockhampton
	QTQ,	Brisbane
	MVQ,	Mackay
Police		Brisbane
		* Mackay
		Rockhampton
Fish Boards		Townsville
		Mackay
Harbour Board		Bowen
Light Keeper		Cape Capricorn (to pass to Lady Elliott Island).

* This message was not delivered. P.M.G. Brisbane advised that the addressee was not available.

Post Masters	Ayr Home Hill Bowen Proserpine Mackay Sarina St. Lawrence Port Alma Rockhampton Yeppoon
Shire Engineer	Ayr
Meteorological Offices	Gladstone Mackay

In addition a general broadcast of the flash cyclone warning was made to meteorological offices connected to the Bureau's "Intranet" network, which includes offices at Townsville and Rockhampton.

Distribution by telephone was made to the following addresses in the Brisbane area between 5.10 a.m. and 5.20 a.m.:

Queensland Radio News Service

"The Courier Mail"

Licensed Boat Owners and Shipper's Association

Queensland Railways

Royal Automobile Club of Queensland

Gale warnings for ships at sea were also distributed to radio stations including VIT Townsville and VIR Rockhampton by telegram.

The distribution of the flash cyclone warning included all cyclone warning liaison officers and radio stations in the coastal section Ayr to Rockhampton, and also

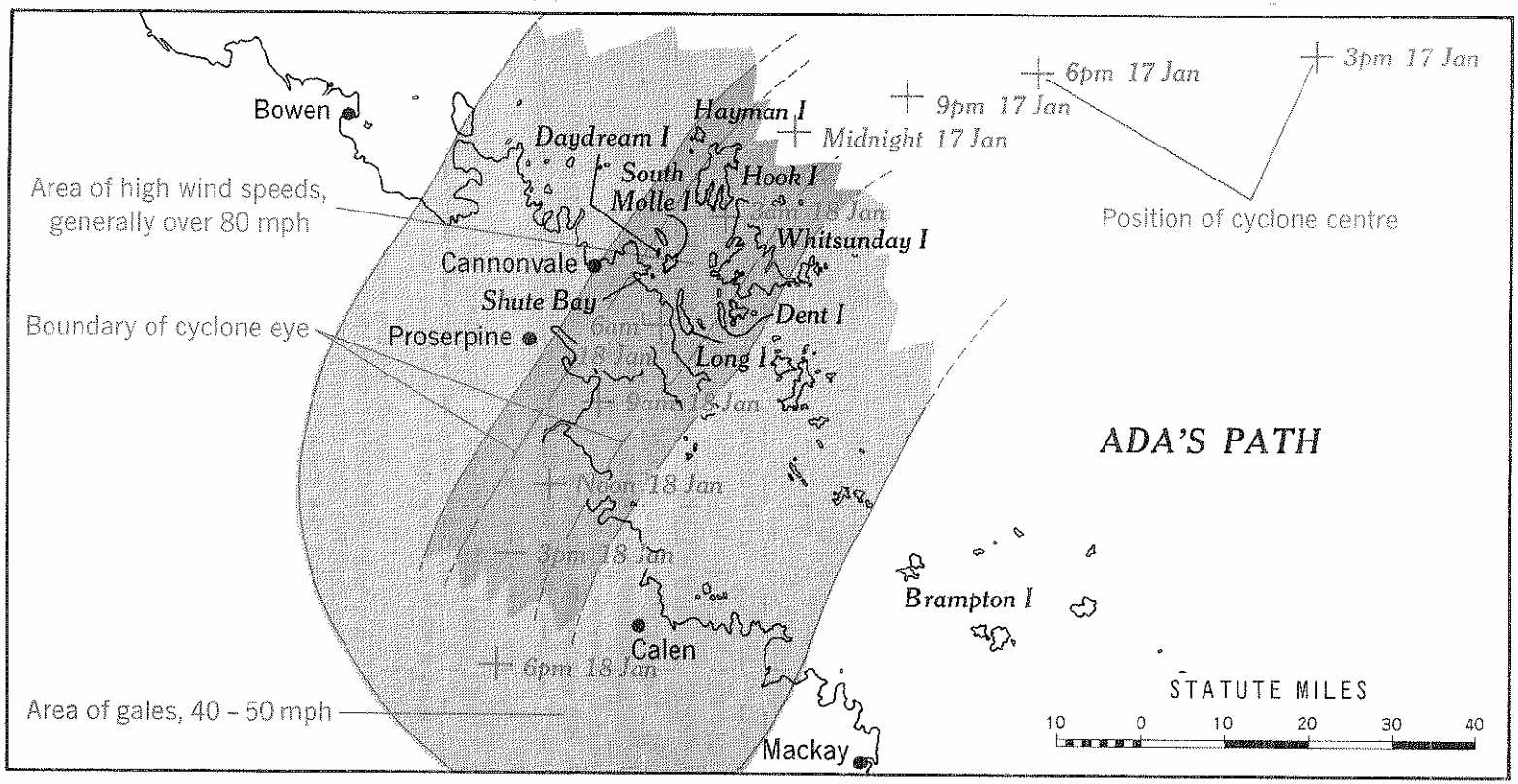
Bowen
Area of high wind speeds, generally over 80 mph
Boundary of cyclone eye
Area of gales, 40 – 50 mph
Daydream I
Hayman I
South Molle I
Hook I
Whitsunday I
Cannonvale
Shute Bay
Dent I
Proserpine
Long I
Noon 18 Jan
3pm 18 Jan
6pm 18 Jan
Calen
Mackay
6pm 17 Jan
9pm 17 Jan
Midnight 17 Jan
3pm 17 Jan
Position of cyclone centre
ADA'S PATH
Brampton I
STATUTE MILES
10 0 10 20 30 40

Fig. 4

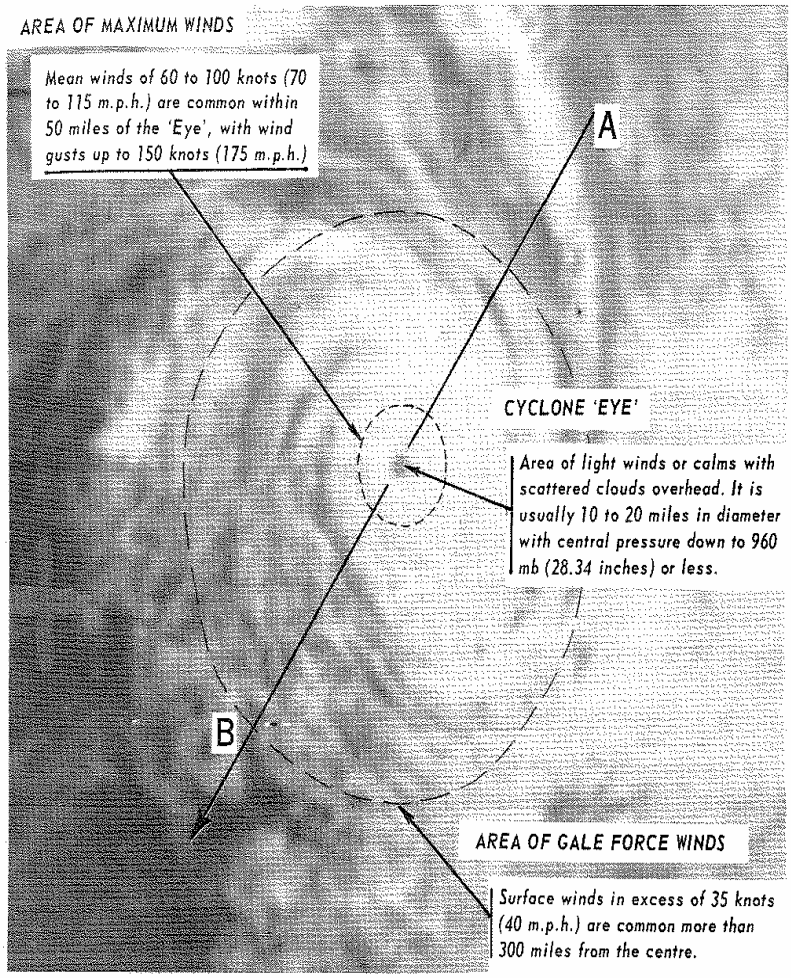

Fig. 5 This is a photograph of cyclone 'Dinah' taken by satellite on 28th January 1967 when it was centred approximately 300 miles off the Queensland coast.

The ocean appears black in sharp contrast to the cloud formations of the tropical cyclone.

Cyclone 'Ada' was much smaller in area than 'Dinah'.

Winds up to 100 knots or more circulate clockwise around the 'Eye' of the cyclone. The system as a whole moves with a speed of about five to 15 knots.

With a cyclone moving in a southwesterly direction from A to B an observer at B would experience the following weather conditions with the approach and passage of the centre.

For the first 24 hours – southeasterly winds freshening to gales (over 35 knots), an overcast sky with rain squalls increasing in frequency, rising seas.

For the next 5 hours – southeasterly winds of 60 to 100 knots (70 to 115 m.p.h.), continuous heavy rain and extremely rough seas.

For the next 1 to 2 hours – in the 'Eye' of the cyclone – light variable winds, a confused sea, scattered clouds overhead but a high wall of cloud surrounding the observer.

For the next 5 hours – northwesterly winds of 60 to 100 knots (70 to 115 m.p.h.), continuous heavy rain and extremely rough seas.

For the next 5 hours – northwesterly gales rapidly moderating after the first 2 or 3 hours, rain squalls decreasing in frequency, very rough but moderating seas.

Brisbane and Townsville radio stations serving the area. The headquarters of the Police and of the ABC in Brisbane also received the flash warnings.

Cyclone warnings were issued at approximately three hourly intervals throughout Saturday 17 January – 7.30 a.m., 10.30 a.m., 1.30 p.m., 4.50 p.m., 7.15 p.m. and 9.50 p.m. These and all subsequent warnings were selectively addressed to the recipients of the flash warning and also to Police, Townsville.

The Bureau's emergency reporting network including Daydream and Lindeman Islands was brought into action during Saturday morning 17 January. Due to the small area affected by the cyclone, reports from these stations gave a little or no indication of the approach of the cyclone; barometers were relatively high and steady, there was no wind or rain of significance and the observers on these offshore islands expressed doubt about the presence of the cyclone.

The weather radar at the Mackay Meteorological Office was manned continuously by Bureau staff from Saturday morning until the cyclone crossed the coast and lost intensity. The first radar fix of the cyclone centre was obtained at 4.15 p.m. on Saturday 17 January. Thereafter positions of the centre deduced from the radar observations were received at the Brisbane TCWC at approximately half hour intervals.

At 6.00 p.m. on Saturday 17 January Hayman Island was reporting only 25 knots (29 mph) with a barometer of 1006.8 millibars (29.730 inches), by no means a low pressure for this area.

Cyclone warnings issued up to 9.50 p.m Saturday 17 January had predicted winds with gusts to 60 mph. Prior to 4.50 p.m. the predicted cyclone movement had been west-south-west 17 mph. This was changed to west 10 and west 12 mph in the 4.50 p.m. and 7.15 p.m. warnings respectively when it was realised that the cyclone movement was slower than expected and radar reports from Mackay, for a time, indicated an erratic westward movement. The 9.50 p.m.

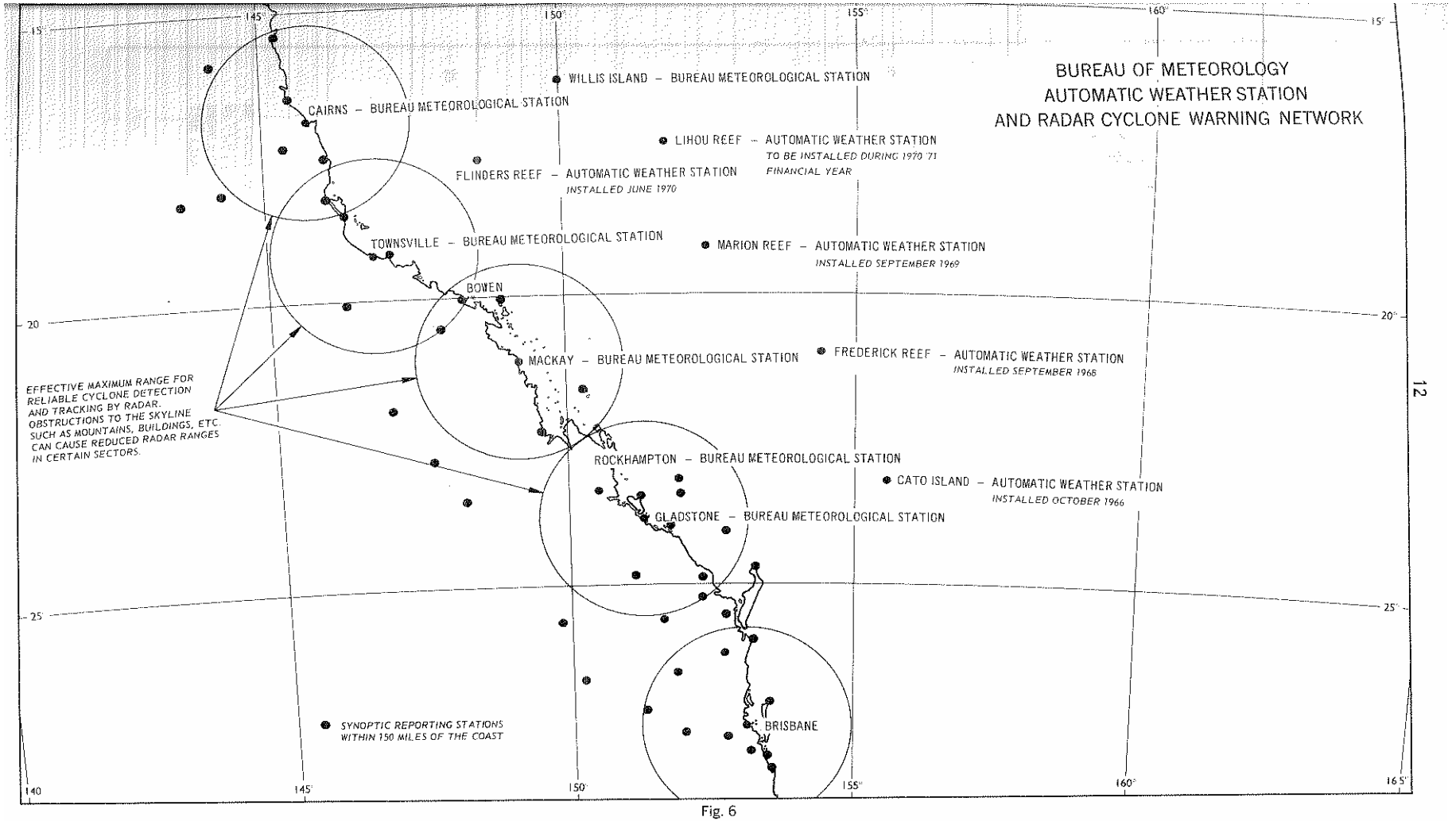
BUREAU OF METEOROLOGY
AUTOMATIC WEATHER STATION
AND RADAR CYCLONE WARNING NETWORK
WILLIS ISLAND – BUREAU METEOROLOGICAL STATION
CAIRNS – BUREAU METEOROLOGICAL STATION
LIHOU REEF – AUTOMATIC WEATHER STATION
TO BE INSTALLED DURING 1970 '71 FINANCIAL YEAR
FLINDERS REEF – AUTOMATIC WEATHER STATION
INSTALLED JUNE 1970
TOWNSVILLE – BUREAU METEOROLOGICAL STATION
MARION REEF – AUTOMATIC WEATHER STATION
INSTALLED SEPTEMBER 1969
BOWEN
MACKAY – BUREAU METEOROLOGICAL STATION
FREDERICK REEF – AUTOMATIC WEATHER STATION
INSTALLED SEPTEMBER 1968
EFFECTIVE MAXIMUM RANGE FOR RELIABLE CYCLONE DETECTION AND TRACKING BY RADAR. OBSTRUCTIONS TO THE SKYLINE SUCH AS MOUNTAINS, BUILDINGS, ETC. CAN CAUSE REDUCED RADAR RANGES IN CERTAIN SECTORS.
ROCKHAMPTON – BUREAU METEOROLOGICAL STATION
CATO ISLAND – AUTOMATIC WEATHER STATION
INSTALLED OCTOBER 1966
GLADSTONE – BUREAU METEOROLOGICAL STATION
BRISBANE
SYNOPTIC REPORTING STATIONS WITHIN 150 MILES OF THE COAST
15°
20°
25°
140
145°
150°
155°
160°
165°

Fig. 6

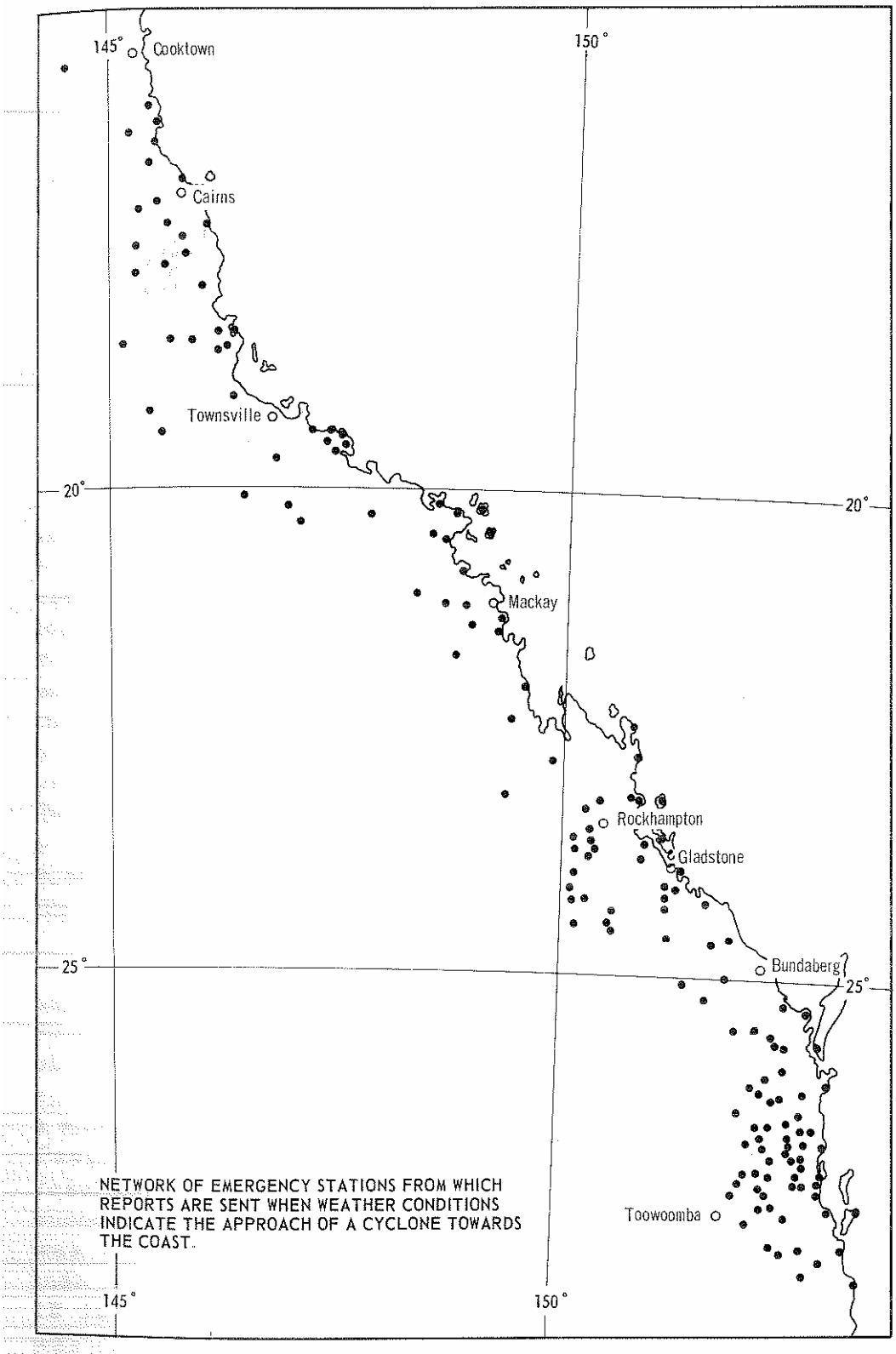

Fig. 7 Emergency Reporting Network

Warning gave a movement of west-south-west 7 mph and this was retained in the subsequent warning.

At 11.00 p.m. on Saturday, Hayman Island reported winds of 60 to 70 mph with a rapidly falling barometer. The following revised warning was then prepared:

> "Cyclone "Ada" 29.45 inches centred at 11.00 p.m. about 45miles east of Bowen or just east of Hayman Island moving west-south-west at 7 mph. Wind gusts to 80 mph. Centre expected to cross coast between Bowen and Proserpine at about 3 a.m. Sunday with heavy to flood rain."

The time of lodgement of this warning on the teleprinter to P.M.G. was not recorded. It was logged by P.M.G. Brisbane at 12.30 a.m. Sunday 18 January and retransmitted within the next four minutes to all meteorological offices in Queensland, to radio stations VIT (coastal radio), 4QN and 4TO Townsville and to Police Brisbane. The warning had been received by the Harbour Master Bowen and the Postmasters at Bowen, Proscrpine, Ayr and Home Hill by 12.58 a.m. Because three radio stations, 4AY (Townsville) and 4MK and 4QA (Mackay) had closed down it was not delivered to them. It subsequently transpired that the P.M.G. Department had been unable to effect delivery of the 9.50 p.m. warnings to these stations as they did not answer the telephone when called.

The cyclone centre passed the Whitsunday area between about midnight Saturday 17 January and 6.00 a.m. Sunday 18 January but no wind speed measurements were obtained. At Hayman Island it was estimated that the wind speed increased to 100 mph in gusts soon after midnight and a similar estimate was made from a ship in the Whitsunday Passage at about the same time. Subsequent deduction from resultant damage and a barograph trace from Hayman Island supported these estimates. The lowest measured pressure was that recorded by the Hayman Island barograph which indicated a minimum of the 976 mb (28.82 inches) on Sunday 18 January, although the central pressure of the cyclone was estimated to be 965 mb (28.5 inches).

Sunday 18 and Monday 19 January

Cyclone warnings were issued regularly at three hourly intervals and at times more frequently, on Sunday 18th and this continued on Monday 19th, the final warning being issued at 4.15 p.m. that day.

The cyclone centre passed over Shute Harbour at 4.30 a.m. on Sunday 18 January and then moved in an arc to a position about 40 miles northwest of Mackay at 9.00 p.m. on the 18th after which it remained almost stationary for about 24 hours before dissipating. Heavy rain caused significant flooding in the Pioneer and Connors Rivers and other coastal streams.

Excellent radar fixes of the cyclone centre were obtained from the Mackay Meteorological Office during Saturday night and Sunday. Late on Sunday there were indications from the radar that the structure of the cyclone was becoming complex with the development of multiple (probably two) centres. Definite centres could not be located on the radar after this time.

Warnings issued on Sunday and Monday were accurate except that wind speeds decreased more slowly than expected after the cyclone crossed the coast. Timely flood warning were issued for the Pioneer, Connors and adjacent coastal streams well before heavy rain commenced.

The final cyclone warning issued at 4.15 p.m. Monday 19 January, read:

> "Tropical cyclone "Ada" 29.7 inches was centred at 3 p.m. near Mirani about 20 miles north-west of Mackay and continuing to lose intensity. Wind gusts should decrease to below gale force but heavy to flood rains continue above the Lower Central Coast. Withdraw pennants."

PERFORMANCE OF THE TROPICAL CYCLONE WARNING SYSTEM

From the exhaustive examinations of the circumstances surrounding the occurrence of cyclone “Ada” it is clear that the areas in which the greatest improvement is needed are:

- The method of communication of warnings from tropical cyclone Warnings centre to media, local authorities and Bureau’s offices
- The method of dissemination of warnings from media, local authorities and Bureau’s offices to members of communities threatened by cyclones
- The need to make members of communities in cyclone prone areas aware of the nature of cyclones, the form of the cyclone warning system, the need for precautionary activities before the cyclone season, protective action which should be taken during a cyclone
- The need for State Government of local action to produce a disaster plan.

The experience with cyclone “Ada” also revealed that improvements are possible in the system for detecting and tracking cyclones and in the communications by which information is received at the tropical warning centre.

The conclusions reached in respect of each phase of the Tropical Cyclone Warning System are now discussed in more detail.

Observations for Detecting and Tracking Cyclones

Weather Satellites. Satellite photographs received by the Bureau’s APT readout station in Melbourne are relayed to Brisbane daily. These photographs were of very considerable value in detecting and tracking cyclone “Ada” from Monday 5 to Saturday 17 January.

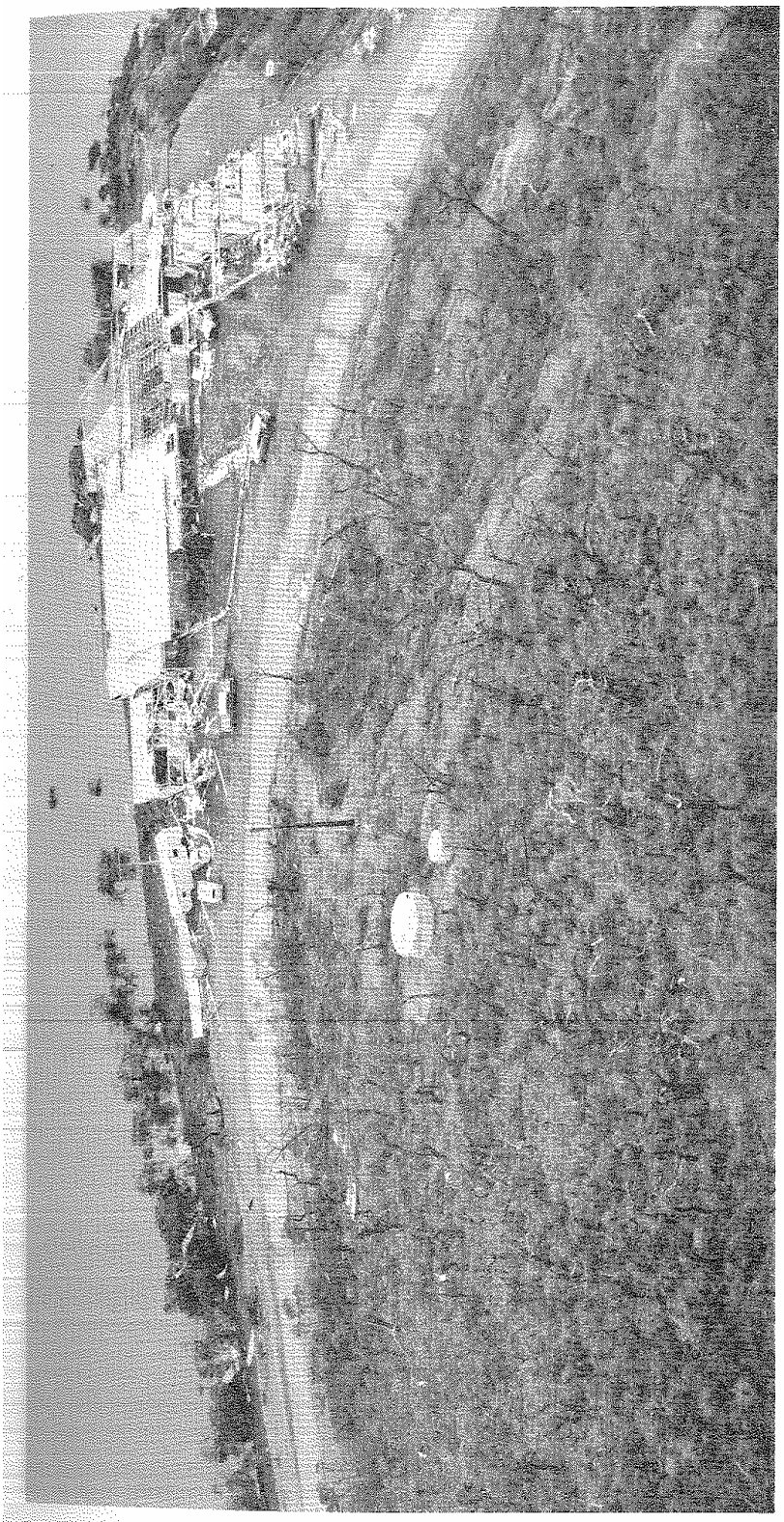

Fig. 8 Shute Harbour Hotel/Motel (Note denuded trees in foreground)

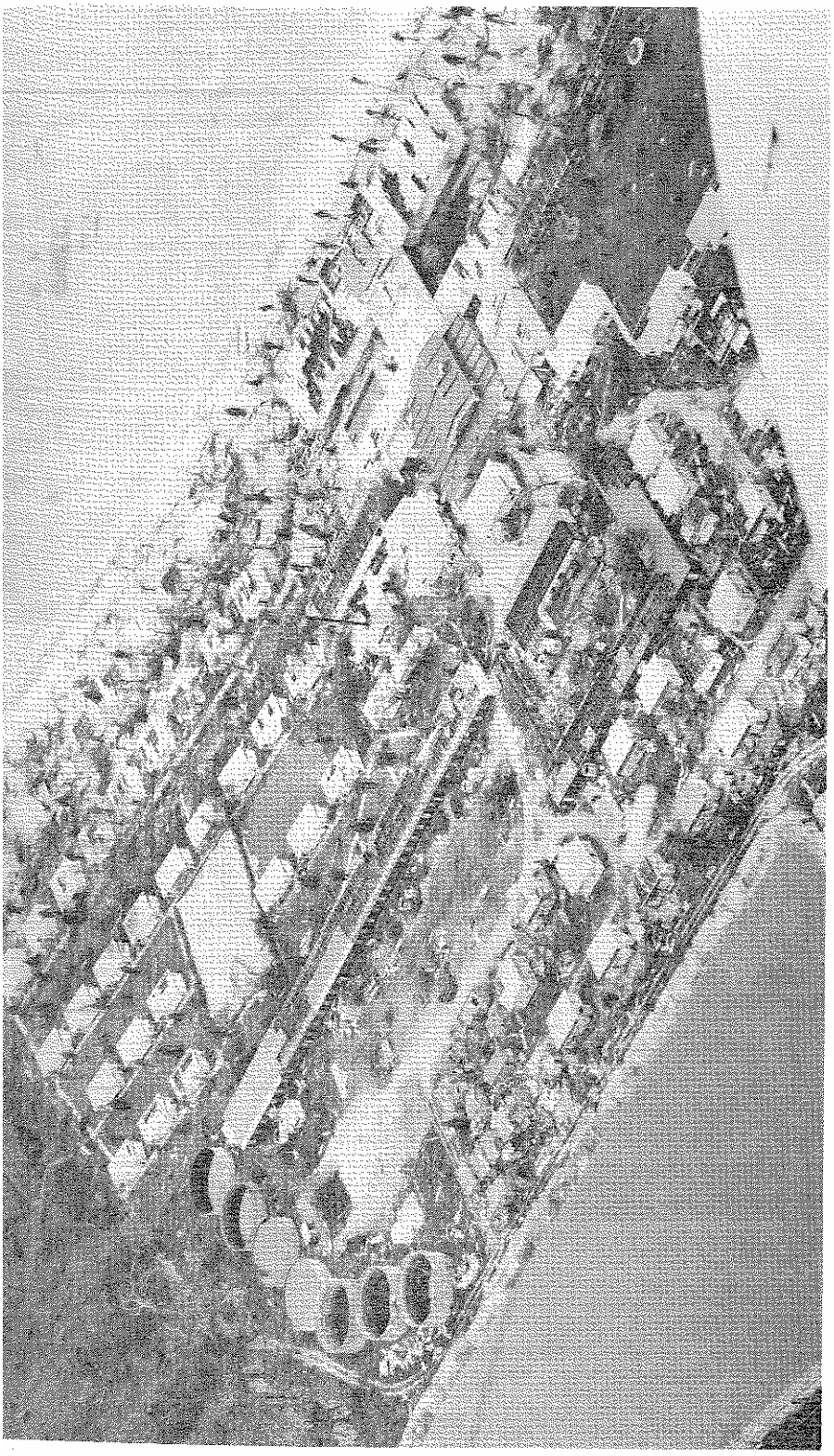

Fig. 9 Hayman Island

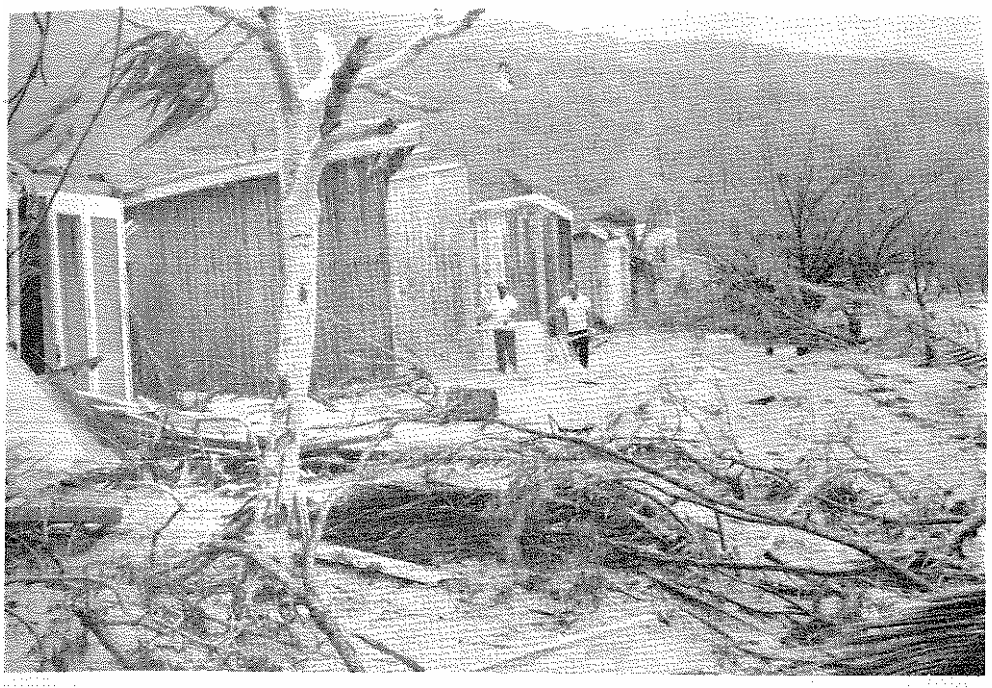

Fig. 10 Hayman Island (Note sandblasting of paintwork)

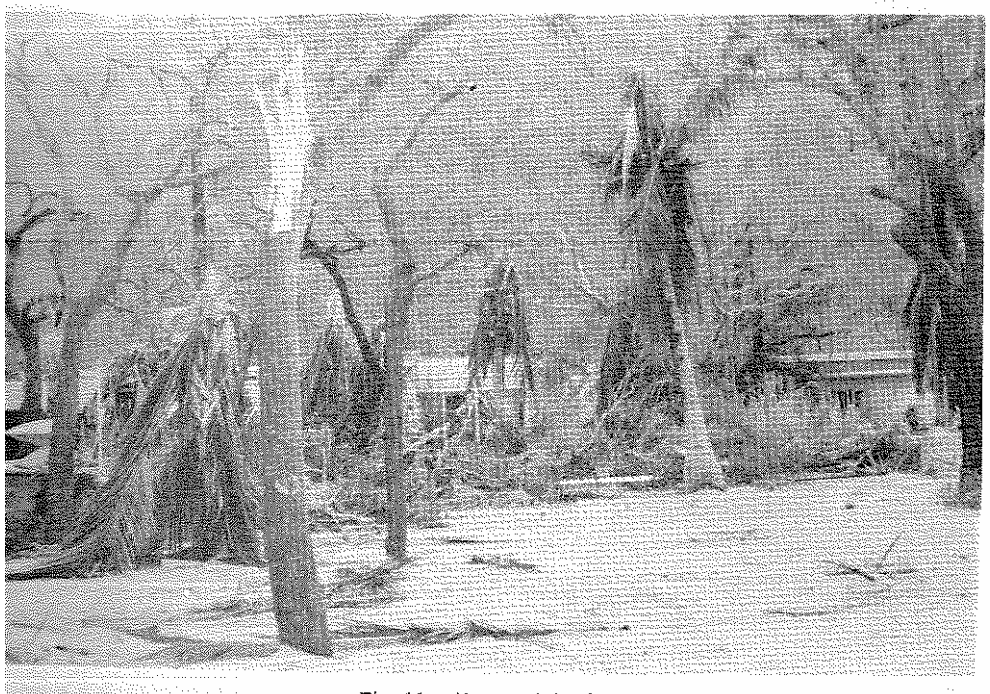

Fig. 11 Hayman Island

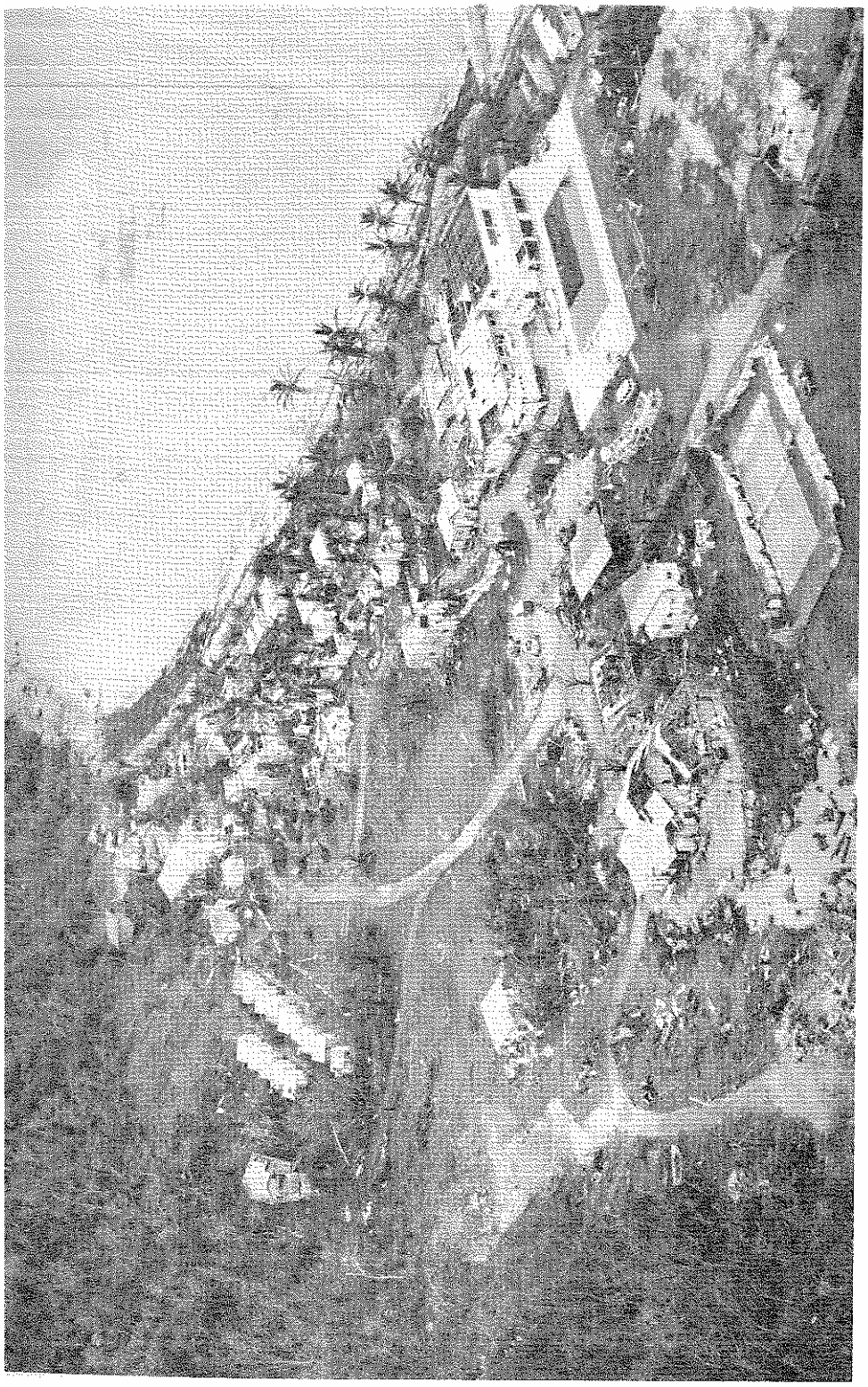

Fig. 12 South Molle Island

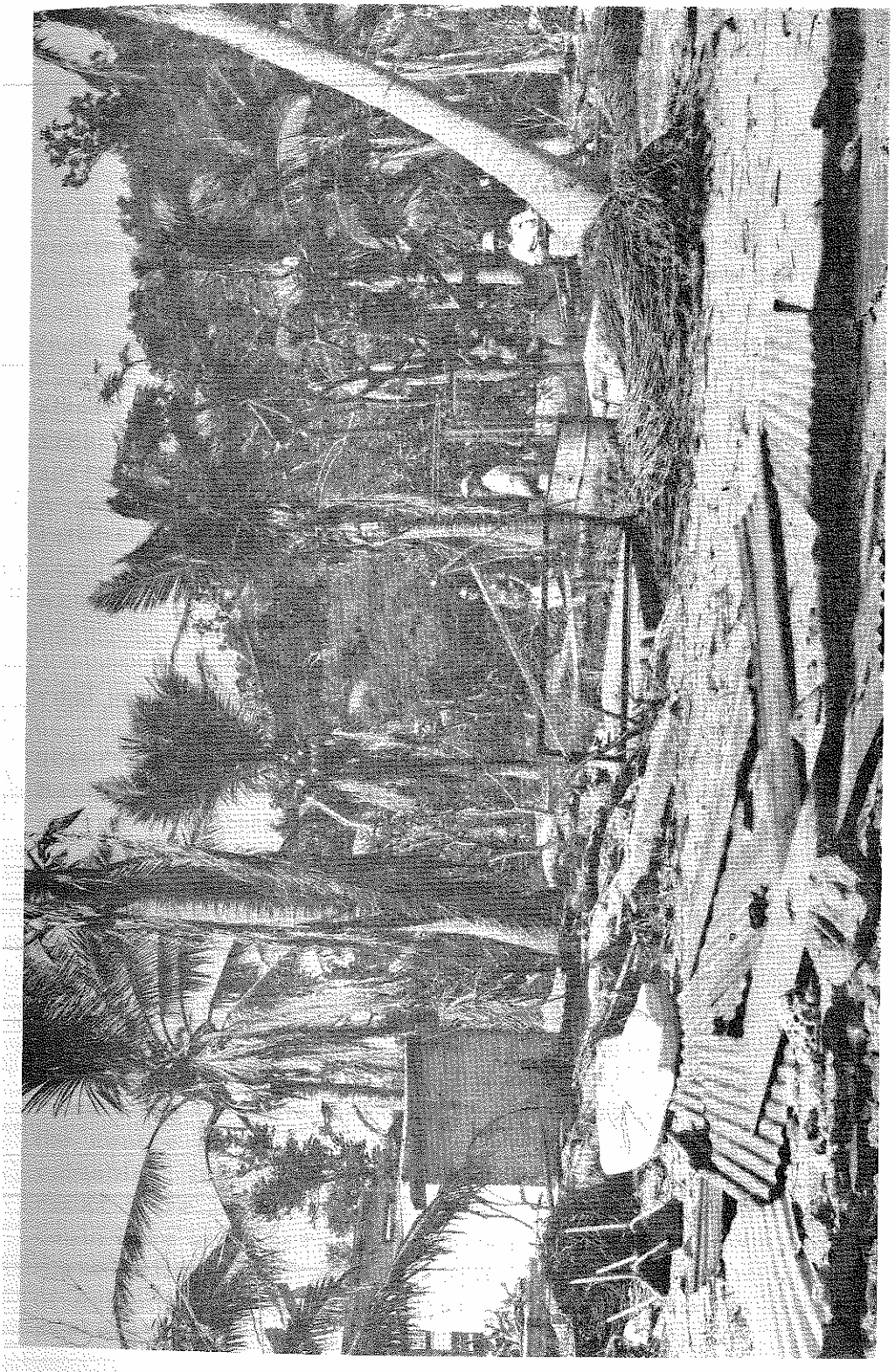

Fig. 13 Palm Bay Resort on Long Island

Radar.

The Mackay radar was used to the fullest advantage in tracking cyclone "Ada" and confirmed the value of this facility for constant surveillance of systems within its operational range.

Routine and Emergency Synoptic Observations.

There was not obvious deficiency in the operation of the routine and emergency synoptic network. In fact the volunteer observers at emergency synoptic stations performed admirably, but unfortunately communications were disrupted from most of the observing stations after the passage of the cyclone. There were, however, no actual measurements of cyclone strong winds due to the lack of anemometers in this particular area. During the cyclone occurrence estimates of wind speed are based on effects visually noted by the observer. A post-analysis of damage can enable reasonably reliable estimates of wind speed to be made. Such information is useful for design purposes but contributes nothing to a warning system.

Automatic Weather Stations.

Some of the most vital pieces of information used in the formulation of warnings of cyclone "Ada" during Saturday 17 January were observations from the automatic weather station at Marion Reef. These confirmed the conclusions, which had been reached on satellite information, well before the cyclone was within range of the radar screen. This was a clear demonstration of the value of the automatic weather stations which the Bureau commenced installing in the Queensland region in 1966.

Aircraft Weather Reports.

Two radar reports from civil aircraft in the early afternoon of Saturday 17 January identified the position of the centre of cyclone "Ada". At the time the Mackay radar had accurately located the centre so that the aircraft reports were not especially valuable. Indeed, the positions reported from the aircraft radar were in error by 60 to 80 miles which in this case could have been seriously misleading in the absence of other more reliable information. It is clear that "ad hoc" reports of cyclone centres from aircraft need to be very carefully assessed.

Microseisms.

Microseismic equipment is used to detect small earth movements produced by waves generated near the cyclone centre. Due to the small size of cyclone “Ada” microseismic observations were not operationally useful. However, post-analysis did show that there was some slight response to the activity of the cyclone.

Atmospheric Direction Finding (Sferics).

An inter-connected network of radio direction finding stations receives radio waves emitted from lightning flashes associated with large cumulus and cumulo-nimbus clouds which show intense development sometimes associated with cyclone activity. Sferics observations did not assist in the detection of cyclone “Ada”.

Inwards Communications

The system of communications by which the Tropical Cyclone Warning Centre receives data from satellite, radar stations and other reporting stations worked reasonably well during cyclone “Ada” except for radio connection from radar stations to the Tropical Cyclone Warning Centre in Brisbane, break downs in the emergency reporting network and delays in transmissions of flood reports.

Operations of the Tropical Cyclone Warning Centre

A close review of the operation of the Brisbane Tropical Cyclone Warning Centre indicates that the centre functioned efficiently. There is evidence that senior staff of the centre were extremely fatigued by long hours on duty and it is likely that this could have impaired their efficiency if another tropical cyclone had occurred immediately after “Ada”.

Form of the Warning

During the visit by the Director and Regional Director to centres in Queensland there were a number of complaints regarding the “misleading” form of Bureau cyclone warnings. It was suggested that the degree of confidence in locating the centre and assessing speed of

movement should have been indicated. Some felt that indications of central pressure, wind speed and speed of movement should not be included unless the Bureau was confident that their assessment was accurate. Others suggested hat the warnings should include areas threatened and indicate the severity of the threat to life and property. A further suggestion was that warnings should include condtions “green”, “amber”, and “red” to indicate the severity of the threat to particular areas.

Communications from Tropical Cyclone Warning Centre to Media, Authorities and Bureau’s Field Offices

Considerable difficulty was experienced in ensuring that warnings were promptly received by addressees. Whilst in general the PMG communication system worked well prior to the passage of the cyclone, there were later break downs in communications. Arrangements by PMG for handling week-end traffic involves the delivery of the warning in phonogram form. This means that telegrams must be read by PMG officers to the addressee. Where the addressee was a busy policeman, harbourmaster, postman or television or radio announcer the inherent difficulty is obvious.

One of the difficulties encountered at weekends is the limited coverage of local radio stations. This was exemplified by the operation of radio stations at Mackay which was a key point for the dissemination of warnings of Cyclone “Ada”. On Saturday and Sunday the responsibility for inclusions of warnings in broadcasts passes from 4QA Mackay to ABC Brisbane. Broadcasts of warnings of cyclone “Ada” on relay from Brisbane. Brisbane were irregular and delayed until Sunday evening 18 January when the 4QA announcer re-opened the station and broadcast warnings from 9.15 p.m. to 1.30 a.m. Monday, at which time the station was until 7.00 a.m.

The commercial station in Mackay (4MK) broadcast warnings soon after receipt. However some warning messages were delayed by from one to two hours and as described on Page 14 two of the messages late Saturday night and early Sunday morning were not delivered to 4MK, nor to 4QA Mackay and 4AY Townsville. These were the critical warnings issued on Saturday night.

Messages to many other points suffered similar and in some cases greater delays. On 19 and 20 January delays in transmission of flood warnings to Mackay addresses were even greater, up to four and three-quarter hours in a few cases, due to dislocation caused by flooding.

There is no doubt that one of the areas most requiring action is that relating to the manner in which warnings are distributed to the media and other authorities.

Dissemination of Warnings to the Public

In one centre a local official, intending to avoid unnecessary panic, instructed the local radio station to add a rider to the warnings to the effect that “this is only a small cyclone and there is no cause for alarm”. This was a most unfortunate action and an assurance has been obtained from the authority concerned that no additions or amendments will be ordered to Bureau warnings in future.

Apart from the question of public education dealt with below this is probably the area requiring the greatest attention. It is obvious that radio and television stations play a vital part. Suggestions were made that they should remain open 24 hours a day and broadcast warnings on the hour every hour. It was also suggested that a recording of the warnings should be “patched in” to local automatic telephone exchanges so that the warnings would be available to any member of the community dialling a specially provided number. It was recommended that warnings should be promulgated on frequency 2524 Hz which is that used communication between some ships and shore bases. Many people felt that police, harbourmasters and civil defence authorities should have responsibility for dissemination of warnings. It was also suggested that the Bureau’s field offices at Townsville, Mackay, Gladstone, Rockhampton and Cairns might also be points of information. Present Bureau staff would not enable this. Strangely enough there was considerable support for the continuation of the system whereby special cyclone pennants are flown from flag poles on post offices, town halls or other prominent buildings.

Public Education

The lack of public awareness of the nature of cyclones and the organisation for dissemination of warnings was obviously the most serious deficiency associated with cyclone “Ada”. Some residents of long experience of cyclones disregarded the warnings because of the most unusual nature of this cyclone. In the case of “Ada” the usual preliminaries of pressure fall and gradually increasing wind were absent. Many residents, particularly the transitory holiday population in the Whitsunday area were unaware of the nature of cyclones. In some cases there was a tendency to blame imaginary deficiencies in the warning system when individuals themselves were at fault. There are five areas where much more effort is needed.

Public Education on the Nature of Cyclones.

There is a requirement for an increased public education programme on the nature of cyclones, pointing out such features as the cyclone eye, the strong wind ring and other characteristics.

Public Education on the Cyclone Warning System.

There is a requirement to further educate the public regarding the manner in which they are distributed.

Public Education on Pre-Cyclone Precautions.

There is a need to make the public more aware of building practices to withstand cyclones and the necessity for the annual overhaul of roofing, removal of loose material, etc.

Public Education on Precautions during Cyclones

There is an urgent need for more of the public to be instructed regarding the action they should take during a cyclone for their own safety and the protection of their property.

Cyclone Disaster Plans

Discussions with local authorities in Queensland centres revealed that there was an urgent need for more local disaster plans to be formulated or reviewed to guard against the likelihood of the occurrence of a tropical cyclone. Such a plan would need to be based on design storms for each locality which should include an

Assessment of the risk for a storm surge which is a substantial rise in sea level (up to 15 or 20 feet) associated with an intense tropical cyclone moving very slowly offshore. Storm surges present a rare but very real threat of inundation of low lying coastal areas including those in the vicinity of Mackay, Bowen and Townsville.

VISIT TO QUEENSLAND BY DIRECTOR OF METEOROLOGY AND REGIONAL DIRECTOR (Q'LD & T.P.N.G.) FOR DISCUSSIONS ON CYLCONE "ADA"

To the Director of Meteorology, Dr. W.J. Gibbs, and the Regional Director for Queensland and Territory of Papua and New Guinea, Mr. A.J. Shields, visited Queensland from 27 April to 7 May. They were accompanied by Mr. M. Rosel, Public Relations Officer, Bureau of Meteorology. Director and Regional Director had discussions with local government authorities, harbour masters, post-masters, police, managements of island resorts and representatives of press, radio and television at Maryborough, Bundaberg, Gladstone, Rockhampton, Mackay, Hayman Island, Happy Bay, Proserpine, Bowen and Townsville. Regional Director also had discussions with local authorities in Cairns.

The Director and Regional Director also took the opportunity of having discussions with staff members of the Bureau of Meteorology at Gladstone, Rockhampton, Mackay, Townsville and Cairns.

The Director and Regional Director had the opportunity of inspecting damage from Cyclone "Ada" both on the ground and from the air in the Whitsunday district and in the Proserpine region.

The attitude of representatives of council and other authorities was somewhat unconcerned at Maryborough, Gladstone, Bundaberg and Rockhampton which have not experienced a tropical cyclone in recent years. However at Mackay, Proserpine, Bowen, Townsville and at Hayman Island and Happy Bay there was very real and considerable interest.

The general subjects discussed at the various centres were:

1. The adequacy of the Bureau's detection and tracking system,

2. The adequacy of the Bureau's warning system and the appropriateness of the form of warning,

3. The adequacy of the system of distribution or dissemination used for cyclone warnings,

4. The subject of public education.

There is no doubt that the visit of the Director of Meteorology and the Regional Director for Queensland was well worth while. It enabled first-hand examination of cyclone damage and the area over which the cyclone passed. It also permitted free and frank discussion with local representatives for which there is no substitute if a comprehensive and accurate assessment of the warning system is to be obtained.

During the 11 day visit there were 11 formal meetings at which brief lectures were given by the Director or Regional Director and the U.S. film "Hurricane" was shown. In addition two meetings of Rotary were addressed by the Director and Regional Director. There were many discussions with Members of Parliament, municipal representatives, police, representatives of large films such as Queensland Aluminium in Gladstone and Walkers and Hynes in Maryborough, with resort managers and with officers of Civil Defence, Search and Rescue and RAAF.

A list of persons with whom cyclone "Ada" was discussed appears at the end of this report.

At the meetings the Director and Regional Director explained that forecasts issued early on Saturday 17 January had underestimated the intensity attained by cyclone "Ada" late on Saturday night and had overestimated the speed of movement. Nevertheless the Bureau's warnings have notice of a cyclone with strong winds which would pose threats to lightly constructed buildings, to small craft at sea and to

residents (who could be endangered by flying debris). A considerable number of residents, fishermen and others took adequate precautionary measures acknowledging that a dangerous situation existed. Some residents and fishermen admitted they had disregarded warnings, in some cases because the cyclone had not arrived at the due time and in other cases because, due to the small area covered by the strong winds the usual precursors of rising wind and falling pressure were absent.

The damage caused by Cyclone “Ada” is conservatively estimated at $12 million some of which could have been avoided if precautionary action had been taken. There were some remarkable escapes from death and injury including those boat owners who moved their boats whilst in the eye of the storm from one protective anchorage to another. The 11 lives lost at sea were generally the result of taking the warning to lightly, taking incorrect action or taking action too late. The other two deaths were due to the heart attack of a woman at a holiday resort and the death by drowning of a soldier in a flood at Proserpine.

Representatives of press, radio and television were in attendance at the formal meetings between the Director and Regional Director and local authorities. There was widespread coverage in all mass media, both in the form of reports of meetings and interviews.

ACTION PROPOSED

Observations for Detection and Tracking Cyclones

In the last twelve years three small but intense cyclones with the characteristics of “Ada” have occurred on the Queensland coast.

After each season the Bureau of Meteorology reviews the effectiveness of its system for detecting and tracking cyclones, forecasting their development and movement and warning the public. From lessons learnt in these annual reviews, particularly when cyclones have affected the

Mainland and offshore islands of Australia, improvements to the system are put into effect.

In addition the Bureau evaluates new equipment for cyclone detecting, tracking and warning with a view to its further development for inclusion in the tropical cyclone warning system.

Weather Satellites.

Satellite cloud pictures are received in Australia at present from four weather satellites launched in the U.S.A. and equipped with television type cameras for photographing cloud pictures and transmitting the pictures to “read-out” stations on the ground. Since 1966 the Bureau has installed read-out stations in Melbourne, Perth and Darwin.

The Brisbane Tropical Cyclone Warning Centre receives data from the satellites by land-line from the Melbourne read-out station. To improve the quality of data a photo facsimile receiver and photographic print processor are being installed at Brisbane. To extend the coverage eastward, and also to enable maximum benefit to be gained from the number of satellites available, an additional satellite Automatic Picture Transmission read-out station is planned for installation in Brisbane in 1971.

Radar

The Bureau has weather watching radar stations along the Queensland coast at Cairns, Townsville, Mackay, Gladstone and Brisbane. Plans are in hand to install more modern radar equipment at Gladstone and Mackay. Action is in hand to resite and replace the existing Townsville radar which is located in an unfavourable position for weather watching. This relocation is a difficult problem because the only sites giving suitable coverage are on mountain tops with extremely difficult access. However, investigations are continuing and finance and man-power will be sought for the installation of a new weather watching radar on a suitable mountain top by 1973. It may be possible to make interim installation at an earlier date.

The desirability and feasibility of installing a weather watching radar screen in the Maryborough are is also being investigated.

Routine and Emergency Synoptic Observations.

Certain anemometers for the continuous measurement and recording of wind speed and direction installed at the Bureau's meteorological offices in the Queensland coast will be replaced by new equipments capable of measuring gusts of up to 150 knots. Anemometers will also be progressively installed during the next three years at those observing stations manned by part time observers on the Queensland coast which are not already so equipped.

Automatic Weather Stations.

The Bureau has Designed and installed automatic weather stations on a chain of reefs about 300 miles off the Queensland coast. These stations were installed at Cato Island in 1966, Frederick Reef in 1968 and Marion Reef in 1969.

However, if the track of cyclone "Ada" had been about 100 miles to the north or 50 miles to the south it is likely that the observations at Marion Reef would not have indicated its presence. It is clear that if cyclones of the "Ada" type are to be detected the automatic weather station network must be denser.

Two more are to be installed this year; at Flinders Reef in June and Lihou Reef in October. Three additional stations at approximately 100 miles off Cairns (Holmes Reef) Proserpine (Edgel Reef) and Rockhampton (Hickson's Cay) are considered desirable and these sites are being examined. If they prove suitable, automatic stations will be installed in 1971.

Microseisms.

Cyclone "Ada" did not show much microseismic response; however, on some previous occasions microseisms have indicated tropical cyclone development Further investigations will be made in studying this technique but the potential does not appear to be as great as that from satellites, radar or automatic weather stations.

Atmospheric Direction Finding (Sferics).

These direction finding bearings have been useful in locating thunderstorm activity sometimes associated with the early days of development of tropical cyclones. However, sierics did not assist in locating or tracking cylone "Ada". There are no plans for extension of the existing Sferics network.

Aerial Reconnaissance.

Rapidly developing technology in satellite observations, weather radars and automatic weather stations and increases in the mainland observation network make the need for aircraft reconnaissance in detecting and tracking of cyclones a relatively and progressively less vital factor.

If the use of special aircraft reconnaissance were to be contemplated it would demand aircraft which were specially instrumented and equipped and manned by specially trained crews; moreover to be effective at least two squadrons of such aircraft would be necessary to make any reasonable contribution to cyclone protection in the North of Australia.

In the light of developments in other means of detection and tracking there are no plans at this stage for the acquisition of squadrons of special aircraft for this purpose.

Inwards Communications

The only deficiencies in the performance of the inwards communications system during cyclone “Ada” were the performance of the single side band radio network linking the cyclone radar stations in Queensland with the Tropical Cyclone Warning Centre in Brisbane due to inference by “night” effect and the necessity for more reliable communications from emergency reporting stations. These deficiencies will be overcome by the upgrading of radio aerials by 1973 and a review of methods of communication from the emergency reporting stations.

Operations in the Tropical Cyclone Warning Centre.

Proposals for extra professional and assisting staff in the Tropical Cyclone Warning Centre in Brisbane are being processed with the Public Service Board at the present time. These were initiated before the occurrence of cyclone “Ada” and consideration will be given to the need for further staff increases if such are warranted.

Despite very large research programmes in many countries (notably the U.S.A.) and a considerable amount of research in this country, our knowledge of the processes which generate and effect the progress of tropical cyclones is still incomplete. Consideration is being given to the need to supplement staffs of the Research and Development division in the Bureau's Central Office and the Brisbane Regional Office to accelerate research and develop and evaluate new forecasting techniques.

Form of Warnings

In consultation with authorities the Bureau is reviewing the form of its cyclone warnings to ensure that they will always be meaningful and readily understood by the public and by those officials responsible for the local distribution of the warnings. The Bureau is also investigating the proposal that "green", "amber" and "red" signals be used.

Communications from Tropical Cyclone Warning Centre to Media, Authorities and Bureau's Field Offices

Arrangements have been made with the tele-communications authorities (particularly the P.M.G.'s Department) and with the Australian Broadcasting Commission and commercial broadcasting networks in Queensland to minimize delays in the distribution of cyclone warnings. The Australian Broadcasting Commission and commercial networks will arrange for radio transmitters in threatened areas to be kept open for twenty-four hours a day when cyclone warnings with 'top priority' classification are issued. The P.M.G.'s Department will likewise accord the highest priority "FLASH" to the Bureau cyclone warnings.

Dissemination of Warnings to the Public

In addition to the above arrangements, investigations are being made with the P.M.G.'s Department and other authorities of other means of speeding up the distribution of warnings to the public including better communication of flood reports from local gauge readers to district radar stations. The use of the ship to shore radio frequency 2524 Hz has been negotiated with the P.M.G.'s

Department and warnings will be issued to six Air Sea Rescue Squads which use this frequency. This frequency is commonly used by holiday resorts on the offshore islands along the Queensland coast.

The proposals for a “dial a cyclone” telephone number to be available in the cities and towns along the Queensland coast are also being negotiated with the P.M.G.’s Department. Such services would be brought into force only after the initial warnings had been issued.

It is also proposed that the staff of the Regional Office of the Bureau in Brisbane be augmented, to allow for a “flying squad” of meteorologists and assistants to be transported from the Tropical Cyclone Warning Centre to any part of the Queensland coast threatened by a cyclone, to assist in the cyclone waning system at the local level.

Public Education

Because cyclones are infrequent and public memories are short it is clear that the Bureau for its part must intensify its programme of public education about the behaviour of tropical cyclones and must keep the community fully informed of details of how and when cyclone warnings are issued and with what frequency, so that full advantage can be taken of the Bureau’s warning system.

The Bureau conducts its educational campaign in cyclone affected areas in the following ways:

a) by talks and interviews over radio and television

b) by public lectures

c) by distribution of pamphlets and booklets

d) by articles in the press

e) by the displays of exhibits and posters and by the direct contact with groups and individuals at ceremonies and exhibitions

f) by the showing of films

g) by courses in schools, universities and adult education classes.

This is the most important area in which improvements to the cyclone warning system can be effected easily. In collaboration with other authorities the Bureau will embark on an intensified programme of educating residents in cyclone prone areas in:

a) the nature of tropical cyclones

b) precautions which should be taken before the cyclone season

c) the Bureau's Warning System and how and when warnings can be obtained

d) precautions to be taken when a tropical cyclone is in the vicinity.

It is intended to produce cards explaining the precautions which residents in threatened areas should take when a cyclone is imminent. These cards should be displayed in a prominent position in every household where the message will be regularly seen.

Other measures proposed are the issue of public information pamphlets, the showing of films such as the U.S.A. film "Hurricane" and the making of short tape recorded segments advising the public what to do in preparing for the onslaught of a cyclone. These tapes will be distributed to all radio and television stations with the request that they be broadcast in conjunction with cyclone warnings.

The Bureau will also arrange for the making of a special film on cyclones for the Australian region by the Commonwealth Film Unit and preparation of special school projects and feature articles in the press.

Participants in discussions with Director of Meteorology and Regional Director (Qld. And T.P.N.G.) on visit to Queensland 27 April to 12 May 1970

BRISBANE

The Hon. Dr. P.R. Delamothe M.L.A.	Queensland Minister for Justice and Attorney General
Mr. R. Whitrod C.V.O., Q.P.M.	Deputy Commissioner of Police
Mr. B. Fogg	Co-ordinator of Civil Defence
Mr. D.R. Channell	Manager ABC
Mr. J.W. McKay	Manager, Queensland Television Ltd
Mr. M.E.W. Baker	Manager, Radio 4BC
Mr. R.G. Cochrane	Manager T.A.A.
Mr. W.H. Harper	Commonwealth Public Service Inspector
Mr. Curtis	Posts and Telegraph P.M.G. Department
Mr. R.M. Seymour	Regional Director, Department of Civil Aviation
Mr. A.T. Brunt	Supervising Meteorologist, Bureau of Meteorology
Mr. W.R. Wilkie	Senior Meteorologist, Forecasting and Warning Section Bureau of Meteorology
Mr. B. Aubrey	Regional Maintenance Office, Bureau of Meteorology
Representatives	Radio Stations
Representatives	Television Stations
Representatives	Daily Press

MARYBOROUGH

Alderman J. Anderson	Mayor
Mr. M.H. Kidd	Town Clerk
Mr. F. Millsen	City Engineer
Inspector McCarthy	Officer in Charge, Police Department
Mr. R.S. Whelan	P.M.G. Department
Mr. H. Peddie	Manager Radio 4QB (ABC)
Mr. G.W. Robertson	Manager 4MB
Mr. J. Rogers	Harbour Master
Mr. L. Hyne	Manager, Hyne & Son Pty. Ltd.
Mr. M. Daniel	Wide Bay & Burnett Television Ltd.
Mr. J. Concannon	Walkers Shipyards

BUNDABERG

Alderman C.J. Nielsen	Mayor
Alderman A.B. Martin	Bundaberg City Councillor
Alderman D.G. Rattray	Bundaberg City Councillor
Alderman R.E. Clemence	Concil Representative
Mr. R.G. Crane	Town Clerk
Mr. T.J. Healy	Council Health Inspector and Civil Defence Controller
Mr. C.S. Brewer	City Engineer
Inspector F.R. Thrupp	Police Department
Senior Sergeant Harding	Police Department
Mr. F. Wise	Assistant Secretary, Harbour Board
Mr. G.C.C. Maughan	Chairman, Woongarra Shire Council
Mr. A.E. Dionysius	Shire Clerk, Woongarra Shire Council
Mr. N. McCormack	Manager, Radio Station 4 BU
Mr. R. Coulter	Postmaster

GLADSTONE

Alderman W.R. Goldring	Mayor
Mr. H.E. Colbran	Town Clerk
Mr. B. Lloyd	Civil Defence Controller
Mr. C.E. Gallagher	Customs Officer
Mr. R. Tanna	Engineer/Manager, Harbour Board
Mr. F. Stevens	Acting Post Master
Mr. K. Gregory	Queensland Alumina Pty Ltd.
Mr. A. Frost	Officer in Charge, Meteorological Office

ROCKHAMPTON

Alderman R.B.J. Pilbeam	Mayor
Mr. A. Philp	City Engineer
Mr. N. McPherson	Town Clerk
Mr. Tennant	Livingstone Shire Councillor
Mr. P.A. Galvin	Fitzroy Shire Councillor
Mr. J.F. Featherstone	Fitzroy Shire Councillor
Mr. W. Eastman	Manager, Australian Broadcasting Commission
Sgt. S.T. Castledine	Police Radio
Mr. G. Nash	Editor, Morning Bulletin
Mr. S. Martin	Officer in Charge, Meteorological Office

MACKAY

The Hon. R.A. Patterson M.P.	Member for Dawson
The Hon. R.E. Camm. M.L.A.	Queensland Minister for Mines and Main Roads
The Hon. E.D. Casey M.L.A	Member for Mackay
Alderman A. Abbott	Mayor
Mr. L.A. Payne	Shire Clerk
Mr. T.J. Abbiss	Shire Engineer
Inspector J. Bianchi	Inspector of Police
Mr. E.E. Evans	Shire Clerk, Pioneer Shire
Mr. L.T.A. Hansen	Controller, Civil Defence committee, Pioneer Shire
Mr. G. Lowther	Shire Clerk, Mirani Shire
Mr. R.A. Wood	Shire Clerk, Sarina Shire
Mr. J. Ole	District Engineer, Irrigation & Water Supply Commission
Mr. R. King	Rural Department, ABC.
Mr. W. Frazer	District Superintendent, Queensland Railways
Mr. E.A. Muir	Postmaster
Mr. J. Alcorn	Divisional Engineer, PMG Department
Mr. N.J. Ullman	Consulting Engineer
Mr. G.A. Nolan	Consulting Engineer
Mr. N.B. Jackson	Manager, Mackay Broadcasting Service
Dr. Ian Chenoweth	Mackay Medical Emergency Services
Mr. D.L.S Williams	Superintendent, Q.A.T.B.
Mr. G. Graves	Secretary, Fire Brigade Board
Mr. S. Murray	Manager, Regional Electricity Board
Mr. M. E. Lowe	Manager, Mackay Television Ltd.
Mr. N.B. Jackson	Manager, 4MK Radio Station
Mr. C.M. Manning	Editor, Daily Mercury
Mr. G. Trotman	Officer in Charge, Meteorological Office

AIRLIE BEACH

Mr. H. Muller	Proprietor, Airlie Beach Motel

HAYMAN ISLAND

Mr. A. Maestracci	Manager, Hayman Hotel, Hayman Island
Mr. B. Elsey	Owner, Daydream Island

HAPPY BAY – LONG ISLAND

Mr. Ware	G.B.R. Promotional Council
Mr. J. Mountney	Chairman, Happy Bay Tourist Resort, Long Island
Mr. L. Nicholson	Secretary, Lindeman Island Tourist Resort
Mr. W. Bauer	Manager, South Molle
Mr. F. Hiser	Manager, Hook Island Observatory

PROSERPINE

Alderman P. Faust	Chairman, Shire Council
Mr. D.F. Erriker	Shire Clerk
Mr. W.J.A. Lamberton	Chairman, Q.A.T.B.
Mr. F. Holmes	Chairman, Canegrowers Council
Mr. C.F. Grimestone	Chairman, Canegrowers Council
Mr. W. Clarke	Postmaster
Mr. B.J. Lewis	Editor, Guardian Press

BOWEN

Alderman J.A. Gralton	Chairman, Shire Council
Alderman R.A. Bull	Deputy Chairman, Shire Council
Mr. J. Wood	Shire Clerk
Mr. E. Chambers	Fire Chief, Fire Brigade Board
Mr. R. Steen	Secretary, Harbour Board
Mr. I. Mackey	Postmaster
Mr. W. Ayles	President, Air-Sea Rescue Organisation

TOWNSVILLE

Alderman F. Phillips	Mayor
Mr. C.B. Campbell	Town Clerk
Mr. J.H. Gibbard, M.B.E.	Townsville Daily Bulletin
Mr.K. Duncan	Manager 4TO
Mr. G.T. Schmid	Manager 4AY
Inspector C. Germain	Inspector of Police
Mr. F. Haly	Secretary, North Queensland Fish Board
Mr. R. Butler	Postmaster
Mr. H. Taylor	Administrator, Harbour Board
Mr. E.D. Murray	Manager, Northern Electric Authority
Mr. R.D. Waldie	Manager, Regional Electricity Board
Mr. F. Gregory	Department of Civil Aviation
Group Captain K.M. Rundie, O.B.E.	Local Controller, Civil Defence Organisation
Mr. R.D. Marshall	Regional Manager Australia Broadcasting Commission
Mr. K.R. Christensen	General Manager, Telecasters N.Q. Pty. Ltd.
Captain T.C. Chambers	Harbour Master, Department of Harbours & Marine
Sgt. R. Gibson	Police Station, Home Hill
Mr. M.D. Haig	Shire Engineer Ayr Shire Council
Mr. K.J. Dobbins	Postmaster, Ayr.
Mr. A. Walker	Officer in Charge Meteorological Office
Mr. A. Jeffries	Meteorological Office

CAIRNS

Alderman D. De Jarlais	Mayor
Mr. G. Haussmann	City Engineer
Mr. W. Trundle	Town Clerk
Mr. W.M. Maloney	Public Relations Officer, City Council
Mr. C.R. Barrett	Manager, Radio Station 4CA
Mr. G. Harding	Manager, A.B.C.
Mr. L.J. Roberts	Manager, Television Station Channel 10
Inspector H. Hore	Superintendent Police
Mr. W.A Whiting	Regional Electricity Board Distribution Engineer
Mr. H.L. Harvey	Regional Electricity Board Operations Engineer
Mr. H. Friend	Gutterage, Haskin & Davey, Consulting Engineers
Mr. F. Gibson	Civil Defence and Air Ambulance
Mr. T.W.C Briggs	Superintendent, Air Ambulance
Mr. O.M. Ellison	Chairman, Fire Brigade Board
Mr. Adrian Scott	A.B.C. Rural Section
Mr. D. Franzman	Editor, Cairns Post
Mr. Mann	R.A.C.Q.
Mr. C. O'Connor	Government Tourist Bureau
Mr. D. Flanders	Kairi Irrigation & Waterworks, Mareeba
Mr. J.P. Rhule	Postmaster
Mr. P.O. Lynam	Postal Section
Mr. J.A Hickman	Postal Section
Mr. K.A. Wilkinson	Telegraph Section
Mr. J. Pease	Post & Telegraph Office
Miss. A. Bowden	Supervisor, Telephone Exchange
Mr. A. Sheppard	District Postal Office
Mr. P. Emmerson	District Postal Office
Mr. D. Annatt	Officer in Charge, Department of Civil Aviation
Representatives	Local High Schools and Visual Aids Section Education Department
Mr. B. McEwen	Officer in Charge, Meteorological Office
Mr. F. Ella	Meteorological Office