

Tropical Cyclone Beverley 22/03/1975 – 03/04/1975

(i) General

“Beverley” was the ninth cyclone of the season and the third to make landfall in Western Australia, the others being “Wilma” and “Trixie”. At maturity “Beverley” was some 500 km from the Australian coast. After recurvature “Beverley” crossed the coast near Learmonth as a degenerating system. It maintained its identity while travelling southsoutheastward bringing substantial rains to the Gascoyne’s and Southwest division. Eventually the low pressure system which had been tropical cyclone “Beverley” crossed into the Southern Ocean and amalgamated with a southern cold front.

Damage caused by cyclone “Beverley” probably exceeded \$1 million with the most extensive damage being in the Learmonth and Carnarvon areas.

(ii) Development

“Beverley developed in a pre-existing low pressure area which was located some 900 km off the northwest coast of Western Australia.

Data from satellite photographs supplemented by that from ship observations indicated the existence of a circulation from 22nd March. By 24th March it was apparent that development was occurring. This proceeded rapidly with an estimated central pressure of about 930 mb being reached on 27th March. No ships were closer than 150 km to the cyclone centre so this estimate could not be confirmed. By 29th March “Beverley” had apparently passed its peak intensity and was beginning to weaken. This system’s subsequent movement caused it to pass inland where for some hours it remained a relatively intense system. At 310830 GMT the pressure at Mardathuna Station as reported as 978 mb and still falling with strong northeasterly winds. By 2nd April the system had moved into the western part of the Great Australian Bight where it merged with a rapidly moving southern cold front.

The surface synoptic situation prevailing while “Beverley” was active was a changing one. At first the cyclonic system was cradled to the north of two high pressure cells with a series of weak cold fronts moving rapidly eastward to the south of these highs. The fronts attained their maximum equatorward extent at about longitude 115°E. From 27th March to 30th March the westernmost anticyclone ridged strongly eastward destroying the low pressure trough near the west coast. After 30th March the centre of the high moved into the Bight ahead of another succession of cold fronts penetrating northeastward. The first of this series caught the remnants of cyclone “Beverley” and weakened it still further.

At 500 and 250 mb the airflow was an almost zonal westerly with little amplitude variation until 31st March when a large scale trough approached the continent from the west. This trough was associated with the cold front which caught “Beverley” and assimilated it.

The value of the first anticyclonically curved isobar outside the mature system was 1009 mb on 28th March.

(iii) Features of the Track (fig. 9.1)

“Beverley” could be distinguished as a separate system for 12 days during which time it moved approximately 450 km. The most unusual feature of the track was the movement to the west on 26th March following its previous southerly travel. Subsequently on 29th March a sharp recurvature from the westerly trajectory to a southeasterly one occurred. After this recurvature the speed of movement of the cyclone also increased markedly. Prior to 29th March the speed was about 8 km/h but after that date it increased gradually until it reached almost 40 km/h on 31st March. This rapid motion was maintained until the system disappeared.

The veering of “Beverley” to the west coincided with the extension of the higher latitude subtropical ridge to the east. Recurvature occurred on the day that the centre of high pressure cell moved to the Bight.

(iv) Rainfall and Flooding

Fig. 9.2 displays the cumulative isophets for the 96 hour period 0100 GMT 29th March 1975 to 0100 GMT 2nd April 1975. Most districts in the western half of the State received at least 20 mm of rain, the chief exception being the lower west coastal district. The heaviest falls occurred in the western parts of the Fortescue and West Gascoyne divisions shortly after “Beverley” made landfall. Totals Exceeding 80 mm were common. The largest 24 hour fall was at Learmonth where 120 mm of rain fell in the period ending 310100 GMT.

Some minor flooding occurred in the Gascoynes. The Great Northern Highway was cut north of Meekatharra by floodwaters and the Geraldton to Mt Magnet road was also closed for about 24 hours.

Damage caused by the rain and subsequent flooding was not extensive. It appeared to be localised to more populous centres of Carnarvon and Learmonth. In the Carnarvon area about half the banana crop was ruined by rain and winds. Many roads about the Learmonth-Exmouth area were left in a dangerous condition because of washways and potholing.

(v) Winds and Related Damage

“Beverley” was a very intense cyclone and winds exceeding 200 km/h were probably generated near its centre during its most intense phase.

The figure was estimated using the Dvorak technique for cloud photograph interpretation. However winds of this magnitude were not experienced as ships in the vicinity manoeuvred to avoid the strongest winds. The ship “Baronwemyss” was for several hours the vessel closest to the centre of the mature cyclone. It reported winds exceeding gale force continually from 261200 GMT to 280600 GMT. The maximum wind reported from that ship was 96 km/h at 270300 GMT when it was about 150 km to the northwest of the cyclone.

Gale force winds associated with “Beverley” were first reported by the ship “Nihamamaru” at 250200 GMT. Thereafter such reports were frequent until 310500 GMT when the “Ironcumberland” reported 82 km/h winds off the Carnarvon coast as that ship sailed southward.

A selection of ship reports is given in Table 9.1.

Land stations also received a battering from the strong winds especially during the period just before and after landfall. A list of the maximum winds reported from stations in the West Gascoyne and Western Fortescue is given in Table 9.2.

(vi) Seas, Swell and Storm Surges

Numerous reports of rough seas and heavy swells generated by cyclone “Beverley” were received from ships at sea. The first ship to report a heavy swell was the “Donovania” at 260200 GMT. It was about 280 km to the southsoutheast of the centre and the swell was northnortheasterly. Heavy swells were still being reported at 310900 GMT. Some of the ship reports in Table 9.1 mention the state of the sea.

Some coastal stations experienced heavy swells. Onslow reported a heavy northerly swell and at Ningaloo Station near Point Cloates the seas were rough and the swell high particularly that from the southwest which caused severe beach erosion.

The presence of the cyclone also resulted in some changes to the tidal levels. Onslow reported “very high tides” while at Shark Bay the tide was “high’ 1 m above normal”. At Pt Cloates “sea levels rose rapidly with the southwesterly swell but returned to normal after the cyclone passed”. Thus a storm surge of indeterminate magnitude accompanied cyclone “Beverley”.

The jetty at Coral Bay holiday resort was washed away. Extensive repair work was required at the Learmonth jetty as some of the vertical timbers were washed away or destroyed and some decking timbers were also damaged. As a result of the strong winds, rain, flooding and tidal effects damage caused by cyclone “Beverley” in Exmouth and surrounding areas were conservatively estimated to be in excess of \$600,000.

(vii) Satellite Analysis

The satellite photographs of 22nd-23rd march showed a mass of convective cloud off the northwest Australian coast. This mass was a southward protrusion from a band of cloud located along about 10°S latitude. On 24th March the system had drifted farther southwards and was exhibiting some cyclonic banding. A cloud system centre was distinguishable near 15.1°S 116.0°E.

In the next 24 hours rapid development occurred with the systems centre visible through indistinct and a broad convective band feeding into the centre of the cloud system. The cyclone was estimated to be T 3.5 in the Dvorak classification with ongoing deepening indicated. In the photograph from ESSA 8 at 260159 GMT the round but cloud covered eye of the cyclone was visible. The eye was embedded by about 3/4° and a convective cloud band about 1° wide encircled half the central feature. This lead to a value of T 5 with further development predicted. Deepening continued for the next 48 hours during which time the system became larger and more organised. The rate of development had decreased during this period for at its peak on 28th March “Beverley” was estimated to be a T 6.5 system. General isolation of the system from convective feeder bands on that day indicated that weakening was about to occur.

The size of the system was noticeably smaller on 29th March. On 30th March the cyclone had recurved and the cloud mass had become more broken although it remained well organised. An extensive cloud mass covered the western half of Western Australia on 31st march. The cyclone centre had moved over land and could only be approximately located on the photograph but there was more readily determined using surface observations. Photographs on the following days showed the cloud system as it moved rapidly southsoutheastward into the western part of the Great Australian Bight. There it continued tot rack rapidly in a southeasterly direction though the circulation was defined only by low level clouds.

A summary of the satellite data is given in Table 9.4.

Table 9.1 Selected Ship Reports

Ship	Position °S °E	Date/ Time GMT	Bearing/ Distance From centre (km)	Wind (km/h)	Sea (m)	Swell	Weather	Pressure (mb)
Niham- amaur	14.3 117.2	251200	030/340	290/63				1003

Donovania	19.8 114.2	260200	200/280	160/46	5	NNE/ M-H	Rain at times	998
Baron- wemyss	16.4 114.0	261200	330/200	250/83			Violent Showers	1001
Baron- wemyss	17.6 113.2	270300	320/110	220/96			Moderate Rain	994
Triadic	17.4 108.8	270900	280/430	190/44	1.5	200/5		1003.3
Baron- wemyss	17.7 111.5	280000	330/150	270/15 0	270/93			998
Triadic	17.2 110.1	280600	300/270	230/56	1.5	230/5		999.5
Nego- Victoria	23.6 109.1	291200	210/490	160/31	M/R	NNE/H		1006
Nego- Victoria	22.2 109.1	291200	210/490	160/31	M/R	NNE/H		1003.5
Iron cumberland	20.9 114.8	300800	110/270	040/46	Rough	NNE/H		1002
Tasmantide	20.0 116.7	301400	100/400	020/46	Rough	NW/H	Showers	1000
Iron cumberland	23.8 113.2	302300	200/200	180/83			Heavy Rain	999.3
Tasmantide	19.6 117.2	310400	040/420	310/37	MW/M -R	WNW/ H		1000.1
Iron cumberland	25.1 112.8	310500	220/210	170/81			Heavy Rain	
Aliakmon- pioneer	19.3 111.1	310600	330/620	220/46		S/H		997
Triadic	26.5 112.7	310900	230/200	120/56	1.5	150/5		996.1

Table 9.2 Maximum Winds Reported from Selected Stations during Tropical Cyclone “Beverley”

Location	Time (GMT)	Wind Direction/Speed (km/h)
Navy Base Exmouth (anemometer)	302100	045/107 Max. 152
	310200	290/117 Max. 148
Learmonth (estimated)	302200	060/ 93 Max. 130
	310330	190/ 93 Max. 148
Bullara (estimated)	-	080/161 270/161
Muggan (estimated)	-	225/129
Ningaloo (estimated)	310330	270/150
Quobba (estimated)	310730	220/161

Table 9.3 Times at which the cyclone Eye passed over various Stations

Station	
Navy Alpha	310200 approx.
Giralia	310000 - 310200
Ningaloo	310030 - 310200
Bullara	310100 - 310130
Candabia	310215 approx.
Cooralya	Approx. ½ hr prior to 210845
Pimbee	311000 - 211200

Table 9.4 Data from Satellite Photographs

Satellite Name	Orbit Number	Date/Time (GMT)	Estimated posn. of centre °S	Estimated posn. of centre °E	Final T No.	Min. Sea Level Pressure (mb)
ESSA 8	28716	220225	13	116	1	-
	28728	230121	13.4	116	1	-
	28741	240212	14.1	116	2	1003
	28753	250108	16	116	3.5	988
	28766	260159	17.2	115.8	5	964
	28778	270055	18.1	114.5	6	942
	28791	280147	18.5	112.7	6.5	929
	28804	290237	18.4	110.6	5	942
	28814	300134	19.5	111.5	4	964
	28829	310224	23.0	114.5	-	-

