



**Australian Government**  
**Bureau of Meteorology**

**Severe Tropical Cyclone *Elaine***  
15 - 20 March 1999

Perth Tropical Cyclone Warning Centre  
Bureau of Meteorology

**A. Summary**

A low was evident within the monsoon trough in the Timor Sea from 12 March. It moved westward in a favourable environment and intensified to cyclone strength by the morning of 16 March. Further intensification to severe cyclone strength occurred in the following 24 hours as it continued on a path parallel to but well offshore from the WA coastline.

*Elaine* changed direction to a more southerly course during 18 March and started to weaken. By 2000 WST the following day its movement changed towards the southeast and it weakened further to a tropical low by the morning of 20 March. The low crossed the coast between Geraldton and Kalbarri around 0900 WST. Heavy rain associated with the tropical low caused severe flooding in the town of Moora. Houses and commercial properties in the town were inundated by the floodwaters and approximately 1000 people were evacuated.

**B. Meteorological Description**

*Elaine* formed within the monsoon trough in a region of low shear and favourable upper outflow. The movement of *Elaine* was dominated by a mid-level anticyclone to its southeast. *Elaine* moved around the shoulder of the ridge, and then following shearing a north to northwest flow in lower levels was the main steering influence. The structure of *Elaine* was greatly disrupted by the influence of strong westerly wind shear. The observed 850-200 hPa shear from Learmonth at 2000 WST 18 March was almost 50 knots. By the morning of 19 March, deep convection had been stripped from the centre and *Elaine* began to move towards the southeast. *Elaine* then weakened below cyclone strength by the morning of 20 March.

**C. Impact**

Heavy rain associated with the remnants of *Elaine* caused severe flooding in the Moore River catchment. Properties in the town of Moora, located on the Moore River, were inundated by flood waters and approximately 1000 people were evacuated from the town.

**D. Observations**

Rainfall totals of 80 mm in 6 hours occurred in the catchment areas of the Moore River on 20 March.

**Table 1. Best track summary for *Elaine*, 15 - 20 March 1999.**

Note: Add 8 hours to convert to WST. Refer to best track database for complete track details.

Year	Month	Day	Hour (UTC)	Position Latitude S	Position Longitude E	Max wind 10min knots	Central Pressure hPa	Rad. of Gales nm
1999	03	15	0100	13.1	117.5	25	1002	
1999	03	15	0400	13.2	117.2	25	1002	
1999	03	15	0700	13.2	117.0	25	1000	
1999	03	15	1000	13.3	116.7	25	1000	
1999	03	15	1600	13.6	116.2	25	1000	
1999	03	16	0100	14.0	115.8	35	995	15
1999	03	16	0400	14.1	115.6	35	995	20
1999	03	16	0700	14.2	115.4	40	990	20
1999	03	16	1000	14.4	115.1	40	990	20
1999	03	16	1300	14.7	114.7	50	985	40
1999	03	16	1600	14.9	114.2	55	980	55
1999	03	16	1900	15.1	113.7	55	980	55
1999	03	16	2200	15.4	113.2	60	975	60
1999	03	17	0100	15.7	112.7	65	970	60
1999	03	17	0400	16.0	112.4	70	965	55
1999	03	17	0700	16.4	112.0	70	965	50
1999	03	17	1000	16.8	111.7	70	965	50
1999	03	17	1300	17.2	111.5	75	960	50
1999	03	17	1600	17.6	111.3	75	960	55
1999	03	17	1900	18.0	111.1	80	955	55
1999	03	17	2200	18.5	110.9	85	950	60
1999	03	18	0100	18.9	110.8	90	945	60
1999	03	18	0400	19.3	110.8	90	945	55
1999	03	18	0700	19.8	110.8	90	945	55
1999	03	18	1000	20.3	110.9	90	945	55
1999	03	18	1300	20.9	111.0	85	950	55
1999	03	18	1600	21.5	111.0	80	955	55
1999	03	18	1900	22.1	111.0	80	955	55
1999	03	18	2200	22.7	111.1	70	965	45
1999	03	19	0100	23.3	111.1	65	970	45
1999	03	19	0400	23.7	111.2	60	975	45
1999	03	19	0700	24.3	111.3	60	975	45
1999	03	19	1000	24.8	111.5	55	980	40
1999	03	19	1300	25.4	111.8	55	980	30
1999	03	19	1600	26.1	112.2	50	985	25
1999	03	19	1900	26.8	112.8	40	990	20
1999	03	19	2200	27.5	113.5	35	995	15
1999	03	20	0100	28.2	114.2	30	997	
1999	03	20	0400	28.7	115.0	30	997	
1999	03	20	0700	28.9	115.9	30	997	
1999	03	20	1000	28.9	117.0	30	998	

Figure 1. Track of Tropical Cyclone *Elaine*, 15 – 20 March 1999.  
All times in WST.

