

ARCHIVE: Major Storm Surge Events, Eastern Gulf of Carpentaria, 1964-1996

Tropical cyclones *Dora* (1964), *Flora* (1964), *Fiona* (1971), *Dominic* (1982), *Felicity* (1989) and *Barry* (1996)

By Mr Jeff Callaghan

Retired Senior Severe Weather Forecaster, Bureau of Meteorology, Brisbane

***Dora*, 2-9 February 1964**

Storm surge data

The movement of *Dora* at landfall was 305⁰/9km per hr. A large storm surge came ashore with the cyclone near the Edward and Mitchell Rivers – It was reported that the sea came right over the beach ridge, a rise of approximately 18 feet. (5.5metres).

Other impact data

Dora made landfall on the eastern Gulf coast and devastated the Edward and Mitchell River missions on the 3rd (see Figures 1,2 and 3). The missions are now known as Pormpuraaw and Kowanyama. Trees over a wide area of Western Cape York Peninsula were blown down or completely defoliated in winds of around 100 mph (87 knots). The eye passed directly over Rutland Plains which experienced a 3 hour calm and gave the eye diameter as 12 nm. The winds at Edward River Mission reached hurricane force easterlies at noon on the 3rd. These winds backed to the NW and maintained hurricane force before decreasing after midnight. At Mitchell River easterly winds reached hurricane force at 3.30 pm on the 3rd and thereafter veering to the SE and increasing in force. A near calm period was observed there between 8.30 pm and 10.30 pm after which the wind veered SW, then W, slackening in speed at 3.30 am on the 4th. Rutland Plains experienced destructive easterly winds From 3pm to 10.30 pm on the 3rd with the strongest winds between 8pm and 10 pm. A complete calm then occurred until 1.30 am on the 4th after which westerly winds of slightly less speed persisted until 6.30 am.

Damage was reported as far north as Aurukun Mission, extending to Miranda Downs and Karumba in the south.- a strip almost 480 km in length. Maximum damage was a 130 km strip from near Edward River to the Nassua River. The Edward River Mission reported little damage 8km east of the mission- the strip was therefore very narrow in the north and widened to about 48 km in the south. In this maximum damage zone one quarter of the trees were blown down and those left standing were defoliated with major limb damage. At Wallaby Island at the mouth of the Mitchell River extensive and dense belts of Mangrove 10 metres high were completely destroyed and flattened like grass. The two mission stations and Rutland Plains all suffered severe damage. For the two mission stations the

damage was estimated at 300,000 pounds(1964). *Dora* was accompanied by torrential rainfall over a long period. Example of large 24 hour totals were Yirrkala 248mm on the 1st, Edward River 197mm

4th, Croydon 368mm 5th, Mary Kathleen 228mm 7th, Disraeli 320mm 8th and Iffley 247 mm 9th. The Norman, Flinders, Leichhardt and Gregory experienced record floods with river levels in many instances breaking records. The total discharge was estimated at nearly double the average annual discharge of the Murray/Darling systems. The Norman River was 8 inches higher than the 1951 record at Normanton.

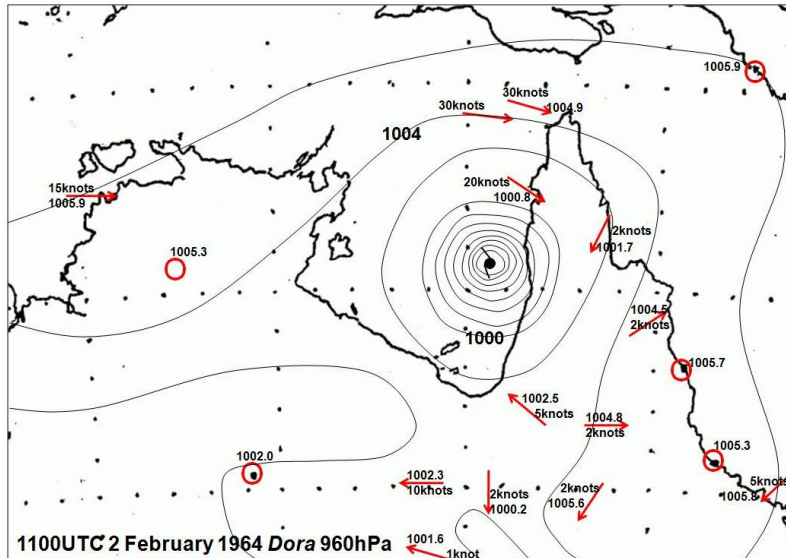


Figure 1 Mean sea level analysis with some wind observations for 1100UTC 2 February 1964. Pressure contours every 2hPa down to 1000hPa.

Figure 2 Best Track of Dora where 740223 means 974hPa 2 February 2300UTC. Hatching denotes areas of wind damage-Horizontal hatching marks areas of maximum wind damage (20% of timber down.) Arrows show reported direction of tree fall.

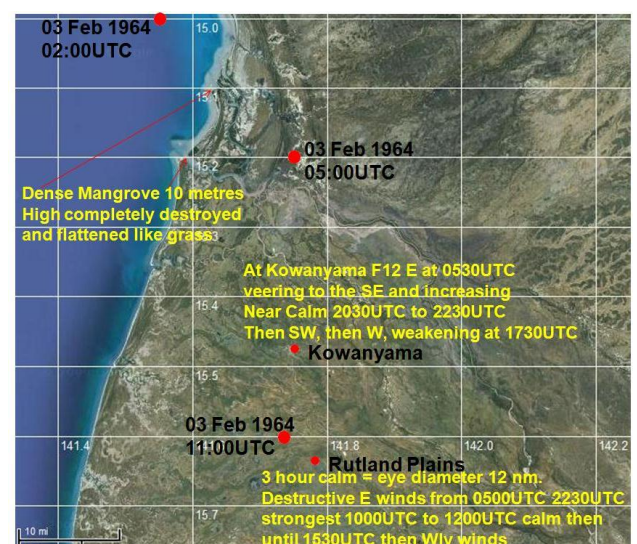
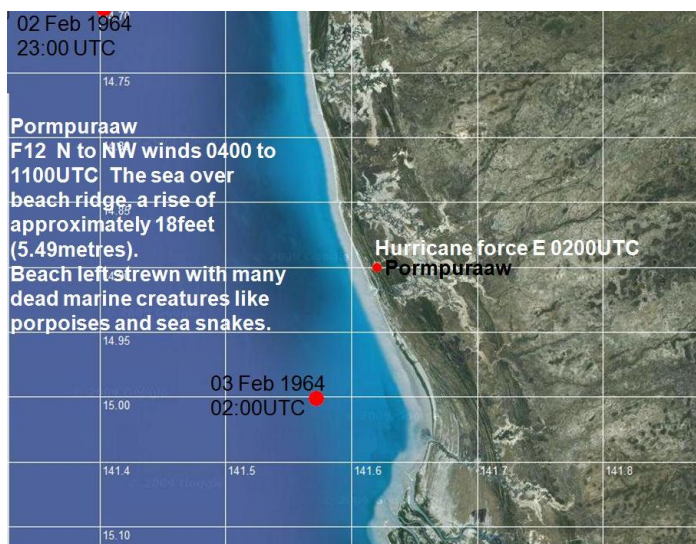
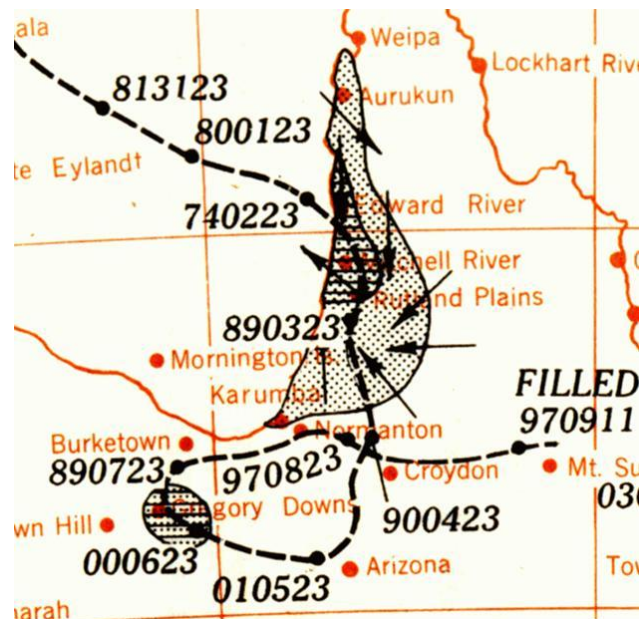


Figure 3 Storm surge and other impacts from Dora.

Flora, 5-6 December 1964

Storm surge data

The movement of *Flora* at landfall was 283⁰/26km per hr. A storm surge accompanied the cyclone with the sea coming up the creek with a terrific rush. The bridge weighing approximately 2 tons was lifted and carried upstream about 800 metres and dumped approximately 90 metres up a ridge.

Other Impact data

Flora crossed the southern Gulf passing to the north of Mornington Island and making landfall near Inkerman Station at 9pm (Figures 4 and 5). The station (7 km inland) felt the full effects and the natives quarters, the butcher shop and a 2 room house were demolished. The northeast side of the homestead was lifted, 2-way radio aerials disappeared and rain penetrated all buildings. Large trees were snapped off or blown down. A surge of sea water accompanied the winds. Further north and 95km inland, Dunbar Station was subjected to damaging winds between 6.30 pm and 7.25pm. Mango trees were blown over in a strip 200 metres wide, houses were flattened, while roofing iron was deposited 800 metres away and twisted beyond use. Vanrook Station (80 km inland) estimated hurricane ESE winds followed by a lull between 2.30 am and 3.30 am and then storm force SW winds. Buildings were unroofed and structures badly damaged and trees uprooted. At Miranda wireless aerials were blown down, roofing iron lifted, trees stripped of branches and many birds were found dead. There was heavy flooding and around Burketown about 100 stations were isolated.

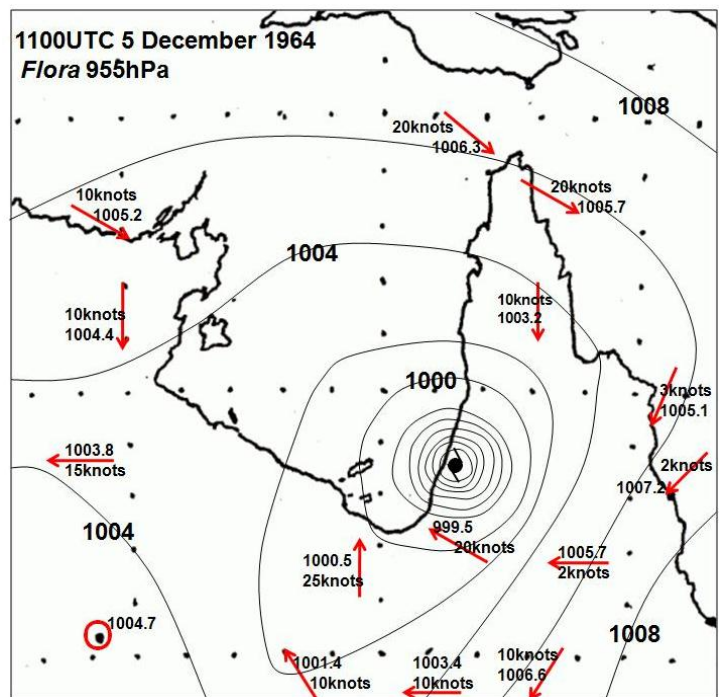


Figure 4 Mean sea level analysis with some wind observations for 1100UTC 5 December 1964. Pressure contours every 2hPa down to 1000hPa.

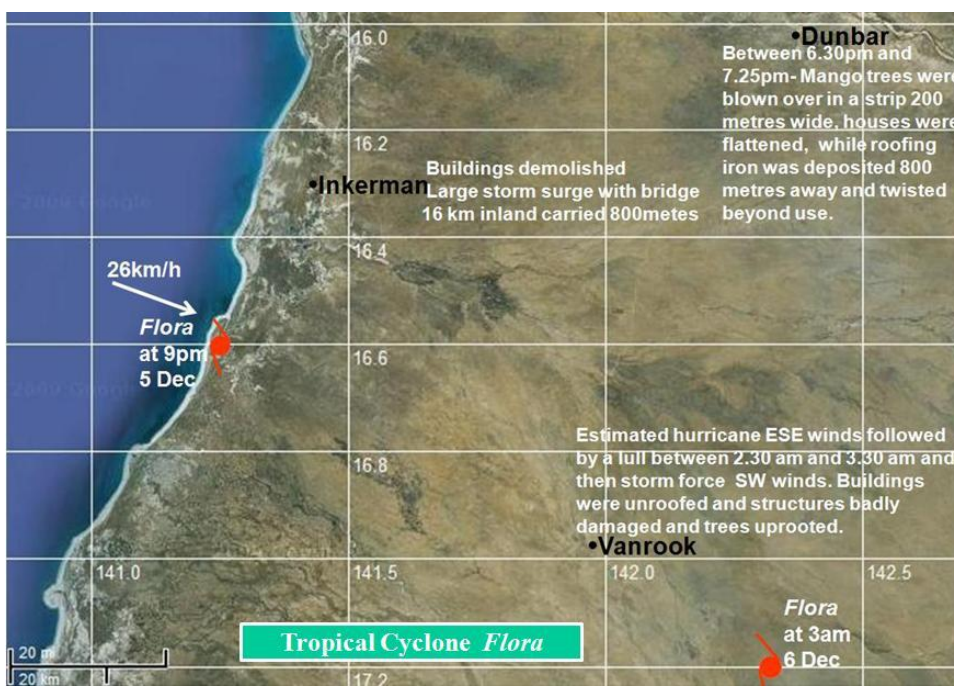


Figure 5 Position of Flora at landfall at 1200UTC 5 December 1964 and 6 hours later together with damage areas.

***Fiona*, 19-20 February 1971**

Storm surge data

Fiona 19 Feb 1971 +12.5. Movement at landfall $318^{\circ}/26\text{km}$ per hr. A tidal wave 4.6 metres high came 2km up the Nassua River washing away 3m high walls. At Edward River Mission the sea washed out a road on one of the sand ridges 2.7 m above sea level. At Aurukun a tidal surge of 0.9 m was observed in the river about 5 miles from the Gulf.

Other Impact data

Fiona was a continuation of *Gertie* which crossed the east coast and Peninsula and entered the SE Gulf (Figure 6). It looped back and crossed the coast at the Nassua River mouth while rapidly intensifying. From the extensive defoliation and damage to the few buildings there (Figure 7), it was most likely accompanied by hurricane force winds. From satellite imagery before landfall the cyclone had a very clear well shaped eye with a small bright convective ring surrounding it and a bright overcast cloud canopy surrounding this three latitude degrees in diameter. An outstation of Inkerman Station is located at the Nassua River mouth and a brief calm was noted at 0930 UTC preceded by ESE winds and followed by WNW winds. Damaging winds lasted about 2 hours and

flattened timber and demolished buildings. About 50 % of the trees were left standing and these were damaged, some stripped of bark. The wharf was destroyed and 4 four 55,000 litre fuel tanks lifted and scattered up to a mile away. Forty four gallon drums were scattered widely like confetti. The caretaker of the outstation observed

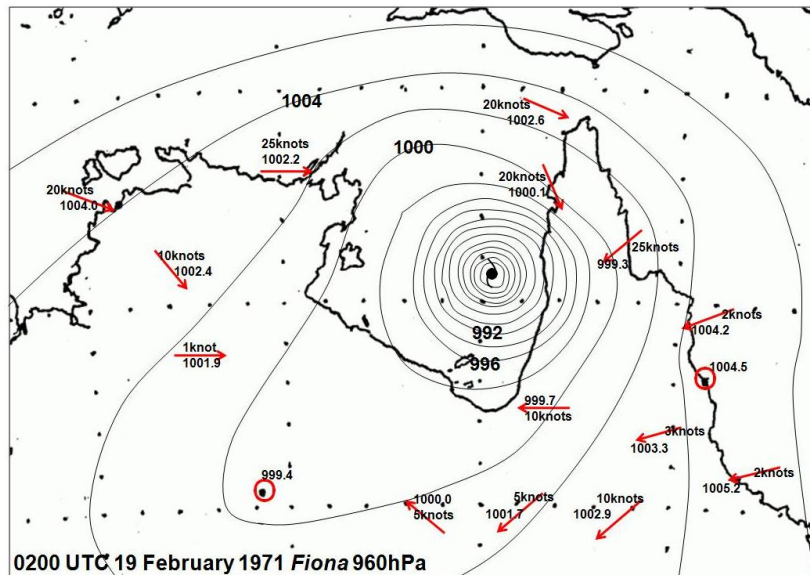
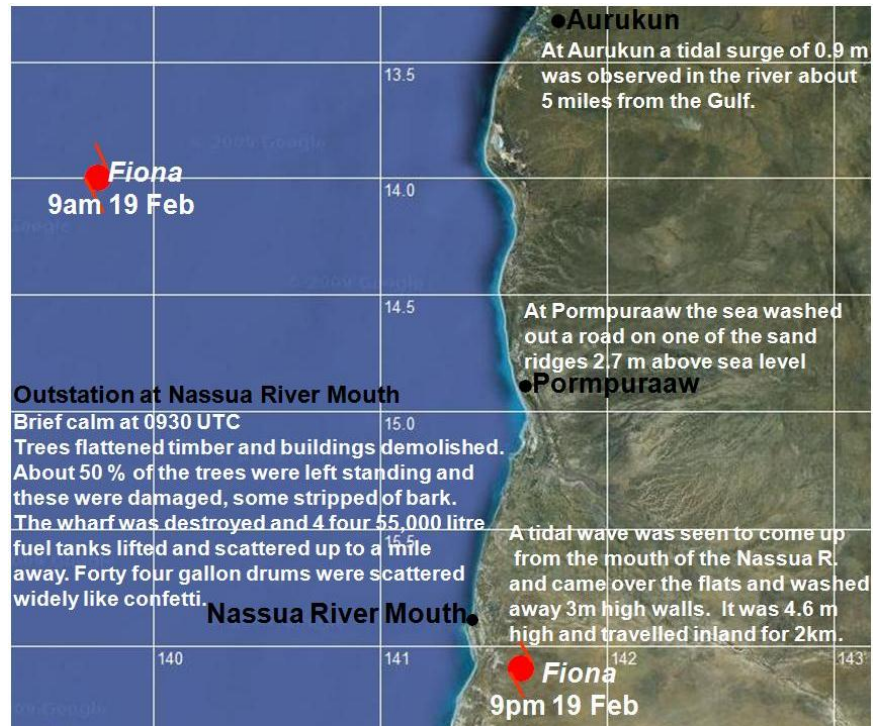


Figure 6 Mean sea level analysis with some wind observations for 0200UTC 19 February 1971. Pressure contours every 2hPa down to 992hPa.

Figure 7 Position of Fiona at landfall at 1200UTC 9 February 1971 together with damage areas.



Dominic, 7-8 April 1982.

Dominic 7 Apr 1982 -3.2. Movement at landfall 288°/11km per hr. One mile north of Cape Keerweer was an area devoid of all vegetation (no grass or trees) - the area appeared like a ploughed field for one mile inland. Tides were 1 m above normal at Weipa and 1.5 m above normal at Karumba. The most extensive damage was from Love River to Holyrod River. There, all seashore Casuarinas were killed presumably due to salt water in root system

Dominic crossed the coast near Cape Keerweer (Figure 8). Just prior to landfall satellite imagery showed a **clear eye around 40 km in diameter** surrounded by cloud tops colder than -70°C (**7.0 on the Dvorak T scale**) (Figure 9). There was damage to buildings and power lines at Edward River Mission (Pormpuraaw). At Aurukun damage was assessed at \$(1982)200,000. A detailed report of the damage in the remote Cape Keerweer area was provided by the log of The Round Australia Kayak expedition (Figure 10). Tree damage commenced at Wallaby Island (mouth of Archer River) and extended south of Edward River Mission. The most extensive damage was from Love River to

Holyrod River. There, all seashore Casuarinas were killed presumably due to salt water in root system. North of Cape Keerweer tree damage suggested onshore winds. One mile north of Cape Keerweer was an area devoid of all vegetation (no grass or trees) - the area appeared like a ploughed field for one mile inland.

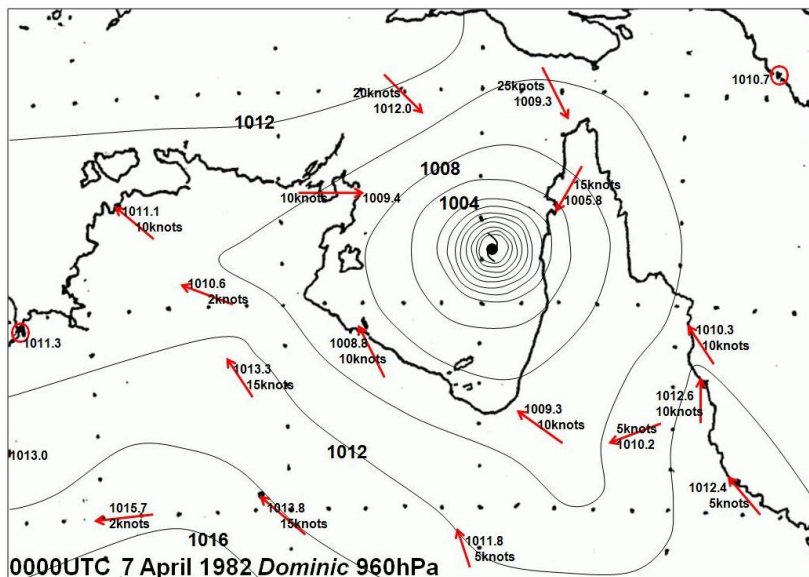


Figure 8 Mean sea level analysis with some wind observations for 0000UTC 7 April 1982. Pressure contours

every 2hPa down to 1000hPa.

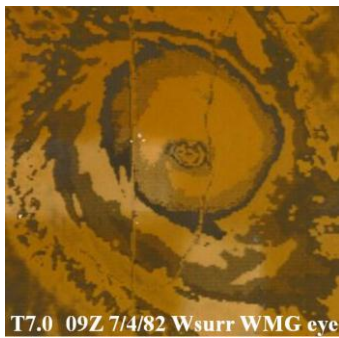
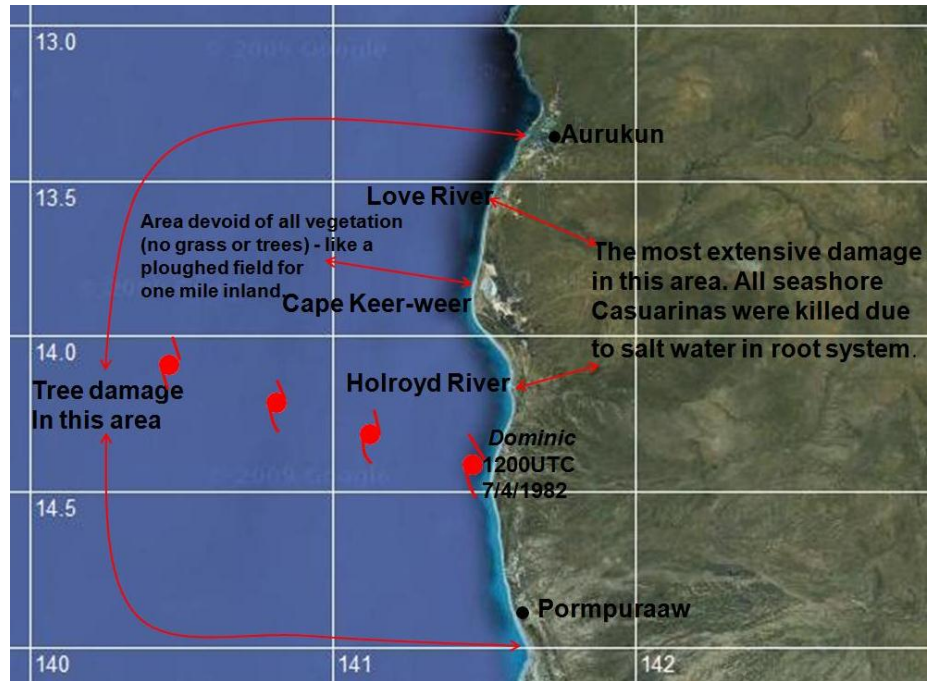


Figure 9 Dvorak enhancement of infrared satellite imagery at 0900UTC 7 April 1982 from the Japanese geostationary satellite imagery.

Figure 10 Three hourly positions of Dominic up to landfall at 1200UTC 7 April 1982 together with damage areas.



Felicity, 15-16 December 1989

Felicity 15 Dec 1989 -2.7. Movement at landfall 288⁰/22km per hr. The sea came up to within 1.1m of a fisherman’s house (3.6m above HAT) i.e. a storm tide 2.5m above HAT. The house remained offshore winds so that the surge would have been greater to the north. The strongest winds were from the SE.

Figure 11 shows the rapid development of *Felicity* with a Dvorak analysis of T5.5 (lower right frame) at landfall. The surrounding cloud tops are the pink colour (-54⁰C to -63⁰C) with the dark green (-31⁰C to -41⁰C) which yields and eye number 5.0. For the eye correction the surrounding cloud is the blue (-70⁰C to -75⁰C) which adds 0.5 resulting in a T number of 5.5. The impact was severe. A Barramundi fisherman, Gordon Bell, has his house 12 feet above the high tide level and the sea came up to within 4 feet of the house which is an 8 ft(2.5m) surge (Figure 12). The house remained in offshore winds so that the surge would have been greater to the north. The strongest winds were from the SE and 80% of the trees were blown down and all trees were stripped of leaves. The wind was of sufficient strength to blow over a heavy stove which took 4 men to lift. Mr Bell was in Townsville during the landfall of tropical cyclone *Althea* and his impression was that *Felicity* was more intense.

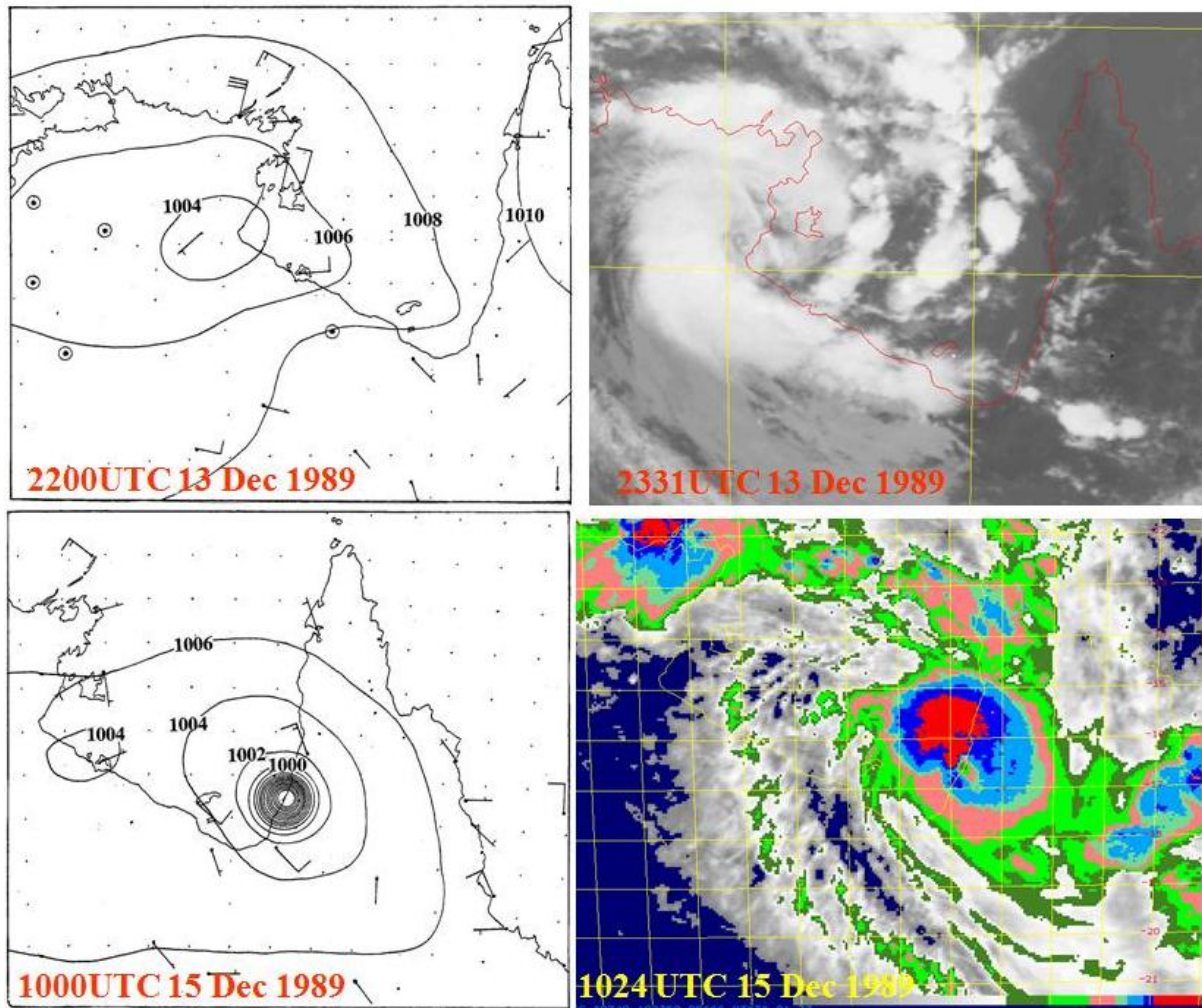


Figure 11 Depiction of rapid intensification of tropical cyclone Felicity. Mean sea level analyses on left and Japanese geostationary satellite imagery on the right with the lower right image a coloured Dvorak enhancement.



Figure 12 Positions of Felicity at landfall at 1024UTC 15 December 1989 together with position of Gordon Bell’s camp.

Barry, 5-6 January 1996

Barry was another rapidly developing cyclone (Figure 13) and it was moving $315^{\circ}/10\text{km}$ per hr at landfall and caused a massive storm surge. An area of coastline 6 to 10 km in length between Duck Creek and the Gilbert R. was badly affected by storm surge with debris in trees indicating a storm tide of 6 to 6.5m. A camp 4m above high water was wrecked by storm surge which from a helicopter survey traveled 7km inland and was “at least” 4metres high (Figure 14). The storm surge again destroyed Gordon Bell’s Camp and several others see below in Figure 15.

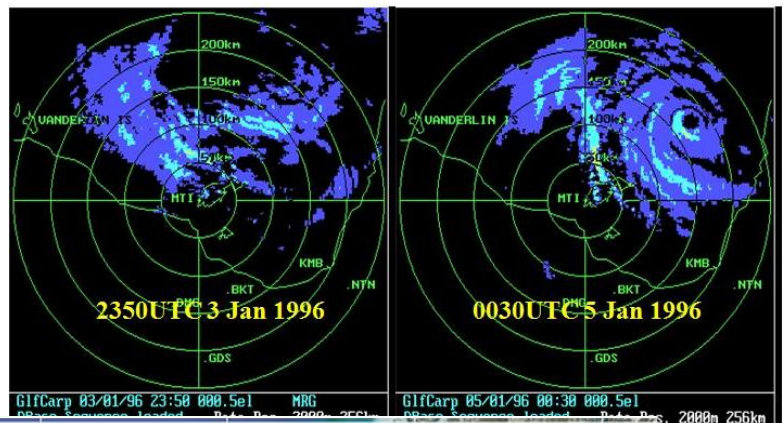
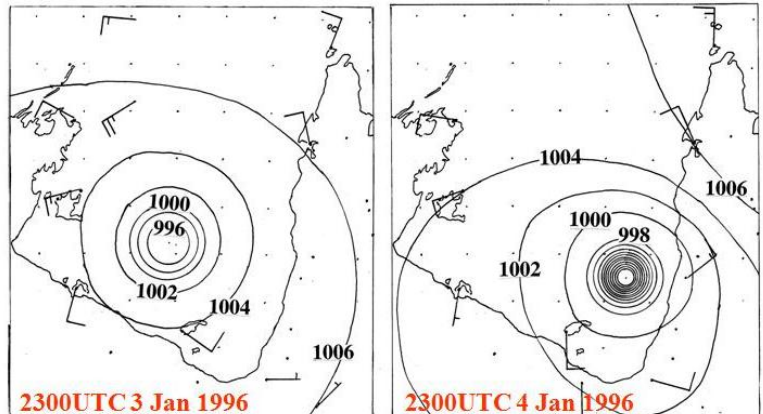


Figure 13 Depiction of rapid intensification of tropical cyclone Felicity. Mean sea level analyses in the top frames and radar images in the

bottom frame.

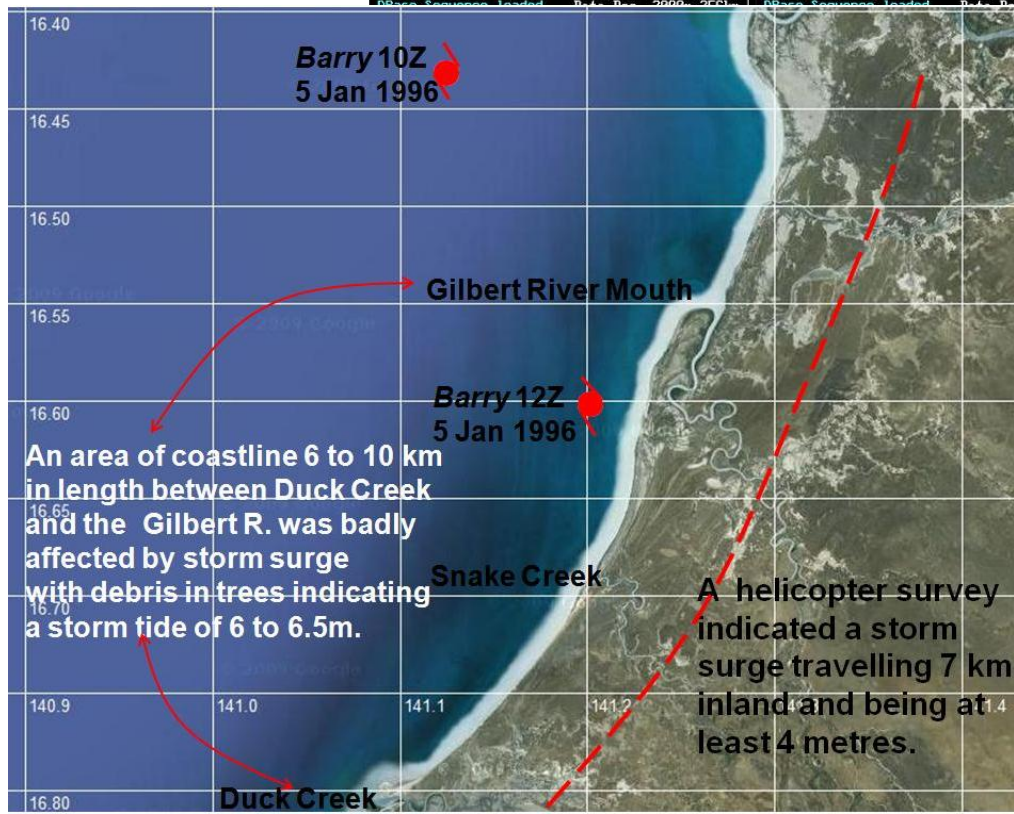


Figure 14 Positions of Barry leading up to landfall during January 1996 with storm surge details.



Gordon Bell's Camp mouth of the Gilbert River

Figure 15 Two of the Barramundi fishers' camps affected by Barry.



Jim Murr's camp on Snake Creek near the Kelso River