

= 2002 ? 03 Australian region cyclone season =

The 2002 ? 03 Australian region cyclone season included Cyclone Inigo , which tied Cyclone Gwenda in 1999 as the most intense tropical cyclone on record in the Australian basin . It began on 1 November 2002 and ended on 30 April 2003 . The regional tropical cyclone operational plan also defines a tropical cyclone year separately from a tropical cyclone season , which runs from 1 July 2002 to 30 June 2003 . These dates conventionally delimit the period of each year when most tropical cyclones form in the Australian region , which is defined as in the southern hemisphere between 90 ° E and 180 ° E. The season 's ten tropical depressions existed within these dates , with the first , designated as Tropical Cyclone 07S , entering the basin on 27 December 2002 . The last system , Cyclone Epi , dissipated on 6 June 2003 . Tropical cyclones in this area were monitored by four Tropical Cyclone Warning Centres (TCWCs) : the Australian Bureau of Meteorology (BOM) in Perth , Darwin , and Brisbane and one in Port Moresby , Papua New Guinea .

Tropical cyclogenesis in the season began when a tropical low developed in the Arafura Sea on 5 January and last until 24 January , after meandering over northern and Western Australia . On 1 February , weakening Cyclone Beni entered the Australian region and brought severe flooding to Queensland , before dissipating on 5 February . Severe Tropical Cyclone Fiona formed north of Western Australia on 3 February and later peaked as a Category 4 severe tropical cyclone on the Australian tropical cyclone intensity scale . Cyclone Graham developed offshore Western Australia on 24 February and made landfall in a rural area of that state on 28 February , producing flooding in the area . Tropical Cyclone Harriet existed offshore of Western Australia from 1 March to 11 March .

On 1 March , Cyclone Erica formed offshore Queensland and strengthened as it moved in a parabolic path , before leaving the Australian region on 12 March . Erica caused only minor damage in Queensland . Cyclone Craig originated offshore Northern Territory on 8 March . The system subsequently struck the territory and eventually made another landfall in Queensland on 12 March , after crossing the Gulf of Carpentaria . Impact from Craig was generally minor . Cyclone Inigo formed on 30 March and caused severe impact in Indonesia , especially in Flores , Sumba , and West Timor . Inigo later deepened into the most intense tropical cyclone on record in the Australian region , tied with Cyclone Gwenda in 1999 . Inigo weakened significantly before striking Western Australia on 8 April and dissipating shortly thereafter . The final system , Tropical Cyclone Epi developed east of Papua New Guinea on 5 June and dissipated on the following day . Overall , the tropical cyclones of this season caused 60 deaths and about \$ 12 million (2003 USD) in damage .

= = Seasonal summary = =

The season began on 1 November 2002 and ended on 30 April 2003 , while the regional tropical cyclone operational plan also defines a tropical cyclone year from 1 July 2002 to 30 June 2003 . Eight cyclones entered or formed in the Australian region , which was below the 1970 @-@ 71 to 2001 @-@ 02 average of 13 per season . There was a major shift in tropical cyclone activity from the Australian region to the South Pacific , because of a moderate El Niño event . Only two cyclones occurred between 125 ° E and 150 ° E , which is east of Australia , and six formed between 150 ° E and 160 ° E. All of the tropical cyclone developed during Madden ? Julian oscillation (MJO) pulses or Equatorial Rossby (ER) pulses . Overall , the tropical cyclones of this season resulted in 60 deaths and slightly less than \$ 12 million in damage .

Activity began in December 2002 , when Tropical Cyclone 07S entered the Australian region from the southwestern Indian Ocean basin on 27 December . In January , an unnamed tropical cyclone existed for more than three weeks over the Arafura Sea , Northern Territory , and Western Australia . The basin became more active in February , with South Pacific Cyclone Beni entering the area on 1 February . This was followed by the development of Fiona on 3 February and Graham on 24 February ; both formed north of Western Australia . Two tropical cyclones ? Harriet and Erica ? both originated on 1 March ; the former developed northwest of Western Australia and the latter formed east of Queensland . About a week later , 8 March , Cyclone Craig developed near the coast of Northern Territory . The strongest tropical system of the season , Cyclone Inigo , originated over the

Lesser Sunda Islands of Indonesia on 30 March . At peak intensity , Inigo had a minimum barometric pressure of 900 mbar (27 inHg) , making the most intense tropical cyclone in the Australian region on record , tied with Cyclone Gwenda in 1999 . Activity remained dormant until the development of Cyclone Epi on 5 June , which dissipated on the following day .

= = Storms = =

= = Tropical Depression 07S = =

Tropical Cyclone 07S developed in the southwestern Indian Ocean on 25 December , while located about 1345 km (835 mi) west @-@ northwest of Cocos Islands . It initially drifted southwest and then turned eastward on 27 December . Around this time , 07S entered Perth 's Area Of Responsibility (AOR) . The Joint Typhoon Warning Center (JTWC) estimated that 07S peaked with 1 @-@ minute maximum sustained winds of 55 km / h (35 mph) and a minimum barometric pressure of 1 @, @ 006 mbar (29 @. @ 7 inHg) . The storm drifted erratically and by 1800 UTC on 28 December , the JTWC issued its final warning on 07S , while situated about 465 km (290 mi) west @-@ northwest of Cocos Islands . However , TCWC Perth continued Tropical Weather Outlooks (TWOs) on the system until 3 January .

= = Unnamed tropical cyclone = =

A tropical low developed over the Arafura Sea on 4 January and strengthened into a tropical cyclone before passing near Elcho Island , Northern Territory . The storm then made landfall in Arnhem Land on 5 January . At 0900 UTC , the system peaked with winds of 95 km / h (60 mph) . It meandered over Northern Territory and the Gulf of Carpentaria for a few weeks . The system remained inland until moving offshore Kimberley on 21 January . A deep trough generated wind shear , which inhibited significant intensification . However , deep convection began to develop late on 24 January as it approached the north coast of Western Australia . Around 0300 UTC on 25 January , the storm made landfall near Port Hedland with winds of 65 km / h (40 mph) . The system quickly weakened and dissipated by 1200 UTC .

Gale force winds caused damage vegetation , trees , vehicles , and buildings in Elcho Island , Gapuwiyak , Maningrida , and Ramingining . Wind @-@ driven waves at the mouth of the Rose River inundated workshops near Numbulwar . Torrential rains fell in the Roper @-@ McArthur River district , peaking at 880 mm (35 in) at Wollogorang . A temporary evacuated occurred along the Waterhouse River at Beswick . Other rivers that overflowed inundated portions of highways such as the Carpentaria Highway and Tablelands Highway . After regenerating into a tropical cyclone , the storm brought up to 146 @. @ 6 mm (5 @. @ 77 in) of rainfall in a 24 ? hour period in the Port Hedland area . This caused the Yule River to overflow its banks , which flooded the North @-@ West Highway . Operationally , the storm was thought to have been two separate systems and to have remained below tropical cyclone intensity .

= = Tropical Cyclone Beni = =

Beni originated from the South Pacific region in late January and its remnants crossed into the Australian region by 1 February . Upon reaching the Coral Sea , the remnants of Beni slowly began to redevelop . After strong convective bands formed , Brisbane TCWC initiated gale warnings . Located offshore Queensland on 4 February , the remnants of Beni regenerated into a tropical cyclone . However , strong vertical wind shear caused Beni to dissipated on 5 February , while situated offshore of Queensland near the city of Mackay .

Heavy rainfall accompanied Beni and its remnants , reaching 500 mm (20 in) near Gladstone . One person drowned due to the flooding rains . Runoff on the Fitzroy River caused by Cyclone Beni resulted in a moderate flood with an estimated return period of four years at Rockhampton . The

cyclone 's heavy rains helped ease drought problems in Queensland . Nine shires in Central Queensland were declared disaster areas . Additionally , strong winds left power outages in Agnes Water and 1770 . Overall , Beni resulted in damages of at least A \$ 10 million (US \$ 6 million) in Queensland .

= = = Tropical Low Isha = = =

= = = Severe Tropical Cyclone Fiona = = =

An area of convection began developing into a tropical low on 3 February , while located about 970 km (600 mi) north of Karratha , Western Australia . Poorly @-@ defined convection was noted as well as good outflow and a weak circulation . The system drifted westward with minimal development until late on 4 February , when satellite imagery showed increasing convection near the center . Subsequently , the JTWC issued a TCFA for the system . With the developing low located in an environment of weak to moderate wind shear , TCWC Perth issued a warning . At 0700 UTC on 5 February , Perth named the system Fiona . The JTWC issued their first advisory on Fiona about five hours later . Fiona strengthened steadily and reached tropical cyclone intensity at 0600 UTC on 6 February . Continuing to intensify , TCWC Perth upgraded the storm to severe tropical cyclone status early on 7 February .

Early on 8 February , an eye became embedded within partial concentric convective bands . Later that day , TCWC Perth reported a peak intensity of 175 km / h (110 mph) at 1000 UTC . Shortly thereafter , the storm began weakening as dry air increased . By 1000 UTC on 9 February , TCWC Perth reduced the intensity of Fiona to 170 km / h (105 mph) . Deep convection weakened somewhat and the eye had become cloud @-@ filled . Although the eye briefly redeveloped , water vapor imagery showed cooler and drier air entering the southern portion of the storm . Fiona began to turn southwestward as it neared the 90 ° E longitude . By late 12 February , Fiona weakened below gale force intensity . Moving steadily southward , it then re @-@ curved south @-@ southeastward along the 91 ° E. With the storm rapidly weakening , JTWC issued their final warning early on 13 February and Perth followed suit four hours later . The remnants of Fiona moved into the Great Australian Bight , leading to significant amounts of rainfall . The Eyre Peninsula and Adelaide recorded more rain in 24 hours than they had in 2002 and 2001 combined . The New South Wales saw major flooding events in towns such as Tamworth . Flooding also closed the Pacific Highway . Over 100 houses along the Gold Coast were damaged due to the torrential rains .

= = = Tropical Cyclone Graham = = =

In late February , an area of convection situated inland for roughly a week emerged over open waters along the northern coast of Australia . A tropical low formed on 24 February , and developed a banding feature by 25 February . Despite strong wind shear , the BOM began issuing warnings while the low was located several hundred kilometers north @-@ northeast of Port Hedland . The disturbance was initially nearly stationary . At 0700 UTC on 27 February , the JTWC designated the storm as Tropical Cyclone Graham . According to the JTWC , the storm had intensified late on 28 February , though the BOM noted the slight weakening of the storm . Graham reached its peak intensity that day with winds of 95 km / h (60 mph) , while nearing the coast . The storm made landfall at Eighty Mile Beach , Western Australia at 1400 UTC on 28 February . Graham weakened and dissipated on 1 March .

The storm dropped rainfall in Western Australia , with 175 mm (6 @.@ 9 in) recorded at Telfer . The heavy rain caused flooding and road closures , and swelled a river passing through Fitzroy Crossing , though the river only topped its banks slightly . In nearby Blue Bush Creek , two men drowned as their group of people attempted to cross floodwaters . Both men were rescued , though one died before emergency services arrived . In addition to the flooding , a number of trees were downed .

== Tropical Cyclone Harriet ==

A tropical low developed southwest of Christmas Island on 28 February . Perth TCWC issued a TWO on 1 March , which indicated an eastward @-@ moving 1 @, @ 005 mb (29 @. @ 7 inHg) low . At 0600 UTC on 2 March , the JTWC initiated warnings on Tropical Cyclone 21S , estimating winds of 65 km / h (40 mph) . The system maintained a well @-@ defined circulation , although deep convection diminished somewhat on 2 March . Later that day , Perth began issuing gale warnings on the low as it was expected to develop into a tropical cyclone . Moving eastward , convection increased near the center , though dry air inhibited much development . At 0400 UTC on 4 March , the TCWC Perth named the system Tropical Cyclone Harriet .

On 5 March , JTWC briefly decreased the intensity of Harriett to 55 km / h (35 mph) , as deep convection diminished , probably due to persistent dry air . By late on 5 March , convection increased in coverage . Based on this , TCWC Perth upped their intensity to 80 km / h (50 mph) . Late on 5 March , Harriet moved slowly southward and curved west @-@ southwestward . Although convection fluctuated , the cyclone maintained its intensity . After deep convection decreased slightly , the JTWC lowered the intensity of Harriett to 65 km / h (40 mph) . However , TCWC Perth suggested otherwise and on 8 March , Harriet peaked with winds of 100 km / h (65 mph) , while located over 480 km (300 mi) north @-@ northwest of Carnarvon . Early on 9 March , JTWC issued their final advisory on Harriet . The storm became extratropical at 1000 UTC on 9 March , while located about 580 km (360 mi) west @-@ northwest of Carnarvon . Strong winds from Harriet contributed to a large bushfire near Walpole , Western Australia .

== Severe Tropical Cyclone Erica ==

A monsoon trough strengthened into a tropical low on 1 March . The low then significantly organized and was named Erica on 4 March , just offshore Queensland . Early on 5 March , the JTWC began classifying the system as Tropical Cyclone 22S . Moving slowly southeastward and then northward under the influence of a weak mid @-@ level ridge to the east , Erica attained 10 @-@ minute sustained winds of 150 km / h (90 mph) . However , Erica soon weakened due to strong wind shear . On 7 March , the cyclone degenerated into a tropical low . After the remnants curved eastward and then southeastward , wind shear abated and became favorable for tropical cyclogenesis . As a result , the low regenerated into a tropical cyclone . After attaining the equivalent to a Category 1 hurricane on the Saffir ? Simpson hurricane wind scale , Erica entered the South Pacific basin on 12 March .

Severe Tropical Cyclone Erica was a powerful cyclone that severely affected New Caledonia and was considered the worst to affect the country since Cyclone Beti in 1996 . Early in its existence while just offshore Queensland , the predecessor to Erica brought strong winds to the coast . Several trees were uprooted , and others were defoliated . Power lines were also damaged .

== Tropical Cyclone Craig ==

TCWC Darwin began monitoring a tropical low that developed west of Darwin on 5 March . Early on 8 March , the JTWC classified the system as Tropical Cyclone 24S . At 0300 UTC on 9 March , the storm became Tropical Cyclone Craig , while situated northwest of Cape Fourcroy . The storm deepened and drifted eastward and then southeastward . On 10 March , Craig made landfall on Melville Island with winds of 95 km / h (60 mph) . Upon emerging into the Van Diemen Gulf on 10 March , Craig peaked with sustained winds of 100 km / h (65 mph) . Craig struck the Coburg Peninsula and began to slowly weaken inland . The storm reached the Gulf of Carpentaria on 11 March , where it accelerated southeastward . On 12 March at 0600 UTC , the cyclone made landfall south of Kowanyama . After moving inland , the storm quickly weakened and dissipated later that day .

In advance of the storm , tropical cyclone advisories were issued for communities between Weipa

and Mornington Island . The government of the Tiwi Islands evacuated some residents to shelters . In the Darwin area , certain schools were closed temporarily as a precaution . Impact from Craig was generally minor . At Ramingining , 164 mm (6 @. @ 5 in) of rain fell in just 24 hours . Storm surge ran 2 to 2 @. @ 5 m (6 @. @ 6 to 8 @. @ 2 ft) on Goulburn Island and the Cobourg Peninsula , while tides were estimated at 1 @. @ 5 m (4 @. @ 9 ft) at Nhulunbuy . Strong winds at Maningrida and Kowanyama downed numerous trees , with one striking a house in the latter . Craig inflicted minor damage to small craft in the northwestern Gulf of Carpentaria . Throughout the region , roads were cut by the cyclone .

= = = Severe Tropical Cyclone Inigo = = =

An area of disturbed weather was located within the near @-@ equatorial trough near Papua New Guinea in late March . Despite easterly wind shear , a tropical low developed on 30 March , shortly before crossing the island of Flores . Decreasing wind shear allowed the low to strengthen into a tropical cyclone while crossing the Savu Sea on 1 April . Later that day , the JTWC initiated advisories on Tropical Cyclone 26S . On 2 April , BOM classified the low as Tropical Cyclone Inigo . An eye feature gradually organized as winds increased to 130 km / h (80 mph) early on 3 April . As a result , the BOM began classifying Inigo as a severe tropical cyclone . Later on 3 April , low wind shear and strong divergence allowed the cyclone to undergo rapid intensification as the eye became well @-@ defined .

At 0600 UTC 4 April , Inigo peaked with sustained winds of 240 km / h (150 mph) , according to BOM . Based on the pressure @-@ wind relationship , it was estimated that Inigo reached a minimum barometric pressure of 900 mbar (27 inHg) . Thus , the storm tied with Cyclone Gwenda as the most intense tropical cyclone in the Australian cyclone region . Simultaneously , JTWC indicated the Inigo peaked with sustained winds of 260 km / h (160 mph) . However , later on 4 April , increasing wind shear began to weaken Inigo . On the following day , the eye became cloud @-@ filled and by 7 April , Inigo weakened to Category 2 status . Inigo made landfall in the Pilbara region of Western Australia on 8 April with winds of 75 km / h (45 mph) . The circulation dissipated within 12 hours after moving ashore .

The precursor tropical disturbance dropped heavy rainfall in eastern Indonesia . In Kupang on West Timor , the system destroyed hundreds of homes and large fields of corn , bean , and rice crop . Heavy damage was reported near Ende , where flooding and mudslides destroyed 20 houses and destroyed the roads connecting to East Flores . In Ende , a total of 294 animals were killed . In East Flores Regency in eastern Flores Island , the system left 75 destroyed houses , along with 77 severely damaged and a further 56 receiving light damage . Damage in Indonesia totaled less than \$ 6 million , and 102 injuries were reported . In addition , 58 fatalities were reported . In Australia , the storm dropped 128 mm (5 @. @ 04 in) of rain in 80 minutes .

= = = Tropical Cyclone Epi = = =

In early June , an area of fairly persistent convection stretched from Papua New Guinea to just north of Fiji . Around 0630 UTC on 5 June , Epi developed near Woodlark Island , unusually close to the Equator . Initially , the storm appeared to be undergoing rapid deepening , prompting the JTWC to issue a TCFA . However , strong wind shear caused the system to quickly become less organized and the TCFA was soon cancelled . A very short lived cyclone , a Papua New Guinea warning during the late morning hour of 5 June placed Epi 's center about 130 km (80 mi) northeast of Woodlark Island . Never recognized as a tropical cyclone by the JTWC , the third and final warning was issued later that day after winds fell below gale force .

= = Season effects = =

This is a table of all of the storms that have formed in the 2002 ? 03 Australian region cyclone season . It includes their duration , names , landfall (s) ? denoted by bold location names ?

damages , and death totals . Damage and deaths include totals while the storm was extratropical , a wave , or a low , and all of the damage figures are in 2003 AUD and USD .