



**AGENDA ITEM NO.4:                      REVIEW OF THE 2016/2017 AND 2017/2018 CYCLONE SEASONS**

**AGENDA ITEM NO.4.1:                 RSMC & TCWC REVIEW**

**AGENDA ITEM NO.4.1.X:            TCWC WELLINGTON**

**1. Introduction**

TCWC Wellington (operated by Meteorological Service of New Zealand Ltd, or MetService) is responsible for issuing forecasts and warnings on tropical cyclones and/or reclassified cyclones over the ocean area from 160E to 120W between 25S and 40S, the Wellington area of responsibility (AOR), also for the coastal waters and land areas of New Zealand.

The TCWC role is carried out by RSMC Wellington Lead and Tropical meteorologists who also perform the Severe Weather Forecasting and Disaster risk reduction Demonstration Project (SWFDDP) tasks including the production of South Pacific Guidance (SPG) charts for the tropical area from 150E to 150W between 5N and 25S. The SPG charts and guidance contain references to existing and potential tropical cyclone activity, as well as more detailed information about precipitation, wind and waves during the pre-formation phase of a tropical cyclone. They also highlight any interesting cyclonic areas beyond that covered by the RSMC Nadi TC Outlook. All this information is contained on MetConnect Pacific, the SWFDDP password protected website.

During the 2016/17 cyclone season, set against a neutral ENSO phase trending from a weak La Niña to a weak El Niño bias during the season, a total of three of the five<sup>1</sup> named cyclones in the South Pacific and Coral Sea basins moved into the Wellington AOR (TC's Bart, Cook and Donna). While Donna was the most intense in the Nadi AOR (reaching category 5) Cook was the strongest system to move into the Wellington AOR during the season as a category 2 system. Both Cook and Donna impacted the North Island of New Zealand directly.

During the 2017/18 cyclone season, set against a weak La Niña to neutral ENSO phase, a total of four of the seven<sup>2</sup> named cyclones in the South Pacific and Coral Sea basins moved into the Wellington AOR (TC's Fehi, Gita, Hola and Keni). Gita was the most intense TC in the Nadi AOR this season (reaching category 5) and along with Keni, was a category 3 system on arrival in the Wellington AOR. Fehi and Gita both impacted New Zealand significantly, while Hola passed offshore to the northeast of the country.

As was the case with TC Winston crossing Fiji in in the 2015/16 season, TC Keni's forecast approach and possible impact on Viti Levu resulted in a routine check message procedure being invoked between Nadi and Wellington to monitor and confirm working comms to/from Fiji. Keni subsequently passed southwest of Fiji and did not interrupt forecast/warning service from RSMC Nadi.

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<sup>1</sup> Bart, Debbie (Coral Sea), Cook, Donna, Ella

<sup>2</sup> Fehi, Gita, Hola, Linda (Coral Sea), Iris, Josie, Keni

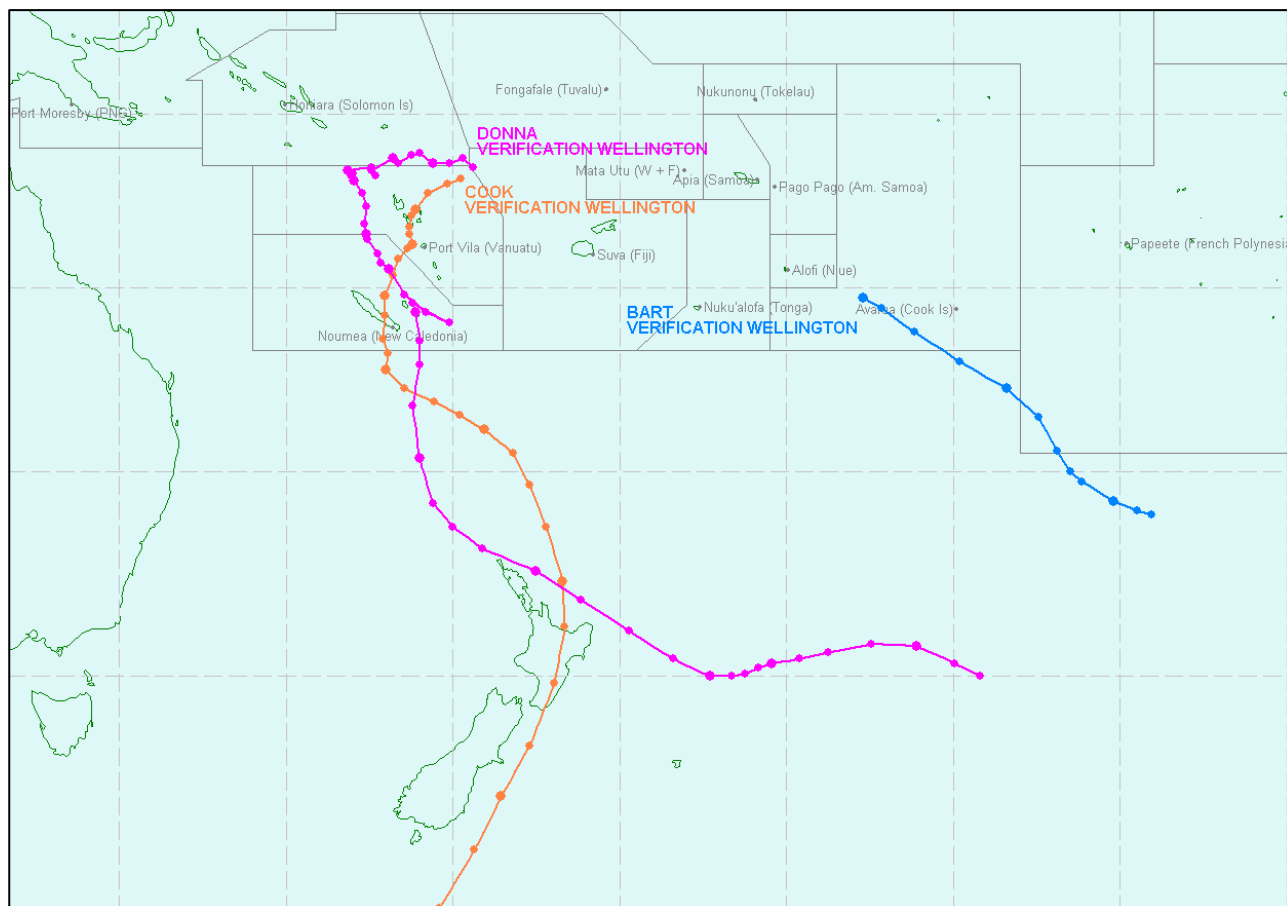
In advance of every tropical cyclone passing from the Nadi AOR into the Wellington AOR, RSMC Nadi shares its Tropical Cyclone Analysis Worksheet with TCWC Wellington to ensure consistency both in the application of the Dvorak technique and in the statement of intensity. This procedure was carried out successfully for all cyclones crossing the Nadi/Wellington boundary during the 2016/17 and 2017/18 seasons.

Verifications of analysis and 12/24 hour forecast positions for named TC's in the Wellington AOR during the 2016/17 and 2017/18 seasons have been compiled and are summarized in section 5.

Finally, it is worth noting here that a realignment of the high seas forecast and warning boundaries between Australia and New Zealand over the Tasman Sea took place on 12 Dec 2017. While this consolidated the high seas forecast/warning boundary to that for the METAREA between areas X and XIV, this change did not apply to the TC Warning boundary between Australia and Fiji/New Zealand which remains on 160E. Further comments are contained in section 4.

## 2. 2016/17 Cyclone Season

During the 2016/17 season, five systems were named in the South Pacific and Coral Sea basins by RSMC Nadi and TCWC Brisbane; Bart, Debbie, Cook, Donna and Ella. Of these, Bart and Cook both crossed 25S into the Wellington AOR as named cyclones, while Donna was reclassified by RSMC Nadi prior to crossing 25S. Tracks for these three systems are shown in the cumulative track map below, with more detailed comments following.



*Cumulative track map for ex- and/or tropical cyclones that moved into the Wellington AOR during the 2016/17 season. Positions plotted are a blend of RSMC Nadi "operational" tracks (north of 25S) and TCWC Wellington "verification" tracks (south of 25S)*

### 2.1 Tropical Cyclone Bart

Tropical cyclone Bart was the first cyclone of the season (marking a late start) which formed in late February 2017 near the Southern Cook Islands. Bart was named at 1200 UTC on 21 February and moved quickly southeast without much intensification. The system crossed 25S and entered the Wellington AOR as a category 1 cyclone at 0000 UTC on 22 February, but convection soon sheared away from the LLCC and it was reclassified as an extratropical low at 1800 UTC on 22 February. Thereafter the system continued to move southeast over open waters and weakened further.

### 2.2 Severe Tropical Cyclone Cook

Tropical Cyclone Cook formed northeast of Vanuatu and was named at 1200 UTC on 8 April 2017. Cook initially took a SW/SSW track across Vanuatu and New Caledonia, reaching a maximum intensity of 85 knots (Category 3) on 10 April while close to New Caledonia. Thereafter the system took a S/SE track and weakened due to increasing shear and cooler seas, crossing 25S and moving into the Wellington AOR at 0600 UTC on 11 April as a category 2 cyclone. The system was reclassified as an extratropical low at 0000 UTC on 12 April, then

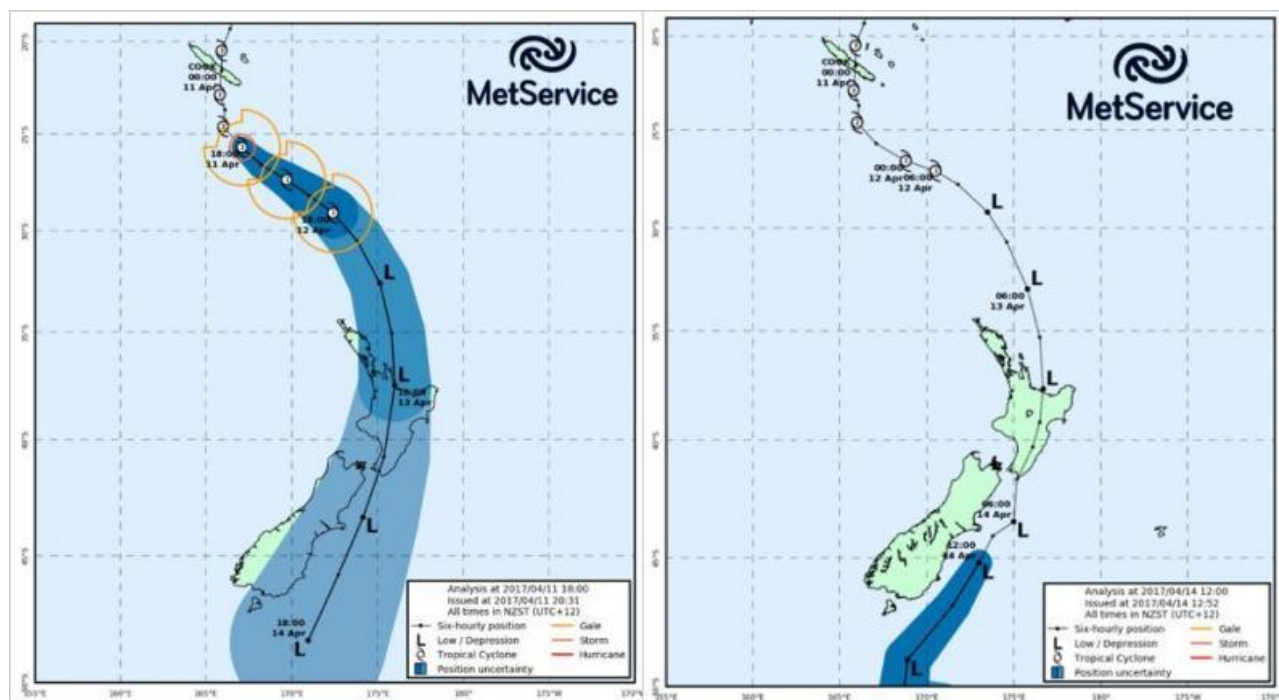
turned southwards towards New Zealand while remaining a deep low. Ex-TC Cook made landfall over Bay of Plenty in the North Island on 13 April, then moved S/SSW over the North Island and emerged over open waters again south of Wellington early the next day before tracking SSW to the east of the South Island and into the Southern Ocean.

### 2.2.1 Cook's Impact on New Zealand

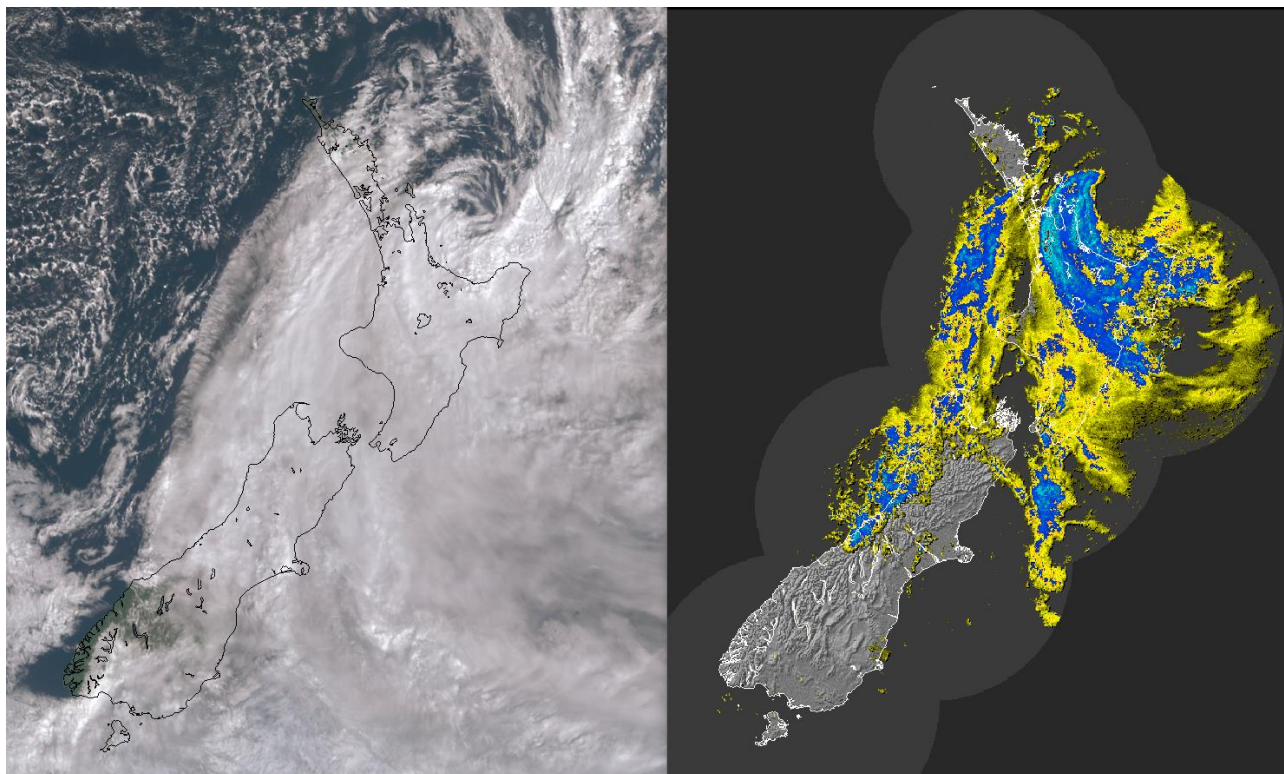
On April 7, around a day and a half before Cyclone Cook was named, the MetService media team began publicly communicating about a developing cyclone in the tropics – first mentioning the system in a news release titled "[The weather focus for the week ahead](#)". The following day, still prior to naming, the Expert Meteorologist team issued a Severe Weather Outlook including low confidence of heavy rain in the northeast of the North Island on 13 April, while also flagging severe weather in other parts of the country due to an unrelated mid-latitude weather system. Confidence in severe weather affecting the upper North Island due to Cook was raised to "moderate" in the Outlook issued on 9 April and further to "high" on 10 April, the same day Cook was first mentioned in a Severe Weather Watch. On 11 April, two days before landfall, the first Severe Weather Warning was published for the impacts of Cook, including heavy rain, large swells and damaging gales. The media team continued updating the public through social media channels, and also started a series of blog posts on 11 April with a post titled "[Cooking Up a Storm](#)".

Given the concern for major impacts in parts of the North Island, including Auckland, MetService liaised closely with the National Ministry of Civil Defence and Emergency Management, attending a number of planning and operational meetings in the National Crisis Management Centre in the days leading up to landfall, providing direct advice to a range of government agencies and responding organisations. Two States of Emergency were declared proactively ahead of Cooks arrival; in Thames-Coromandel and Bay of Plenty.

Cook approached from the north and made landfall over Bay of Plenty early evening on 13 April to the west of Whakatane where a weather station recorded a minimum pressure of 982hPa before losing power.



Left; the first track map issued by TCWC Wellington for TC Cook on 11 April soon after it crossed 25S into the Wellington AOR. Right; the forecast track published 14 April, as the system moved southward to the east of the South Island, showing the operational history of the system.



*Himawari visible satellite image and combined radar image both valid at 0300 UTC on 13 April 2018 showing ex-TC Cook approaching the North Island, a few hours before landfall in Bay of Plenty.*

The strongest gusts associated with Cook were recorded at White Island (314m AMSL) at 113kt or 209km/h. The worst of wind impacts occurred over the east and northeast of the North Island, and resulted in damage to trees and powerlines with power cuts in Bay of Plenty and in several areas down the east of the Island including 15,000 homes in Hawkes Bay. The strongest wind gust recorded over mainland New Zealand was 83kt or 154km/h at Cape Kidnappers in Hawkes Bay.

In addition to strong winds in Bay of Plenty, a peak wave of 12.5m was recorded by the Regional Council's wave buoy, offset from high tide by 3 hours.

The largest rainfall accumulations were recorded in the ranges along the east of the North Island from Gisborne to Wairarapa, with more than 100mm recorded in 24h in many places.

For further comments on Cook and observed weather and impacts, see this [news release](#) or this [blog post](#).

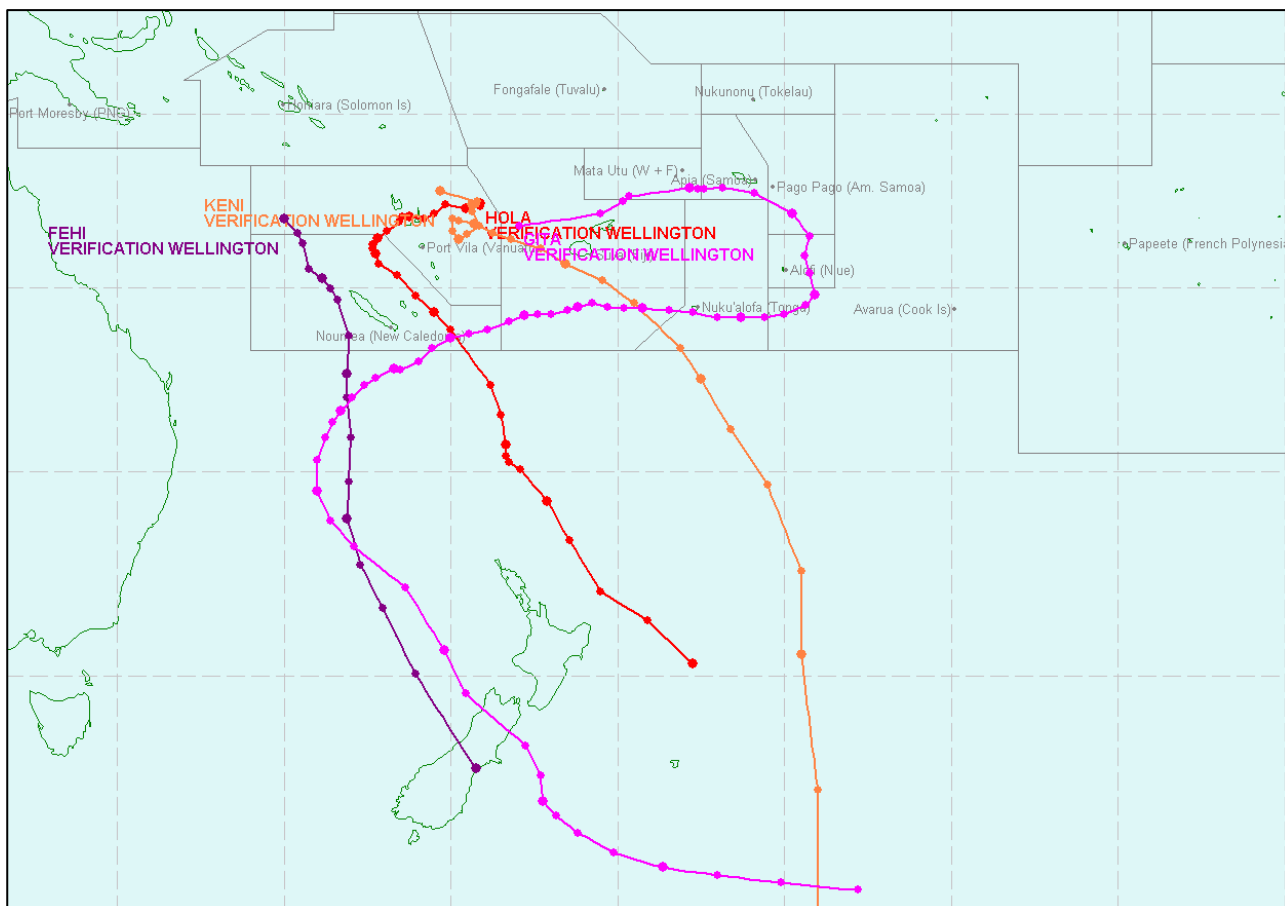
### 2.3 Severe Tropical Cyclone Donna

Tropical Cyclone Donna was a late season cyclone that formed in May 2017 to the northeast of Vanuatu. Donna was named at 0600 UTC on 3 May and intensified to reach category 5 over waters west of Vanuatu (after passing north of the country) – the strongest out-of-season cyclone recorded in the month of May. As the system moved south towards the Wellington AOR it weakened rapidly due to strong shear, and was reclassified as an extratropical low on the evening of 10 May while still north of 25S. The system moved into the Wellington AOR in the early hours of 11 May then moved south/southeast towards New Zealand, and passed close to Northland, Coromandel and East Cape during 12 May. Heavy rain affected many parts of the upper North Island as the low passed by, particularly Gisborne (where stations in the ranges recorded 150-200mm), but also Bay of Plenty and Hawkes Bay. Strong winds were also recorded in the northeast of the North Island, with a peak gust of 80kt recorded at Cape

Reinga in the far north. From 13 May onwards, the system moved east away from New Zealand.

### 3. 2017/18 Cyclone Season

During the 2017/18 season, seven systems were named in the South Pacific and Coral Sea basins by RSMC Nadi and TCWC Brisbane; Fehi, Gita, Hola, Linda, Iris, Josie and Keni. Of these, Gita, Hola and Keni crossed 25S into the Wellington AOR as named systems, while Fehi was reclassified on warning handover from Nadi to Wellington. Tracks for these four systems are shown in the cumulative track map below, with more detailed comments following.



*Cumulative track map for tropical cyclones that moved into the Wellington area during the 2017/18 season. Positions plotted are a blend of RSMC Nadi "operational" tracks (north of 25S) and TCWC Wellington "verification" tracks (south of 25S).*

#### 3.1 Tropical Cyclone Fehi

Tropical Cyclone Fehi developed northwest of New Caledonia and was named at 2100 UTC on 28 January 2018. Fehi moved south/southeast with limited intensification, remaining a category 1 system as it approached 25S. During the afternoon on 30 January, TC Fehi crossed 25S into the Wellington AOR as a category 1 system, but was reclassified as an extra-tropical cyclone at the next warning issue at 0600 UTC that day due to shear.

While warning responsibility for the system initially transferred from RSMC Nadi to TCWC Wellington for the cyclone crossing 25S, upon reclassification warning responsibility then transferred to the Bureau of Meteorology as the system lay in METAREA X when it lost its TC status. Fehi was the first cyclone to trigger a challenging double handover following a realignment of the high seas boundaries between Australia and New Zealand in December 2017. Further comments on high seas boundaries are included below in section 4.

During 30 and 31 January, the system moved south/southeast towards New Zealand, and remained a deep low as it moved onto the South Island on 1 February. While the main low

centre moved southeast across the South Island, a remnant low was left to the west which subsequently tracked northeast up the western coasts of New Zealand.

### 3.1.1 Fehi's Impact on New Zealand

The first Severe Weather Outlook for New Zealand related to the impacts from Fehi was issued on 26 January, three days before Fehi was named, including moderate confidence in heavy rain from 31 January over the West Coast of the South Island. The following day, the Outlook expanded heavy rain areas and began flagging a risk of severe gales in the west of central New Zealand, while the Outlook issued on 28 January also flagged a risk of coastal inundation close to the low centre due to its passage expected to coincide with a period of King Tides in New Zealand. This advice was reinforced through social media channels, and in a news release issued on 29 January titled "[\*Summer heat followed by stormy weather this week\*](#)".

On 30 January, Severe Weather Watches and Warnings were published for the impacts from ex-TC Fehi expected from 1 February, including advice of heavy rain, strong winds and coastal inundation.

The main impacts from Fehi occurred in the west of the South Island and in Nelson, but also in Otago in the lower east of the South Island. Heavy rain exceeding 200mm/24h fell in parts of the South Island ranges, while more than 100mm/24h fell at Dunedin and caused flooding there. Coastal inundation caused significant flooding and damage in parts of Nelson, Buller and northern Westland, while winds gusting in excess of 70kt in some South Island places (with a peak gust of 87kt or 161km/h recorded at Cape Foulwind in Buller) caused wind damage including power outages and road closures. States of Emergency were declared in both Buller and Dunedin, where schools were closed and some evacuations took place. Evacuations also took place in Nelson due to flooding and coastal inundation. The [Insurance Council of New Zealand](#) lists the cost of Cyclone Fehi as NZ\$45.9 million.



*State Highway 6 near Punakaiki (on the West Coast) is severely damaged. [via [Stuff.co.nz](#)]*





*Abel Tasman Drive in Pohara (in northwest Nelson), at the Band Rotunda corner. [via [Stuff.co.nz](http://stuff.co.nz)]*

Further photos and details of Fehi's impacts can be found via news websites [stuff.co.nz](http://stuff.co.nz) and [newshub.co.nz](http://newshub.co.nz).

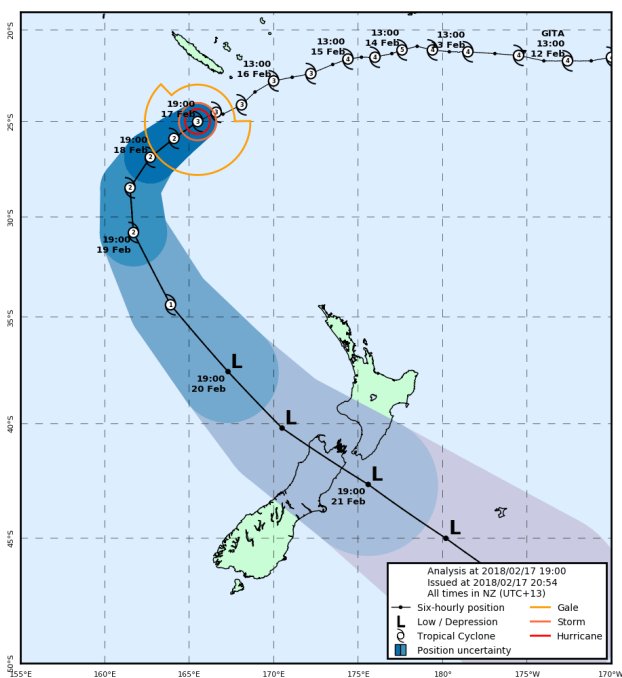
### 3.2 Severe Tropical Cyclone Gita

Tropical Cyclone Gita was named by RSMC Nadi at 0400 UTC on 9 February 2018, located between Wallis and Futuna and Samoa. The system initially moved east towards Samoa passing just south of the country, then turned south to pass to the east of Niue, before turning onto a westerly track towards Tonga. Gita passed close to Tongatapu late on 12 February as a category 4 system, then continued west past southern Fiji and briefly intensified to category 5 system. Gita eventually turned southwest and crossed 25S into the Wellington AOR at 0600 UTC on 17 February as a category 3 system. Over the next two days Gita recurved towards the south and then southeast on 19 February and was reclassified as an extratropical low due to strong shear at 1200 UTC near 34S 164E – approx. 800km west of the Cape Reinga at the northern tip of the North Island in New Zealand. The system continued southeast and moved across the upper South Island late on 20 February, while still a deep low, then moved quickly away to the southeast of NZ and dissipated on 23 February.

#### 3.2.1 Gita's Impact on New Zealand

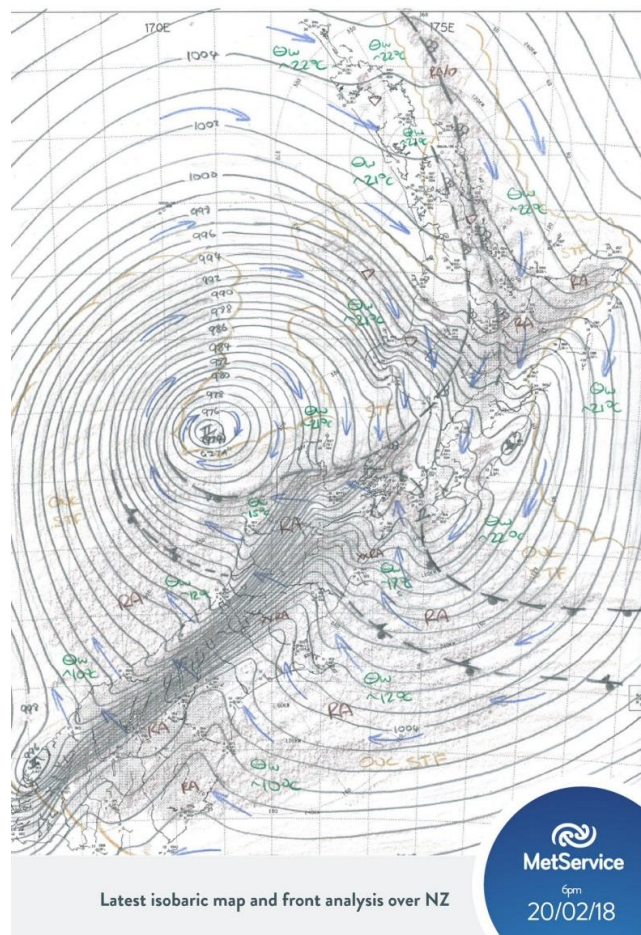
The MetService media team first mentioned Cyclone Gita in a [new release issued on 11 February](#), reinforcing RSMC Nadi as the official warning provider while not specifically mentioning any impacts on New Zealand. The following day on 12 February, an [updated news release](#) was issued which highlighted a potential for NZ to see impacts from Gita. The first Severe Weather Outlook advising a threat of severe weather from Gita was issued on 14 February, citing the potential for "highly impactful" weather including severe gales and heavy rain, while noting a large amount of uncertainty in the track.

Three days later, Gita crossed 25S into the Wellington AOR, with TC track maps being issued alongside high seas marine warnings for the system.



Above: the first track map produced by TCWC Wellington as Gita crossed 25S at 0600 UTC on 17 February

Right: hand-drawn analysis for 6pm 20 February, shortly before Gita made landfall in the northwest of the South Island



The first comprehensive Severe Weather Watch for Gita’s impacts in New Zealand was issued on 18 February, including advice of heavy rain and flooding, severe gales and coastal inundation. Many areas placed on Watch were elevated to full Severe Weather Warning status the following day on 19 February ahead of Gita’s expected landfall during the evening of 20 February. Warnings continued to flag heavy rain and flooding, damaging winds, large waves and coastal inundation. Besides formal Severe Weather Watches and Warnings, the media team continued to keep the public informed through social media channels, news releases, blog posts and videos on MetService TV.

As with Cyclone Cook in 2017, there were serious concerns for major and widespread impacts with the ex-TC and MetService liaised closely with the National Ministry of Civil Defence and Emergency Management, providing direct advice into planning and operational meetings. Due to anticipated and actual impacts, a total of seven States of Emergency were declared; Westland District, Grey District, Buller, Nelson Tasman Region, Taranaki, Christchurch and the Selwyn District.

Gita’s impacts in New Zealand were significant. Wind gusts exceeding 70kt were recorded at a number of exposed locations around central NZ, downing trees and causing thousands of homes to lose power, while large swells caused coastal damage and inundation also around central NZ including State Highway 1 north of Wellington. Flight cancellations affected several airports, while the Ports of Westport and Taranaki both closed. Rainfall exceeded 150mm/24h through Nelson, Marlborough and Canterbury, causing numerous slips (especially in the Nelson-Tasman Region) along with flooding, resulting in damage and many road closures. The [Insurance Council of New Zealand](#) lists the cost of Ex-Tropical Cyclone Gita as NZ\$35.6 million.



Slips and flooding in the Takaka Hill area. [via [radionz.co.nz](http://radionz.co.nz)]



Damage to State Highway 1 north of Wellington. [via [radionz.co.nz](http://radionz.co.nz)]

Further photos and details of Fehi's impacts can be found via news websites [radionz.co.nz](http://radionz.co.nz) and [newshub.co.nz](http://newshub.co.nz), also via a MetService blog post titled "[Cyclone Gita - By the numbers](#)".

### 3.3 Tropical Cyclone Hola

Tropical cyclone Hola originated to the northeast of Vanuatu and was named at 1200 UTC on 6 March. Hola then moved southwest across Vanuatu as a category 2 system on 7 March, before intensifying to a category 4 cyclone and recurving to the southeast between Vanuatu and New Caledonia. As Hola moved south it encountered an unfavourable environment and weakened to category 2 system before crossing into the Wellington AOR at 1200 UTC on 10 March. The system then turned south towards New Zealand and was reclassified as an extratropical low at 0600 UTC on 11 March near 29S where it briefly stalled before accelerating to the southeast and passing offshore to the northeast of New Zealand.

As a result of the stall near reclassification (not well captured by global models) and subsequent southeast movement, Hola was a challenging system to produce forecast tracks for. Initially, as Hola moved south out of the tropics, the system was forecast to pass very close to or over northern New Zealand. As a result, several Severe Weather Warnings for heavy rain and strong winds in the northeast of the North Island were issued on 11 March ahead of the systems closest approach expected 24-36 hours later. However, the eventual track was further offshore than forecast leaving minimal wind impacts over mainland New Zealand.

### 3.4 Severe Tropical Cyclone Keni

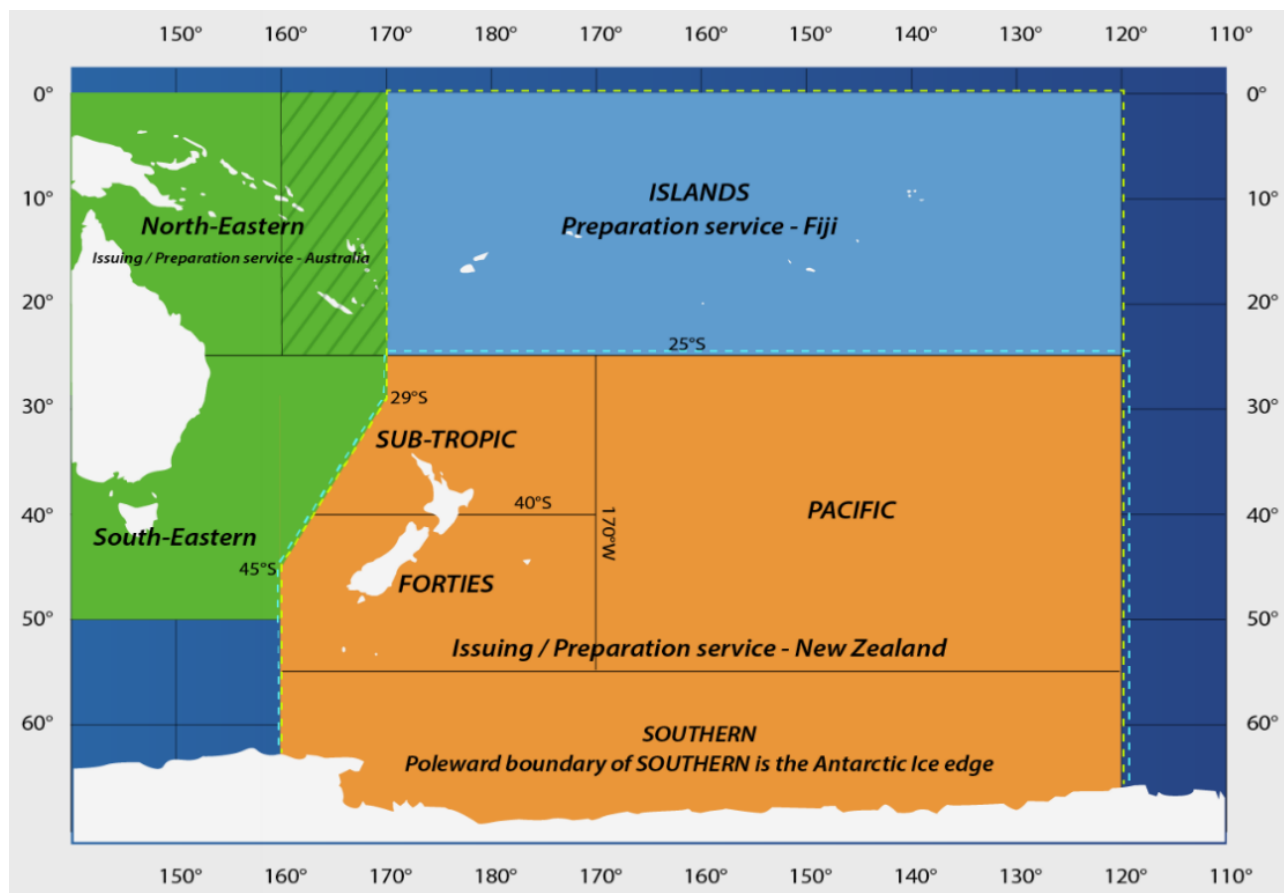
Severe tropical Cyclone Keni originated over waters between Vanuatu and Fiji and was named at 1200 UTC on 8 April. The next day Keni began deepening and accelerating in an east-southeast direction towards Fiji, passing just south of Viti Levu on 10 April as a Category 3 system. Keni continued southeast to pass southwest of Tonga, before crossing into the Wellington AOR at 0000 UTC on 11 April, still as a category 3 system. Thereafter the system encountered strong shear and was reclassified as an extratropical low at 1200 UTC on 11 April while moving SE/S, and was tracked all the way south of 50S.

#### 3.4.1 Co-ordination with RSMC Nadi

Early on Monday 9 April, TC Keni turned onto an east-southeast track towards Fiji, posing a threat of a direct impact over Viti Levu the next day. Following standard operating procedures, RSMC Nadi and TCWC Wellington initiated a routine check message procedure early on 10 April ahead of Keni's approach to Fiji. Under this procedure, designed to verify working comms to/from Fiji, Nadi and Wellington exchanged GTS service messages every 30 minutes with check messages issued by Nadi immediately acknowledged by Wellington. This "ping-pong" check message procedure continued until 0000 UTC on 10 April at which time the centre of Keni had made its closest approach to Viti Levu, and was deemed to no longer pose a threat to infrastructure or communications in Fiji.

#### 4. Warning Boundaries

On 12 December 2017, a realignment of the high seas forecast and warning boundary between Australia and New Zealand came into effect. The realignment resulted in a removal of an overlap in services from the Bureau of Meteorology (Australia) and MetService (New Zealand), with the new boundary for services aligned to the METAREA boundary between regions X and XIV. See this joint [Information Sheet](#) from the Bureau of Meteorology and MetService for further details from which the following figure is taken;

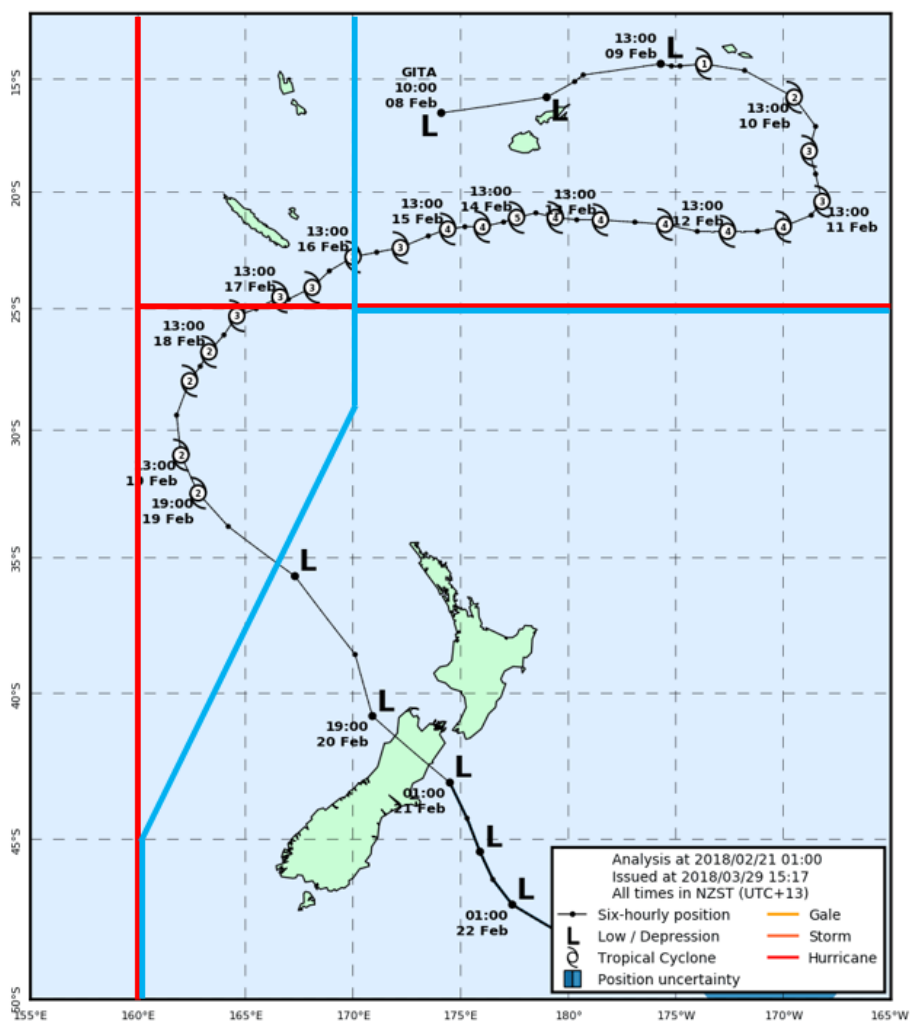


*New High Seas forecast and warning boundaries between METAREA X and XIV.*

However, while the boundary realignment was implemented for high seas forecasts and warnings, it did not formally apply to TC Warnings and RSMC/TCWC boundaries as specified in the Tropical Cyclone Operational Plan (TCOP) for the South Pacific and South-East Indian Ocean ([WMO-1181/TCP-24](#)).

As a result, there is currently an overlap area between the TCWC Wellington AOR and METAREA X in which warnings may come from one of two agencies depending on whether the warning is for a Tropical Cyclone or not (ie for a system south of 25S the warning will come from New Zealand for a TC, but from Australia for a non-TC). Additionally, while a TC Warning will come from New Zealand in this overlap area, the High Seas forecast will come from Australia.

The new boundaries were put to the test twice in the 2017/18 Cyclone Season, as both Fehi and Gita transited through the overlap area between TCWC Wellington and METAREA X. Fehi, in particular, was a challenge as the system was reclassified on the boundary necessitating a double handover for warning responsibility. Fiji handed TC warning responsibility to New Zealand, but as the system was immediately reclassified, warning responsibility on the ex-TC transferred to Australia (despite this not being communicated within the final TC warning issued by Nadi to the north of 25S). An example of the different boundaries with the track of TC Gita are shown below;



*TC Gita operational track with the existing TC warning boundaries shown in red, and the new high seas forecast boundaries shown in blue.*

While these boundaries and overlap may create a challenge at the operational level between forecast offices in New Zealand, Australia and Fiji, the TCOP already has provisions in place to address systems near or transiting boundaries that are relevant; see sections 2.1.2.1 (One comprehensive marine warning per cyclone), 2.2.1.2 (Warnings near common boundaries) or 2.2.1.3 (Transfer of warning responsibilities). Clear and frequent communication between forecast offices will also ensure smooth operations and forecast/warning service.

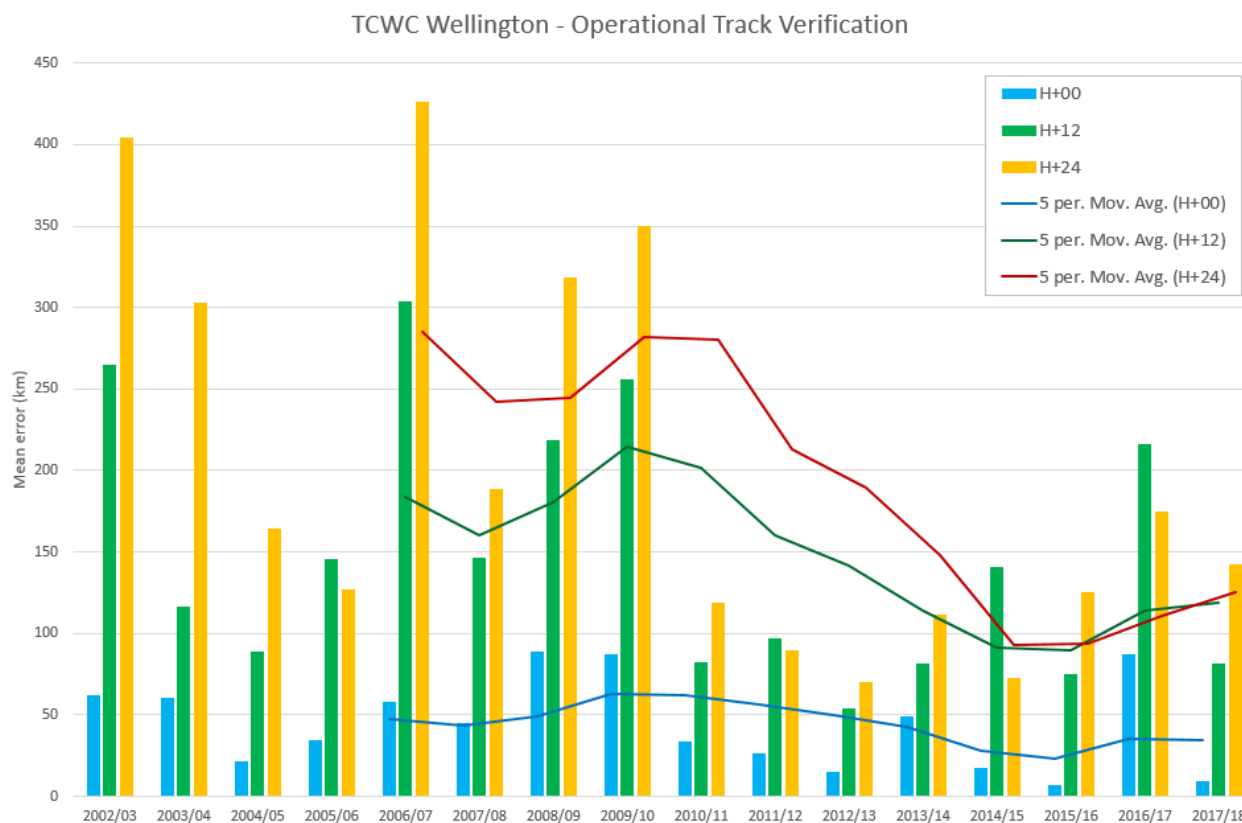
#### 4.1 TCWC Wellington Recommendation

TCWC Wellington believes the current boundary setup, especially with respect to the existing TC warning boundary on 160E, is workable and is indeed preferential for the provision of domestic forecast and warning services in New Zealand. A common track for ex-cyclones that impact New Zealand is through the overlap area between TCWC Wellington and METAREA X (eg Zelia in 2011, June in 2014, Ola in 2015, Cook and Donna in 2017, and Fehi and Gita in 2018). As such, retaining the boundary between Australia and New Zealand on 160E allows MetService to assume responsibility for cyclones likely to impact New Zealand earlier which in turn allows MetService to control forecast and warning policy at an earlier stage providing longer lead time than if the TC warning boundary was aligned to the METAREA.

TCWC Wellington recommends the existing TC warning boundaries are retained, and that clear procedures and communications are maintained between forecast offices in New Zealand, Australia and Fiji.

## 5. Operational Track Verification

Verifications of analysis and 12/24 hour forecast positions for the 2016/17 and 2017/18 season show an increase in the five-year moving average of the mean error during the last two seasons. This increase is largely due to a spike in the 2016/17 season related to poor forecast performance for TC Bart (with just three analysis positions in the Wellington AOR). By comparison, mean errors for TC Cook in the same season were 20/92/83km for the analysis/12/24h positions.



Graph of TCWC Wellington mean position errors for the analysis (H+00) and forecast (H+12 and H+24) position in operational TC warnings for the high seas. The 16-year period above includes 47 cyclones and 165 analysis (H+00) positions.

Mean position errors for named TC's in the TCWC Wellington area of responsibility during the 2016/17 and 2017/18 cyclone seasons were;

Season	Num. TC's	Num. H+00 points	H+00 mean error	H+12 mean error	H+24 mean error
<b>2016/17</b>	2	6	88km	216km	175km
<b>2017/18</b>	3	14	10km	81km	143km

## 6. Key Achievements

This section highlights achievements at TCWC Wellington since the RA V TCC-16 meeting in Honiara in 2016 (covering the 2016/17 and 2017/18 cyclone seasons).

### 6.1 TCWC Wellington Training

Training courses are run annually ahead of each cyclone season. These have included;

- Full-day tropical workshops for all RSMC Wellington Lead and TCWC meteorologists involved in the tropical cyclone forecast process (annual in early November)
- Two half-day pre-season training sessions for the New Zealand governmental inter-agency Emergency Task Force coordinated by the Pacific Division of the Ministry of Foreign Affairs and Trade (annual in November)

### 6.2 International Participation

Involvement in international courses or meetings has included;

- 12th RA-V Training Course on Tropical Cyclones, Southern Hemisphere Training Course on Tropical Cyclones, 18-22 Sep 2017, Nadi, Fiji – attended by Miroslav Malivuk
- 8<sup>th</sup> RA-I Training Course on Tropical Cyclones and Public Weather Services – PWS portion from 11-12 Sep 2017, La Reunion, attended and co-facilitated by Chris Noble
- RA-V Working Group Leads' and TCC Chair's Meeting, 28-30 Nov 2017, Jakarta, Indonesia – attended by Chris Noble on behalf of TCC Chair Mike Bergin

### 6.3 New Products/Services

As shown in section 2.2.1 above, a new TC track map was added to the [Tropical Cyclone Activity page](#) on metSERVICE.com ahead of the approach of TC Cook to New Zealand in April 2017. These track maps have and will be published for significant systems expected to impact NZ and when issued will appear alongside other tropical information including; a Tropical Cyclone Potential Bulletin, combined synoptic/streamline analysis chart, and satellite image player. In the previous two seasons, track maps for New Zealand were published for TC Cook in April 2017, TC Gita in February 2018, and TC Hola in March 2018.