



10 March, 2011

Our 16th Year

Commissioner Gate Holmes  
 Queensland Floods Commission of Inquiry  
 PO Box 1733  
 Brisbane QLD 4001

Dear Ms Holmes,

**Cyclone impact on Caloundra South and Brisbane**

We have examined current information on severe weather, cyclones, and rain inland floods for the Sunshine Coast. We find that much information is missing, is not easily available, or is not readily understandable to the public. This causes us considerable concern. We feel that public complacency exists arising from the recent "Drought" years, which has allowed advisory information to be neglected. Much is actually known, but the appropriate advice has not been promoted - possibly to Councils and certainly to the Community. Recent events have alarmed many people with the fear that severe weather events (Yasi and March follow-up rains) are likely to recur.

Improved information needs to be immediately updated and published for this summer's cyclone season. There are safety risks that affect both current residential and business properties as well as severe risks arising in the future from the planned new development at Caloundra South. Much better advice needs to be mandatory for Councils and Agencies responsible for Infrastructure.

We ask that reviews initiated by the Floods Commission include examination of areas, such as the Sunshine Coast and the Gold Coast that may, by luck, have avoided the severe floods early this year but are indeed very vulnerable to coastal risks from cyclones, depressions, severe rain, and sea encroachment.

**We request that:**

1. A review is completed urgently on the likely effects of a Cyclone that may be predicted to cross the Sunshine Coast at Golden Beach, impacting the Caloundra South Development Area and then proceeding to Brisbane and Ipswich. This matches well known Cyclone history and paths for La Niña events from BoM and CSIRO.
2. Interim information is made available immediately from Agencies including:
  - a. Modelling Rain maps for both the Sunshine Coast, and the Lockyer and Brisbane Rivers (Wivenhoe and Somerset).
  - b. Forecasts and advice for Cyclone 5 events
  - c. "La Niña" and Climate Change Forecasts
  - d. Property standards appropriate for severe weather events
3. A direction is given in the interim review on 1 August 2011 that the "Caloundra South Development" is required to include current recommendations from the

Department of Environment and Resource Management for both Climate Change and Coastal Zone Management.

In addition, the Floods Commission is asked to review the plans for Caloundra South that are expected to be released by ULDA at the end of March. These plans need to confirm that adequate evaluation is made for risks of severe weather events from both cyclone sea level inundations and surface floods caused by inland rain run-off.

This request supports the previous recommendation by OSCAR made to the Sunshine Council Regional Council and to the Minister for Infrastructure, Local Government and Planning.

4. We have asked Sunshine Coast Regional Council to publish immediately, and to send the Commission copies of:

1. A revised flood and storm plan based on current information is published - see Townsville, Redlands, and Gympie examples.
2. The severe flood evacuation routes for Pelican Waters, Golden Beach, and Caloundra, Kawana and suburbs to Mooloolaba are identified and published immediately.
3. The list of roads flooded from January 11<sup>th</sup> to 14<sup>th</sup> is re-published so the public can avoid these areas during future rain events.
4. Rescue and Recovery Refuges that may be used for significant floods are identified immediately - these may be at Sugarbag Rd, and Queen St.
5. Advice is made available for storm tides and rain floods, covering severe risk events, including:
  - a. Identifying properties at risk below revised AHD levels
  - b. Effects of Flood levels from 1 metre of inland rain
  - c. Effects of a Category 5 Cyclone with 5 metres storm surge.

We ask that the Residents Association South Sunshine Coast may be granted permission both to attend hearings and has "Leave to Appear" to present views to the Commission.

We also wish to submit further information to the Commission at a later date.

Yours Sincerely,

Research Officer  
 [Redacted Signature]

## Explanation Commentary

### Summary

The Sunshine Coast has experienced severe weather over the last 2 months. Floods were experienced in several areas, including Caloundra, Golden Beach, Currimundi, and Maroochydore. The Sunshine Coast Regional Council has been requested to provide information that advise residents about the flooding from inland rainfall flowing directly onto the Sunshine Coast, (eg 1 metre of rain) and also against the possibility of a Cyclone during the current summer season.

The Commission of Inquiry is urged to demand that other Agencies continue to provide information critical for this cyclone season. Advice must not be delayed until after the Commission's final report

### Introduction



The rainfall in Queensland for January 2011 has typically been much larger than average and double the amounts for January 2009.

By luck the Sunshine Coast missed some of the excessive rain - this was delivered to Kenilworth, Esk, Kilcoy, Somerset and Wivenhoe and resulted in the floods in Gympie, Ipswich, Toowoomba and Brisbane

The main rain band progressed from Gympie to Toowoomba. The increase this year as compared with last year was between 400mm and 1M with a total over 2 metres. The rainfall figures are well supported by reviews published in the Courier Mail and Sunshine Coast Daily.

SCD - "More than 1500mm fell in Southeast Queensland, mainly as a result of a low pressure system in January. .... Up to 2500mm in the state's southeast. This is as much as 1500mm higher than the annual average." CM - "Sunshine Coast Airport had 1369.2mm between December and January compared with a 478.3mm average. Maleny had 350mm on 10 January, the second highest in the state, plus a 3 month total of 1849mm compared with a long term average of 795.7mm - a 232% increase - the 5th highest in the state. Happy Valley had 339mm the 4th highest in the state."

<http://top.bom.gov.au/sca/owm/rain/index.jsp?calou=calou&time=Interstate&Q=Sunp=total&period=month&area=ad>

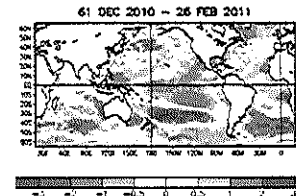
We have found newspaper references to past destructive cyclones in Caloundra and Brisbane. Eg Saturday 25 January 1947, Wednesday 31 January 1951, Thursday 15 July 1954, Monday 30 August 1954, Wednesday 12 May 1971.

The possibility of a category 5 cyclone in Brisbane is supported by the history of a cyclone at Maitland NSW in 1955 with a 4M surge. The BoM weather history also includes a much larger list of floods from troughs and depressions.

The BCC Apelt report suggests that 2.8M storm surges should be included in disaster plans, and also Climate Change and La Nina effects need evaluation.

Request 1 relates to a risk forecast for a category 5 cyclone following a path 100km further south from Golden Beach to Gatton.

### Current Climate Assessment



A new Ocean Surface Topography Mission (OSTM) Jason-2 satellite image from NASA was released on 28 February that shows the warm area in eastern Pacific has increased. The cyclone zone runs west from Brisbane and North NSW below Fiji. The increase in sea height is between 100 and 400mm and the temperature is over 27C, which means cyclones can form in this area. This affects tide levels.

La Niña has increased the sea temperature on the east coast of Australia. This has moved the cyclone risk area south to the level of Brisbane and even into North NSW. This analysis is confirmed by the Cyclone history from 1950 to 2011.

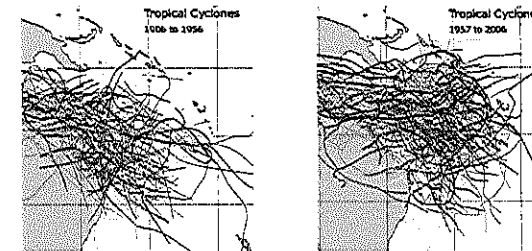
BoM states the risk is high until April. "Australian rainfall patterns during La Niña events" <http://www.bom.gov.au/climate/enso/lnhucmp.shtml>

"....but in the east of that state, (Queensland) the La Niña-induced tendency towards wetter than average conditions continues to be moderate to strong. This is significant as December to February are, on average, three of the four wettest months in this part of the country."

"La Niña - Detailed Australian Analysis" <http://www.bom.gov.au/climate/enso/lnhuc/>  
 "La Niña events are associated with wetter than normal conditions across eastern and northern Australia."

### 1. Current Cyclone Risk

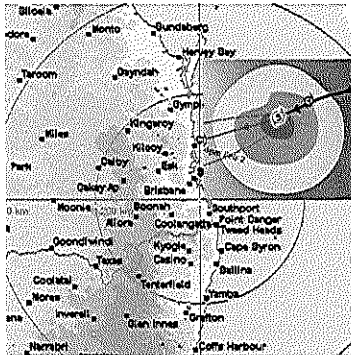
There have been some 28 cyclones in SE Queensland in 61 years (between 1950 and 2011). Many (even most) have occurred during La Niña years: 2010/11, 2008/9, 1998/2001, 1988/89, 1973/76, 1970/72, 1964/65, 1954/57 and 1949/51. The flood history published by BoM strongly supports this view.



[http://www.bom.gov.au/hydro/flood/aid/aid\\_history/index.shtml](http://www.bom.gov.au/hydro/flood/aid/aid_history/index.shtml) and <http://www.bom.gov.au/enh-bin/silo/cyclones.cgi>

It shows that cyclones are often following paths crossing the Coast between Bundaberg and the Sunshine Coast and then flowing to Brisbane, Toowoomba, Ipswich, and the NSW border. The historic paths of cyclones and severe depressions are available to the public and re-confirm these conclusions. [http://australiasevereweather.com/tropical\\_cyclones/twc\\_1973\\_1974\\_south\\_pacific\\_ocean\\_tropical\\_cyclones.htm](http://australiasevereweather.com/tropical_cyclones/twc_1973_1974_south_pacific_ocean_tropical_cyclones.htm)

The risk may be as high as a 1:5 year ratio; (or 20% chance p.a.) during La Niña. The recent "El Niño" years have caused serious drought in eastern Queensland. The average drought between 1977 and 2007 has unfortunately misled some



people to forget that SE Queensland is a cyclone area.

It is therefore suggested that an urgent examination is made of the effects if a category 5 cyclone (like YASI) should reach South East Queensland.

It is asked that similar information to that published by the Queensland Police and Northern Councils is made available for severe storms for the Sunshine Coast.

The information about sea height, storm surge and the addition of wave action does not appear to be published in ways that are understandable to the Community. In addition, the public record does not indicate the effects of cyclones and depressions. Some

agencies have reported storm surge outside Fraser Island, Moreton Island, and the Gold Coast of between 8 and 15 metres. Hence the request for a review at 5 metres may well be conservative – this needs more information from agencies.

The review of information about cyclone activity around South East Queensland and history of rain related severe weather events has been surprisingly easy to evaluate. What has been a complete surprise is the lack of long term future forecasts and risk analyses. The western coast of USA has research on "inter-decadal oscillation" Some agencies like "Haydon Walker" (Weatherzone) and "Tropical Storm Risk" (UCL, UK) have published risk reviews, BUT, both BoM and CSIRO do not appear to have circulated any "multi-decadal" analysis information. For example, the POAMA forecast for the Great Barrier Reef needs to be re-published for SE Qld and Brisbane in terms understandable to the community. The Floods Commission is asked to rectify this inadequate situation immediately. The Sunshine Coast Council has been asked to publish the information currently to hand (letter 19 February and Request 4 below). The Floods Commission is asked to initiate and undertake expert checks across all agencies.

**Request 1: A review is completed urgently on the likely effects of a cyclone that crosses the Sunshine Coast at Golden Beach, impacting the Caloundra South Development Area and then proceeding to Brisbane and Ipswich. This view matches well known climate records for La Niña events from BoM and CSIRO.**

It is also noted that the review by the Residents Association has concentrated on Caloundra. There are likely to be issues within other parts of the Sunshine Coast and in areas for other Councils.

## 2. Information by Other Agencies

Our members very much appreciate articles like that published at the end of February in their Special Flood Crisis Supplement page 66 by the Sunshine Coast Daily (also sponsored by Suncorp) in which Dr Jeff Sabburg and David Grant of BoM explain the effects of La Niña. However, this explanation only covers why La Niña occurs.

Our members would like to know from agencies with some authority:

- What actions they need to take to protect their property?
- Should they initiate any new protective facilities?
- If there are storm events, how do they get to safety?
- What are the forecast for the next severe weather events?

Agencies and Councils need to publish more appropriate advice. The Building Services Agency (BSA) does have some FAQ sheets – but these seem to mainly cover safety and contracts and only provide minimal advice on how to change buildings for additional flood protection eg – How do you raise a building by 2 metres? What are water resistant wall materials?

The Department of Environment and Resource Management (DERM) has completed two such studies – but the conclusions seem to be delayed and are not consolidated into safety, planning, and building rules. Clear advice has not been promoted to the Community.

The first study is the Coastal Management Strategy. The second is the Climate Change Forecast. (LGAQ support). These detailed reports and recommendations need support by the Floods Commission. The recommended standards and planning rules must be promulgated as soon as possible.

There have been flood maps published for both Brisbane and Gold Coast of the likely effects of climate change. These show a maximum normal tide level increase of a maximum of 1.1 metres by 2100, resulting from a possible 4 degrees warming.

Such "climate change" forecasts do NOT cover the current variations arising from "La Niña" and therefore need very urgent revision. The SOI cycle is viewed as multi-year with a 7-year re-occurrence pattern. (See also ENSO/El Niño cycle)

NASA has already reported that this year's changes in sea level are of the order of 0.5 metres increase for "La Niña". This has good accuracy as height levels are directly measured by satellites. Such findings cause difficulty for the climate change maps based on AHD static information, as the sea level has already risen during La Niña's warm sea / low pressure events. Additionally, it is well known that tide variations have large differences around Australia. A single maximum figure of "1.1 metres" is certain to be misleading.

We have previously written to the Commonwealth Department of Climate Change asking that such multi-seasonal sea level maps are published for the flood vulnerable areas of the Sunshine Coast. It is very disappointing that currently only the Gold Coast and Brisbane have any published information (even if accuracy can be questioned.)

The 100 year flood level needs very urgent revision. Reviews will make significant changes to the "Australian Height Data" AHD, the "Maximum High Tide" MHT levels, and forecast flood inundation areas and levels.

The recent floods in Ipswich, Toowoomba, Gympie, and Brisbane show that the 100 year flood levels have very serious errors. On the coastal areas of the Sunshine Coast, there are scant records relating to pre-1950 events. Hence a 1 in a 100 estimate is likely to be very misleading due to lack of data. See Campbell Newman's comments and BCC Apelt report. It is requested that revised estimates are identified and published.

The Bureau of Meteorology (BOM) has indicated in several reports that the events related to depressions, inland rain, cyclones and severe winds are increased by an order of magnitude during "La Niña" events such as 1973/4 and 1893/4.

Similarly, CSIRO states: <http://www.csiro.au/org/Tropical-cyclones.html>

- "The Queensland coast experiences three to four times as many cyclones during La Niña years as during El Niño years. The current La Niña is one of the strongest on record."
- "The La Niña-rainfall relationship oscillates over several decades, in tandem with a longer-lasting feature called the Interdecadal Pacific Oscillation (IPO)."
- "CSIRO research suggests that a rise in sea level of around 0.2 m and a 10 per cent increase in cyclone intensity could double the area of Cairns affected by a present-day 1-in-100 year storm-tide."

A preliminary internet search has not found any interdecadal forecasts of La Niña cyclone risks. When will the next high risk event occur – is it this year (until May), next year, in 2014 or 2018?

The rain history information for the Sunshine Coast has been reviewed. The monthly average is about 300mm. The typical storm adds another 300mm with a peak of an additional 1000mm. It is easy to review the figures but the risks of severe rain in any area have not been forecast.

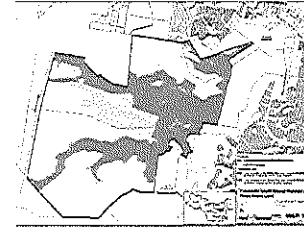
The Sunshine Coast Regional Council has raised the issue of Developers appealing planning decisions and the liability of Councils to developers and property owners for land that is seen as subject to floods. Perhaps developers should be asked to underwrite 25 year bonds to protect property and infrastructure from future floods.

The community needs advice about upgrading existing property and building new flood resistant residences. Sites like <http://www.youthbuilding.org/> sponsored by Australian Architects need better information.

**Request 2: Interim information is made available immediately from Agencies that includes coverage of:**

- a. Forecast Rain maps for both for Sunshine Coast, and for the Lockyer and Brisbane Rivers. (Wivenhoe)
- b. Forecast and advice for Cyclone 5 events
- c. "La Niña" and Climate Change Forecasts
- d. Property standards for severe weather events

### 3. Review Caloundra South Development

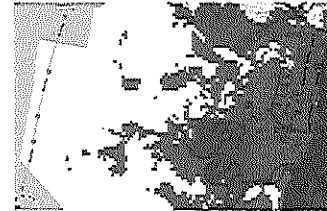


The Sunshine Coast Council Caloundra South Plan has Map13.2 showing possible flood areas. This only covers the "Area defined specific for the development".

An equivalent map from NASA shows that Golden Beach, Pelican Waters, and Pumicestone Passage might be severely damaged from such a flood level. However this does NOT cover inland flood events.

A very much larger area needs evaluation. This must cover Pumicestone Passage, Golden Beach, and Pelican Waters, and requires safety and environmental impact reviews to protect existing property as well as new developments. The study should also include Moreton Bay, Bribie Island, and the RAMSAR National Park

The Residents Association chartered a plane to take flood photos of the Caloundra South area after the floods of January 11-14<sup>th</sup>, (available at our website). These very clearly show that the inland rain run-off effects are significantly larger than the NASA forecast showing storm tides only. It appeared that severe flash floods had occurred.



Some discussions with ULDA indicate that the development will be reviewed to be self-sufficient for water supply and sewerage and will also examine flood areas for water retention and appropriate use of wetlands for sustainable ecological protection of Pumicestone Passage. The new standards used at Fitzgibbon Chase may require further revision.

Further, the Commission is asked to review the possible effect of changes in river and canal scour water events. It is known that developments and residential suburbs with significant canal blocks suffer from water scour connected with river / canal flow, tides and rainfall. In Caloundra weirs have been provided at Parrearra and Lamerough. These may well need raising to deal with the Pelican Lakes and Caloundra South developments as well as Climate Change and Storm Surges. Similar weirs and/or levees may be needed for the Mooloolah River sand pit extraction sites. Mitigation and adaptation advice is needed for climate change.

**Request 3: That a direction is given in the Commission's interim review due on 1 August 2011 that the "Caloundra South Development" is asked to include current recommendations from the Department of Environment and Resource Management for both Climate Change and Coastal Zone Management."**

In addition the Floods Commission is asked to review the plans for Caloundra South that are expected to be released by ULDA at the end of March. These need to confirm that adequate evaluation is made for risks of severe weather events from both cyclone sea level inundations and surface floods caused by inland rain runoff.

A review also needs to confirm the building standards to use in the future for developments adjoining flood plains and the sustainable facilities to include mitigation and adaptation.

This request supports the previous recommendation by OSCAR made to the Sunshine Council Regional Council and to the Minister for Infrastructure, Local Government and Planning.

#### 4. Immediate Requests Sunshine Coast Regional Council

We have asked Sunshine Coast Regional Council to publish disaster management advice immediately, and to send copies to the Commission:

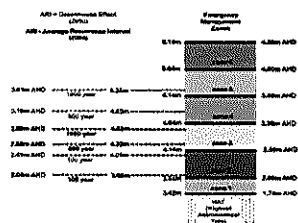
Please can the Floods Commission follow up these requests and ensure information is available to the community at the earliest time

See Requests in SCRC letter of 19 February (copy attached):

1. Evacuation routes that are identified for Pelican Waters, Golden Beach, Kawana and Warana
2. List of Roads re-published that are known to Flood
3. A review of Rescue refuges accessible in Caloundra
4. Advice is made available for properties on Sunshine Coast for storm tides/floods and inland floods covering:
  - a. Identify properties for revised AHD/MHT levels
  - b. Effects of 1 metre floods from rain as January 2011
  - c. Effects of a Category 5 Cyclone storm surge of 5 metres
5. A flood and storm plan based on current information is published – see Townsville, Gympie and Redlands examples.

#### Property Flood Advice

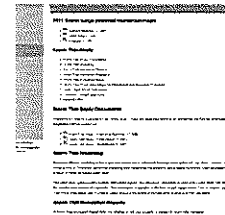
The analysis of storm tide surges is explained in the Townsville 2007 study.



It is noted that there seems to be views that preliminary estimated information should not be published. This opinion may be from fear that if Councils and Agencies know information that can help the public, they can be subject to negligence claims if they do not provide suitable advice.

For example, the reports prepared by Connel Wagner for Caloundra City Council between 2004 and 2007 have disappeared. This causes the Residents Association concern.

#### Emergency Plans



The Residents Association has noted that the Gold Coast Council has produced several reviews of cyclones and inland floods together with Griffith Uni. It is expected that further examination will produce recommendations that apply to the Sunshine Coast.

The Queensland Police published an excellent website with information for Cairns, Douglas, Townsville, Mackay, and Cassowary Areas. These need further analysis.

<http://www.police.qld.gov.au/forms/aid/floods/default.html>

The Townsville Plan is comprehensive

<http://www.townsville.qld.gov.au/residents/emergency/Pages/tidmg.aspx>

It is noted for review by the Floods Commission that agencies are reluctant to publish preliminary estimated information. This is a situation like that of the "tobacco manufacturers" - who eventually incurred significant damages for negligence in failing to warn people. We ask that information is urgently published for the Sunshine Coast Area. This needs to include Moreton Bay, Somerset, and Gympie Councils

We request that the earliest release of draft information which would be useful to residents for their safety and security of property.

The revised flood planning pages on the Brisbane and Ipswich Councils' websites show minimum standards that should be ordered mandatory for all Councils.

The NSW Planning Departments clearly states that Councils are responsible for completing flood and severe weather reviews for their areas. QLD DERM has published similar recommendations. These plans need mandated community involvement. Please can the Commission clarify that agencies must inform Councils about appropriate advice? It does seem a wasteful exercise if every council needs to commission consultants and university studies for their own areas – when much advice should be shared.

#### Further Information and Consultation

Detailed explanations and references can be provided on request in discussion with the Commission at hearings or in writing

*We ask that the Residents Association South Sunshine Coast may be granted permission both to attend hearings; and has "Leave to Appear" to present views to the Commission.*

*We also wish to submit further information to the Commission when we have had time to further examine advice from Agencies and evidence that is presented to the Commission of Inquiry.*

## Limitations

This note is based on material available to the public and published by organisations EG:- The Commonwealth Government, the Bureau of Meteorology (BoM), CSIRO, Australia Severe Weather website, Queensland newspapers, TV, and NASA.

Any person may elucidate similar information by a few hours work on the Internet. (some skill needed to find material and cross interpretate.)

There does not appear to be any validated information that explains the combination of inland flood information with GIS planning maps available to the public. The affects of "La Niña" (eg SOI, ENSO) and sea temperature and height levels does not appear to be well explained. Similarly the affects of normal tides is not available in a form to add to wave patterns, river / canal scour, and then add to Cyclone storm tide information.

This implies that it is very difficult for individuals to interpret and understand the flood and severe weather implications for their properties and therefore to undertake suitable actions for their personal safety and property security.

## Circulation

Cate Holmes, Floods Commission of Inquiry  
Copy: DERM – Coastal Management, Climate Change,  
Bob Abbot Mayor SCRC; John Knaggs CEO SCRC Tim Dwyer Disaster Management  
Infrastructure, ULDA, Qld Climate Change Qld Police, Emergency Services  
Moreton Bay, Lockyer, Somerset, Ipswich, and Brisbane Councils  
Sunshine Coast State Members and Councillors, OSCAR  
Com Climate Change  
Media and Newspapers

## Background and References

Residents Association SSC Flood Photos of Caloundra South

**Copy to be sent to Commission** [http://www.caloundrainsurers.com.au/modules/download\\_gallery/dlc.php?file=250](http://www.caloundrainsurers.com.au/modules/download_gallery/dlc.php?file=250)

Residents Association SSC Letter to Sunshine Coast Council 19 February

[http://www.caloundrainsurers.com.au/media/download\\_gallery/Flood%20Adviser2.pdf](http://www.caloundrainsurers.com.au/media/download_gallery/Flood%20Adviser2.pdf)

Special Flood Crisis Supplement Sunshine Coast Daily February 2011

Advice from BoM ([not on internet](mailto:net.on.internet))

Sunshine Coast Daily 12 February pages 42 and 43 ([not on internet](mailto:net.on.internet))

**"This particular episode (La Niña) has near record SOI values and record sea surface temperature values making it one of the strongest La Niña events in Australia in recorded history."**

SCD 19 January <http://www.sunshinecoastdaily.com.au/story/2011/01/19/council-sunshine-coast-beaches-does-weather/>

The year's highest astronomical tide of 2.09 metres will occur on Friday morning, boosted a further 0.4 metres by a sea level rise caused by the La Niña pressure system. NASA modelling shows the La Niña impact on sea level heights is at its greatest off the South-East Queensland coastline.

Japanese MTSAT2 Cyclone image – Current satellite view of Australia, Fiji, and Solomons.

<http://www.gpsa.noaa.gov/gochem/cshornilcops/shimgesol.html>

ABC La Niña **La Niña's influence in Australia is most pronounced in the north-east - the tropical rainforests of the coast, the Great Barrier Reef, and the deserts of Queensland.** <http://www.abc.net.au/3pm/360a/whc.htm>

The Bureau of Meteorology (BOM) says that the cyclone storm risk continues until end of April. **BOM Models predict La Niña will persist into the southern hemisphere autumn** Australia continues to feel the effects of one of the strongest La Niña's on record. **During La Niña events, tropical cyclone numbers are typically higher than normal during the November to April period.** [http://www.bom.gov.au/climate/ensos/monitoring/la\\_nina/2011/03/03.shtml](http://www.bom.gov.au/climate/ensos/monitoring/la_nina/2011/03/03.shtml)

**BOM Australian rainfall patterns La Niña events** [http://www.bom.gov.au/climate/ensos/archive/ensowrap\\_2011/03/02.pdf](http://www.bom.gov.au/climate/ensos/archive/ensowrap_2011/03/02.pdf)

Campbell Newman Mayor Brisbane CC – severe reservations about 100 year Flood levels

<http://www.brisbaneinmate.com.au/queensland/flood-gauges-limbs-how-low-should-we-go-20110209-1an2a.html>

South-East Queensland region – Deception bay to Loganholme **Maps have been prepared for three sea-level rise scenarios of 0.5m, 0.6m and 1.1m, relevant for the 2100 period**

[http://www.ezcoast.org.au/climate/Map\\_images/SthEastQld/mppLevel2\\_North.jpg](http://www.ezcoast.org.au/climate/Map_images/SthEastQld/mppLevel2_North.jpg)

NASA sea temperature changes [http://www.cpc.ncep.noaa.gov/products/analysis\\_monitoring/ensupdate/gcstnrim.gif](http://www.cpc.ncep.noaa.gov/products/analysis_monitoring/ensupdate/gcstnrim.gif)

NASA new satellite "La Niña" warning <http://www.nasa.gov/topics/earth/features/strona-la-nina.html>

**13 January NASA Satellites Capture a Stronger La Niña**

[http://www.cpc.ncep.noaa.gov/products/analysis\\_monitoring/ensupdate/advnsodisp.pdf](http://www.cpc.ncep.noaa.gov/products/analysis_monitoring/ensupdate/advnsodisp.pdf)

[http://www.cpc.ncep.noaa.gov/products/analysis\\_monitoring/ensupdate/ensupdate/evolution-status-1stst-2011-02-28.pdf](http://www.cpc.ncep.noaa.gov/products/analysis_monitoring/ensupdate/ensupdate/evolution-status-1stst-2011-02-28.pdf) while regions of above-average temperatures (of 3C have emerged in the far eastern Pacific. 28 February

SCD 28 Feb SCRC Call for tougher flood rules

<http://www.sunshinecoastdaily.com.au/story/2011/02/28/flood-plan-growth-rules-put-council-in-hard-pace/>

SCD Coast Urged to Release Flood Maps

<http://www.sunshinecoastdaily.com.au/story/2011/02/28/planning-for-disaster-sunshine-coast-council/>

WeatherZone Monthly Forecast <http://www.weatherzone.com.au/long-range-forecast/28-day-rain/qld/south-east-coast>

Holton Weather Forecasting <http://www.holtonweather.com/links.html#predicted>

Fraser Coast Chronicle- Haydon Walker's weather on the mark

<http://www.frasercoastchronicle.com.au/story/2011/01/20/fraser-coast-walkers-weather-on-the-mark/>

**Queensland Sunshine Coast Flood History (Extract)**

Cyclones that affected the Sunshine Coast between 1950 and 2011.

[http://www.bom.gov.au/hydro/flood/qld/fld\\_history/index.shtml](http://www.bom.gov.au/hydro/flood/qld/fld_history/index.shtml)

Extracts from BOM Flood History, Local Copy in Word, and Cyclone Path History

Information from BOM, Sunshine Coast Daily, and Australia Severe Weather websites.

Flood Date	Reason	Path	Category	Zone	Waves
2011 February 21	Trough / Storm	SCD Report 110221	0	SE	
2011 January	Cyclone "Yani"		5	N	5.0M
2011 January/10/15	Depression / Wivenhoe January Rain / King Tide	Depression / Zelig BOM January Rain	1 0	SE	
2010 December	Brisbane Flood Wivenhoe	No Track - King Tide	0	SE	
2009 May	Storm	SCD Report 090522			
2009 March	Tropical Cyclone "Hamish"	Path Hamish	5	NE/SE	
2008 November	Storm	SCD Report 081121		SE	
2006 March	Cyclone "Larry"	BoM Larry	5	N	4.2M
1998 March	Cyclone "Yali"	Path Yali	3	FJ/SE	11.3M
1996 May	Apelt Report p16	BCC Flood	7	SE	2.9M
1995 March	Cyclone "Violet"	Path Violet	3	NE/SE	
1992 March	Cyclone "Fras"	Path Frasn	5	FJ/SE	
1992 February	Cyclone "Daman"	Path Daman	3	FJ/SE	
1990 February	Cyclone "Nancy"	Path Nancy	3	FJ/SE	
1989 April	Cyclone "Aiva"	Path Aiva	4	FJ/SE	3.0M
1984 March	Cyclone "Lance"	Path Lance	2	NE/SE	8.8M
1981 February	Cyclone "Cliff"	Path Cliff	3	FJ/SE	1M
1974 March	Cyclone "Zoe"	Path Zoe	1	SE	1M/3.5M
1974 January	Cyclone "Wanda"	Path Wanda	1	NE/SE	1.6M
1974 December	Cyclone "Tracy"	Path Tracy	2	N	
1973 December	Cyclone "Una"	Path Una	2	NE/SE	
1972 March	Cyclone "Emily"	Path Emily	3	NE/SE	1M
1972 February	Cyclone "Daisy"	Path Daisy	1	SE	8.2M
1971 December	Cyclone "Althea"	Path Althea	3	NE/SE	
1971 February	Cyclone "Dora"	Path Dora	2	SE	
1967 March	Cyclone "Elsaine"	Path Elsaine	1	NE/SE	
1967 February	Cyclone "Barbara"	Path Barbara	0	SE	
1967 January	Cyclone "Dinah" / "Agnes"	Path Dinah	3	SE	10M/2M
1963 May	Cyclones 196350 / 196351	Path 196350 Path 196351	1	SE	
1956 December	Cyclone 195709	Path 195709	1	SE	
1956 February	Cyclone 195621	Path 195621	1	SE	
1955 February	NSW Midland Flood	News Photo	0	SE	4.0M
1955 December	Cyclone 195602	Path 195602	2	SE	
1955 March	Cyclone 195519	Path 195519	1	SE/NE	
1955 March	second cyclone 195522	Path 195522	2	SE/NE	
1955 February	Cyclone 195518	Path 195518	2	FJ/SE	
1954 February	Cyclone 195408	Path 195408	2	FJ/SE	2M
1951 March	Cyclone 195124	Path 195124	2	NE/SE	
1951 January	Cyclone 195111	Path 195111	2	SE	
1950 January	Cyclone 195005	Path 195005	1	NE/SE	2M
<b>BOM Rain Flood History</b>			<b>La Niña Year</b>		
<b>SCD Articles</b>			<b>Storm Surge Brisbane</b>		

Risk Ratio is 28 cyclones for SE Queensland in 61 years or 45% average seasonal risk  
The risk is much higher during La Niña years: 2010/11, 2008/9, 1998/2001, 1988/89, 1973/76, 1970/72, 1964/65, 1954/57 and 1949/51 <http://www.bom.gov.au/climate/enso/inflet/>

BoM Cyclone Maps <http://www.bom.gov.au/cgi-bin/infocpl/cyclones.cgi>

BoM Australian rainfall patterns during La Niña events [http://www.bom.gov.au/climate/enso/la\\_nina\\_rain.shtml](http://www.bom.gov.au/climate/enso/la_nina_rain.shtml)

"...but in the east of that state, (Queensland) the La Niña-induced tendency towards wetter than average conditions continues to be moderate to strong. This is significant as December to February are, on average, three of the four wettest months in this part of the country."

BoM La Niña - Detailed Australian Analysis [http://www.bom.gov.au/climate/enso/la\\_nina/](http://www.bom.gov.au/climate/enso/la_nina/)

"La Niña events are associated with wetter than normal conditions across eastern and northern Australia."

BoM Queensland Flood History

[http://www.bom.gov.au/hydro/flood/qld/fld\\_history/index.shtml](http://www.bom.gov.au/hydro/flood/qld/fld_history/index.shtml)

WindWorker - Queensland Cyclones between 2004 and 1864 <http://www.windworker.com.au/qldcyclones.htm>

List some 190 Cyclones over 140 years

JWT / SPAC Historical Cyclone Path Summaries

[http://australasevereweather.com/tropical\\_cyclones/laws\\_1973\\_1974\\_south\\_pacific\\_ocean\\_tropical\\_cyclones.htm](http://australasevereweather.com/tropical_cyclones/laws_1973_1974_south_pacific_ocean_tropical_cyclones.htm)

Rainfall History Queensland

<http://www.bom.gov.au/climate/data/index.shtml?bookmark=136>

Peachester Monthly Rainfall

[http://www.bom.gov.au/mp/bdio/DCJAC0001\\_040169.pdf](http://www.bom.gov.au/mp/bdio/DCJAC0001_040169.pdf)

Year/Item	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
1873	208.1	155.8	108.6	87.6	46.5	24.4	20.9	47.3	213.4	86.2	175.6	2318.6	
1874	207.2	190.2	398.2	180.4	173.5	59.0	18.3	59.8	63.4	125.6	299.0	48.0	2773.3
1989	205.4	241.2	391.6	334.8	334.8	78.5	55	85.6	49	59.8	175.2	103.8	2802.9
1990	72.6	526.3	419.4	270.0	198.0	116.2	47.0	2.0	4.6	57.7	136.0	177.1	2027.1
1999	188.1	354.0	361.6	87.2	243.4	204.7	132.9	108.0	65.3	158.0	124.0	304.5	2858.0
2010	156.7	521.2	435.9	98.0	39.7	12.4	55.6	82.5	101.2	459.7	77.5		
2011	226.8	155.5											
95%ile	666.8	597.7	528.4	546.5	370.4	408.2	216.2	123.1	132.8	242.2	259.8	378.6	2568.7
Highest	1077.3	873.3	611.0	625.5	531.4	631.0	272.2	298.1	267.6	459.7	345.0	842.6	2958.0

Beerburum Monthly Rainfall

[http://www.bom.gov.au/mp/bdio/DCJAC0001\\_040284.pdf](http://www.bom.gov.au/mp/bdio/DCJAC0001_040284.pdf)

Year/Item	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
1873	146.0	322.4	72.8	91.1	35.2	22.1	19.4	65.9	281.7	66.3	225.6	1934.7	
1974	240.0	215.5	398.2	181.9	119.9	86.4	9.6	71.4	44.0	111.8	294.0	44.0	2802.0
1989	115.6	46.4	126.7	196.8	357.3	425.7	76.0	77.2	5.1	81.6	356.7	175.0	2043.3
1989	181.6	166.0	300.4		256.5	26.8	52.0	60.8	28.2	32.5	136.9	93.8	
1990	69.0	483.0	228.2	237.9	162.9	110.9	33.5	7.9	10.1	41.4	190.9	88.0	1573.7
1999	139.3	656.3	302.6	74.6		244.8		96.8	62.8	200.2	89.2	245.0	
2010	100.0	392.6	285.6	136.6	62.4	12.6	43.4	82.2	103.4	287.8	80.6	531.4	2118.6
2011	275.8	122.6											
95%ile	476.5	545.0	391.0	262.6	428.9	235.6	174.7	126.9	112.6	241.5	248.4	393.8	2039.2
Highest	829.6	653.0	539.3	599.5	567.6	509.7	226.2	245.0	197.1	311.4	356.1	606.6	2802.0

JWT / SPAC Current Cyclone Reports (to 2010) [South Pacific Operational Data \(includes Depressions\)](http://www.southpacific.com.au/operations/CurrentData/Depressions/)

BoM Monthly Weather Summary Dec'10 <http://www.bom.gov.au/climate/mwr/qld/mwr-qld-201012.pdf>

January 2011 <http://www.bom.gov.au/climate/mwr/qld/mwr-qld-201101.pdf>

BoM 24/02 A wetter autumn favoured for parts of eastern Australia

[http://www.bom.gov.au/climate/ahcnd/rain\\_ahcnd.shtml](http://www.bom.gov.au/climate/ahcnd/rain_ahcnd.shtml)

BoM March to May - Excess rain forecast of 600mm for Sunshine Coast

<http://www.bom.gov.au/wafl/rainfall/exceedance.shtml>

Tropical Storm Risk UCL UK <http://www.tropicalstormrisk.com/>

World Meteorology Office (WMO) La Niña Update [http://www.wmo.int/hires/ro/la\\_nina/wcncp/la\\_nina\\_update\\_interact.html](http://www.wmo.int/hires/ro/la_nina/wcncp/la_nina_update_interact.html)

POAMA Forecast [http://poama.bom.gov.au/experimental/poama15/top\\_gbr.htm](http://poama.bom.gov.au/experimental/poama15/top_gbr.htm)

Gatton Star Cyclone to hit South-East: experts

<http://www.gattonstar.com.au/story/2011/02/04/cyclone-to-hit-south-east-say-experts/>