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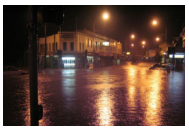
"Where will our knowledge take you?"

Predicting the Next Major Flood on the Hunter River

FMA Conference 2017, Newcastle
Daniel Williams

Introduction

- Hunter River catchment is large and varied;
- Frequent "1-in-100 year" floods:
  - June 1949 Wollombi
  - February 1955 Hunter
  - June 2007 Newcastle
  - April 2015 Dungog
- Often driven by East Coast Lows
- Often impact relatively small areas

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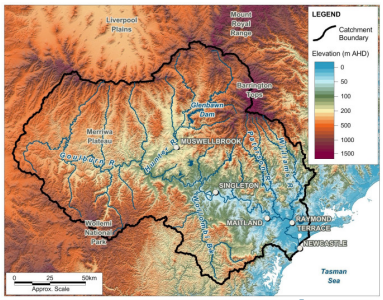
Hunter River Catchment

- Around 21 000 km^2
- Upper 1300 km^2 impounded by Glenbawn Dam
- Goulburn River catchment forms some 40% of the total catchment area
- Lowest and most westerly point of the Great Dividing Range
- Drier than other coastal regions of NSW



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Flood History

- 1820
- March 1893
- May 1913
- June 1930
- February 1955
- Jan/Feb 1971
- February 1990
- June 2007
- April 2015

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February 1955 Flood

February 1955 Flood

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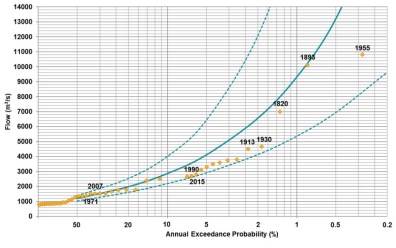
Flood Frequency Analysis



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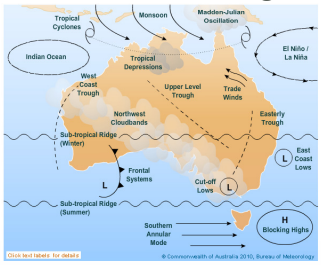
Climatic Drivers of Flooding



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Flood Event Analysis

Flood Event Rank	Singleton	Maitland	Raymond Terrace
1	1820 (?)	1955 (12.1 m)	1955 (5.0 m)
2	1955 (14.6 m)	1820 (12.0 m)	1820 (4.9 m)
3	1893 (14.4 m)	1893 (11.4 m)	1893 (4.8 m)
4	1913 (14.2 m)	1952 (11.3 m)	1930 (3.4 m)
5	2007 (14.1 m)	1913 (11.3 m)	1913 (3.4 m)
6	1971 (14.0 m)	1971 (11.1 m)	1950 (3.1 m)
7	1930 (13.8 m)	1977 (10.8 m)	1951 (3.1 m)
8	1952 (13.8 m)	2007 (10.7 m)	2015 (3.1 m)
9	1949 (13.6 m)	1964 (10.4 m)	1949 (3.0 m)
10	1977 (13.3 m)	1962 (10.4 m)	1990 (3.0 m)

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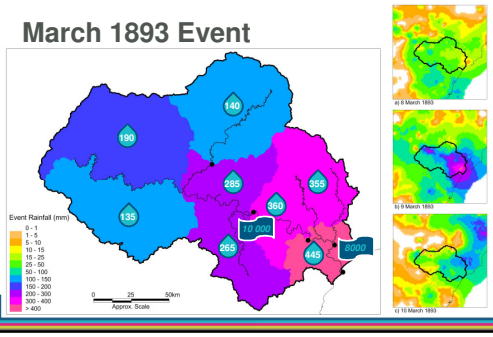
March 1893 Event



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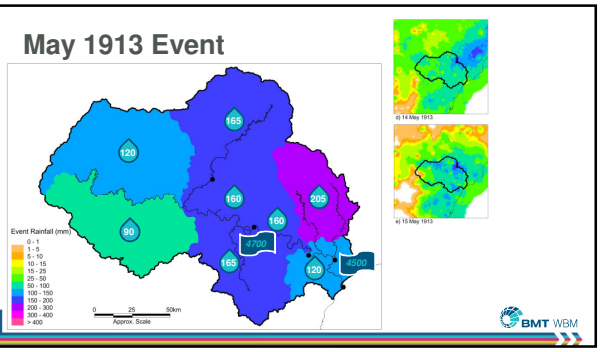
May 1913 Event



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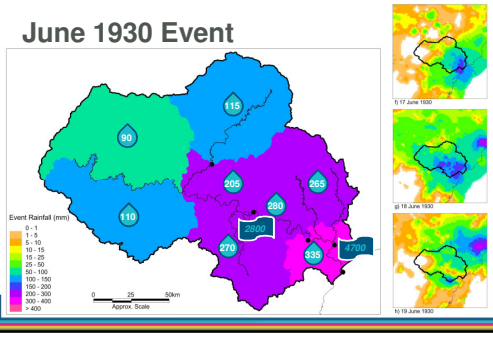
June 1930 Event



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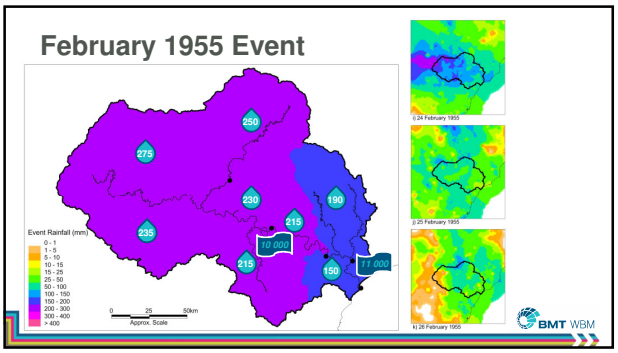
February 1955 Event
250
275
230
190
235
215
10 000
215
150
11 000
Event Rainfall (mm)
Approx. Scale
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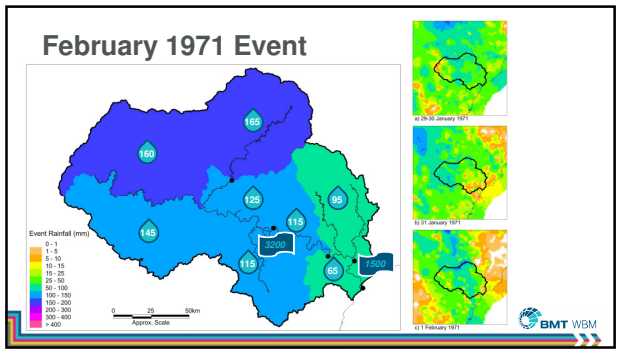
February 1971 Event
165
160
125
95
145
115
3200
115
65
1900
Event Rainfall (mm)
Approx. Scale
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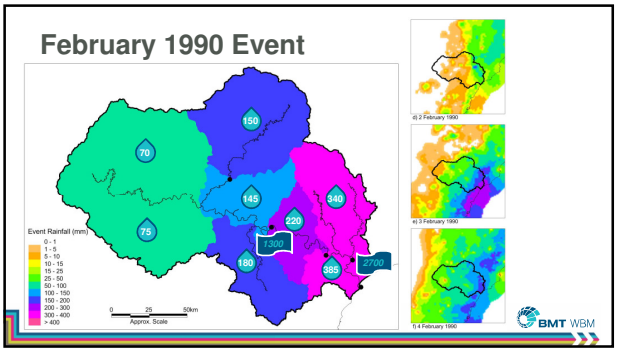
February 1990 Event
150
70
145
340
220
75
1300
180
385
2700
Event Rainfall (mm)
Approx. Scale
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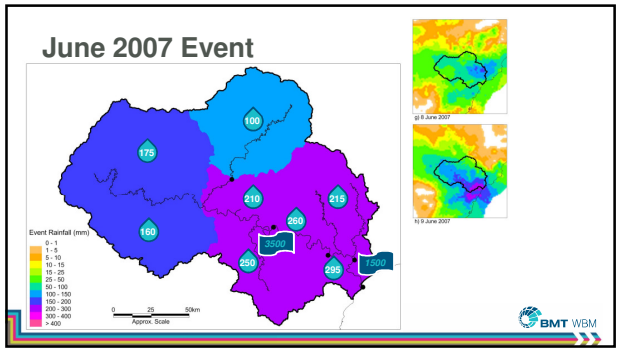
June 2007 Event
100
175
210
215
260
160
3500
250
295
1800
Event Rainfall (mm)
Approx. Scale
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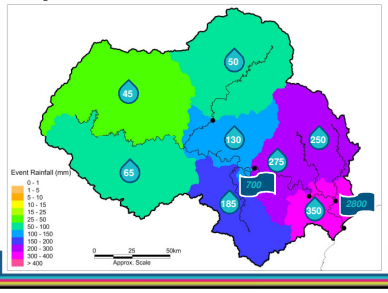
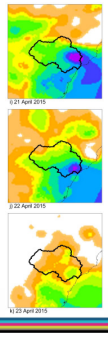
April 2015 Event





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Impact of Dams

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Future Climate Change Predictions

- ARR 2016 (2070):
  - 1.7-2.7°C increase in mean sea-surface air temperatures
  - 8-14% increase in rainfall intensity
- Larger design flood flows – increased flood risk
- Indications that largest Hunter River flood events linked to warmer air flows
- More frequent major floods?

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Take Home Messages

- There hasn't been a major flood event on the Hunter River since 1955
- Largest events require significant contribution from the Goulburn River catchment
- Major floods more frequently occur in warmer months (Feb-Mar) than typical winter East Coast Low season
- Analysis of weather conditions preceding these types of event may assist with the early identification and preparation for the next major flood event on the Hunter River

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Thank You