Building a BRIDGE

Toowoomba flood forecasting in FEWS and Guardian IMS

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Today

- JBP progress since we last met
- A need to rationalise
- New tools
- New Toowoomba System
- New FEWS public interface

Progress since we first met

- 2019 FEWS User Days - Mossman
  Flash Flood Forecasting System

- 2020 FEWS User Days – Noosa
  Flash Flood Forecasting System

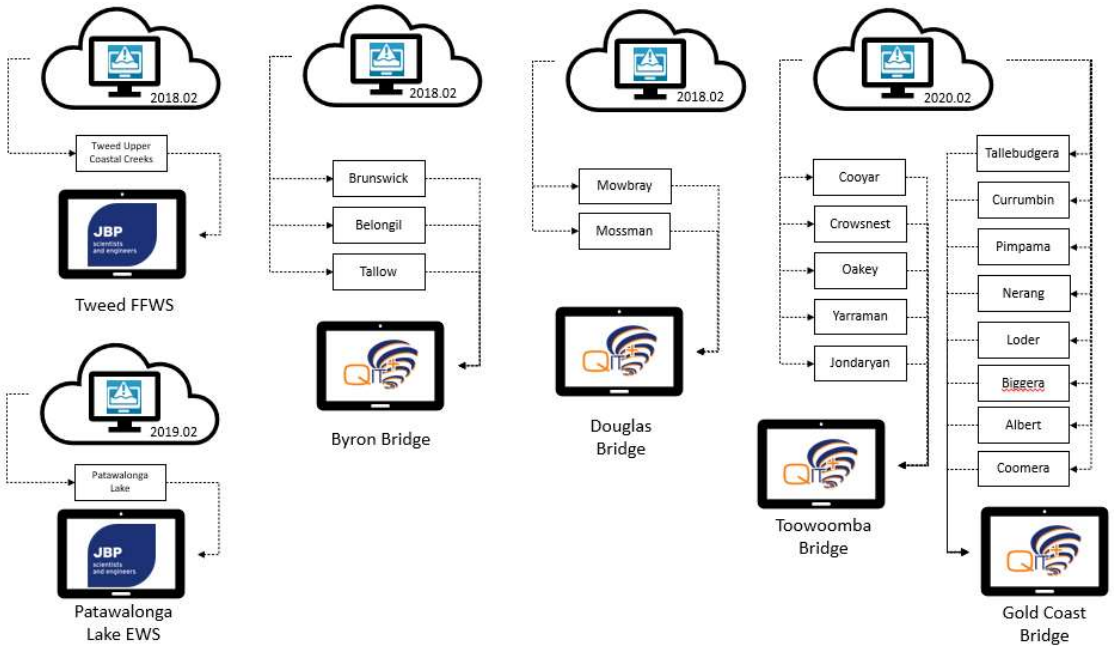
- More expansion:
  - More Flash Flood
  - More URBS
  - More Users

- Patawalonga Lake FFFS
- Douglas FFFS & BRIDGE
- Byron BRIDGE
- Tweed FFWS
- Toowoomba BRIDGE
- Gold Coast BRIDGE

States of Australia

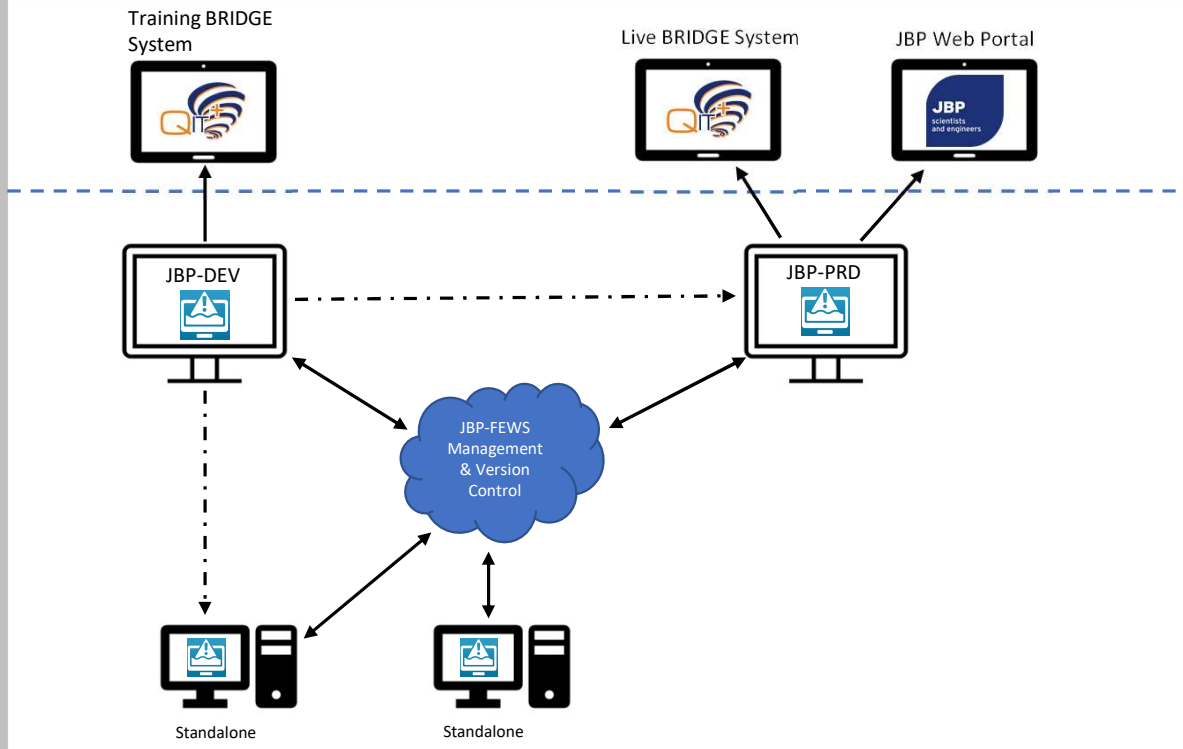
Current systems

- Douglas BRIDGE
  - 2 URBS models
  - Version 2018.02
- Byron BRIDGE
  - 3 URBS models
  - Version 2018.02
- Tweed FFWS
  - 1 URBS model
  - Version 2018.02
- Toowoomba BRIDGE
  - 5 URBS models
  - Version 2020.02
- Gold Coast BRIDGE
  - 8 URBS models
  - Version 2020.02
- Patawalonga Lake EWS
  - 1 URBS models
  - Version 2019.02



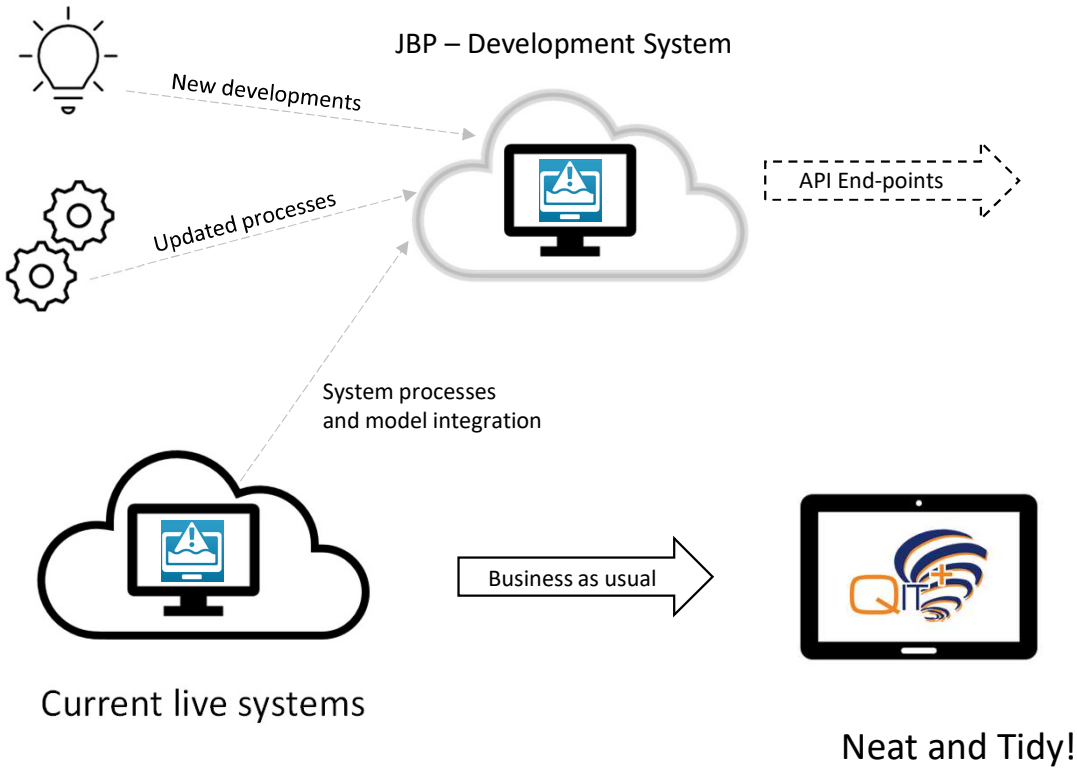
Centralised System Framework

- Worries
  - Things were getting messy
  - Updates were time consuming
  - Bigger clients get more attention
- Centralised System
  - Consistency between forecast catchments.
  - Added redundancy with the integration of DEV and PRD system.
  - Framework is in place for faster delivery and integration of new developments across multiple catchments.
- Improving Previous Processes
  - Configuring efficient modules and workflows to cater for larger data sets and additional catchments.
  - Improving FEWS config and model file structure so that new catchments can be added while minimising the number of changes to existing config files.
- Transition to a National Level
  - Original processes now import and process data across all of Australia, rather than select regions.
  - A lot of the data already exists in our system, allowing a Plug-and-Go approach.



Development of JBP-FEWS

- Moving on from our current set-up
  - **How:**
    - New development configured to run in parallel with existing systems.
    - Existing systems are being reconfigured into the new development system using updated processes.
  - **Why**:
    - Consistency across systems is achieved.
    - When updates are required or new developments are implemented, all systems can be updated at once, reducing time required and methods when implementing.
  - **FEWS Versioning & upgrading:**
    - Previously this was not considered – a new system got a new FEWS.
    - Updates can now be made to all systems, with the development platform allowing a staged implementation and testing approach before transitioning to production.



JBP scientists and engineers

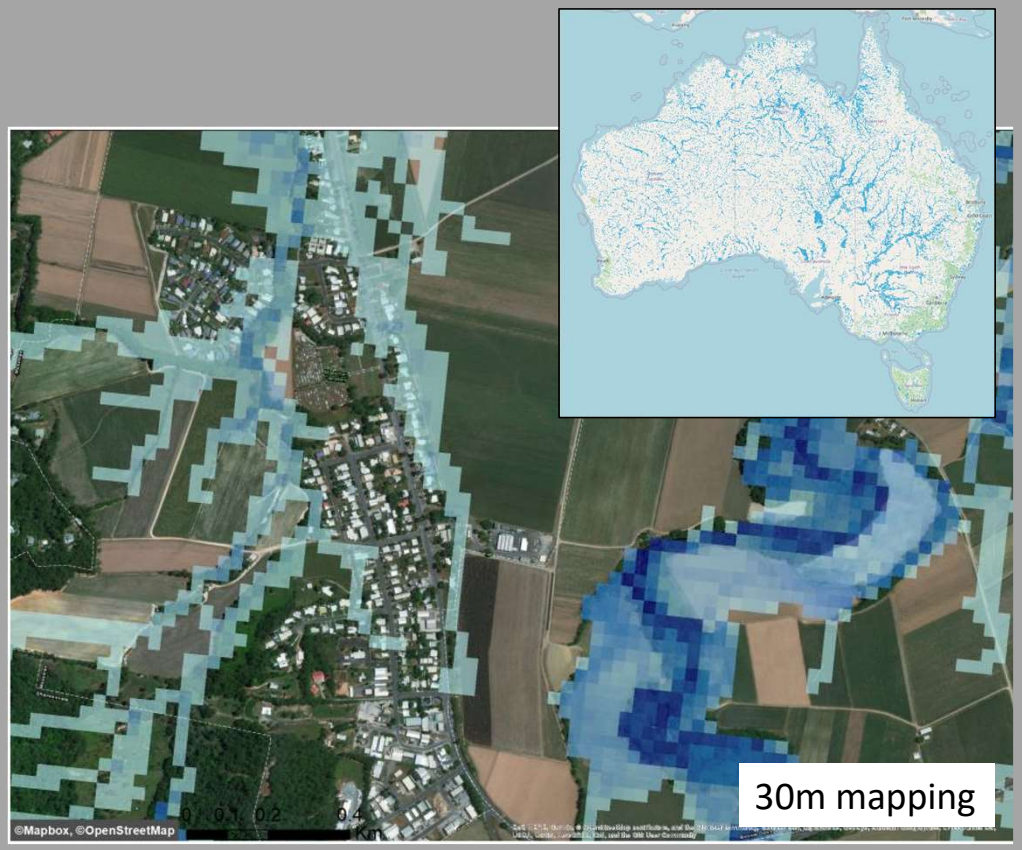
JBA risk management

JBA consulting

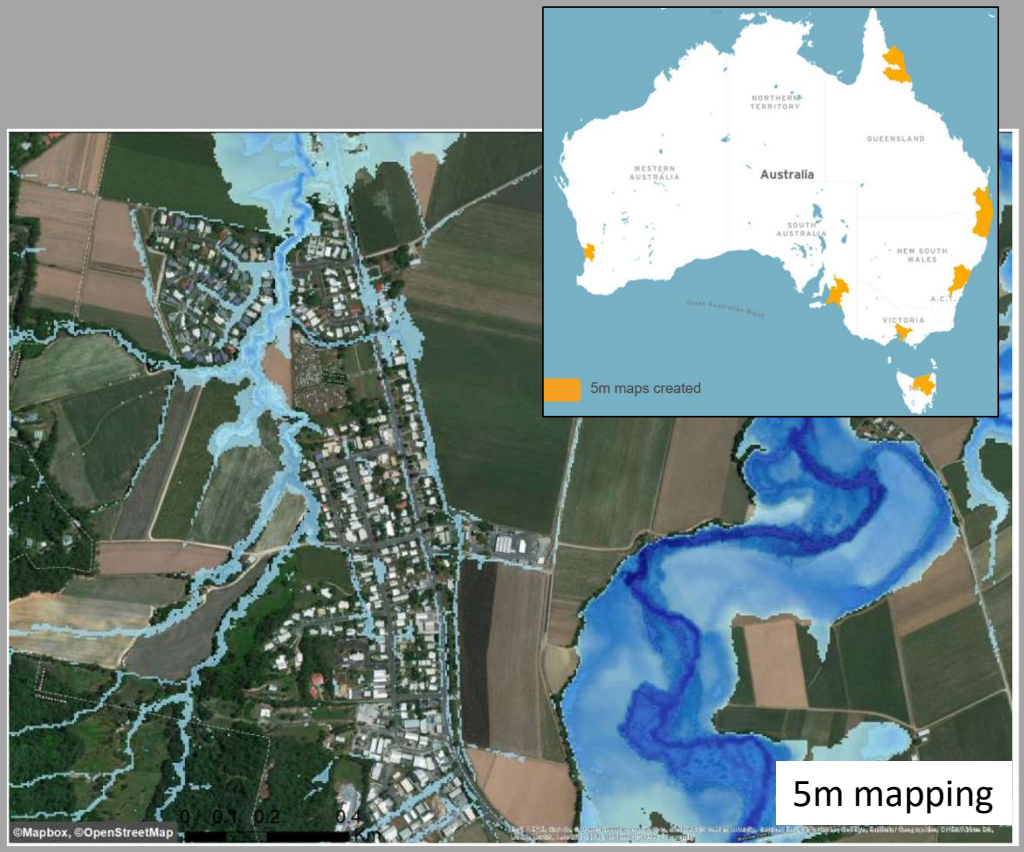
Australian Flood Map: South East QLD


JBP
scientists
and engineers
Australian Flood Map - Gladstone

Recent improvements



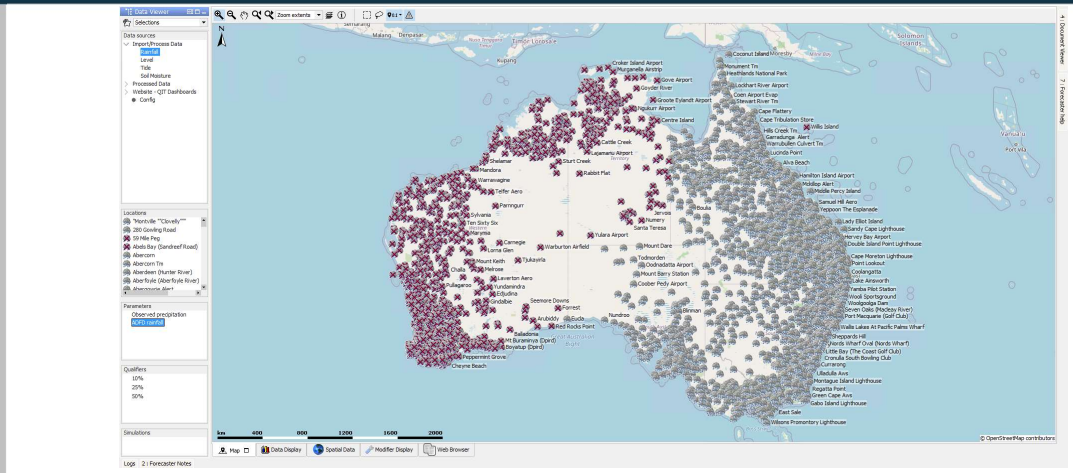
30m mapping

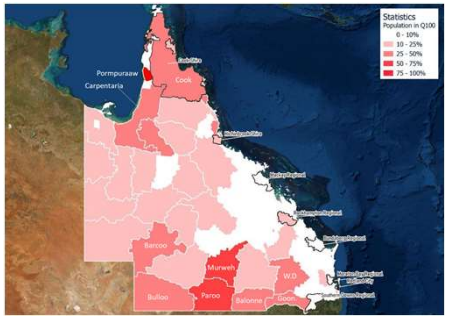


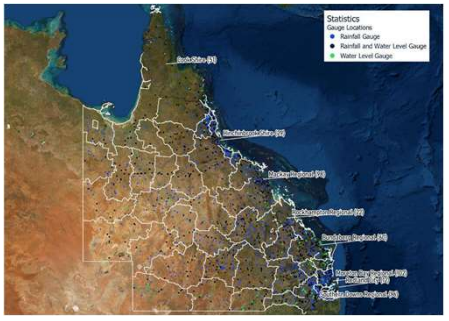
5m mapping

National level data

- To access greater datasets
  - We now access all BoM FTP station and gauge data as a base
  - ADFD forecasts
  - Microsoft Building Footprints

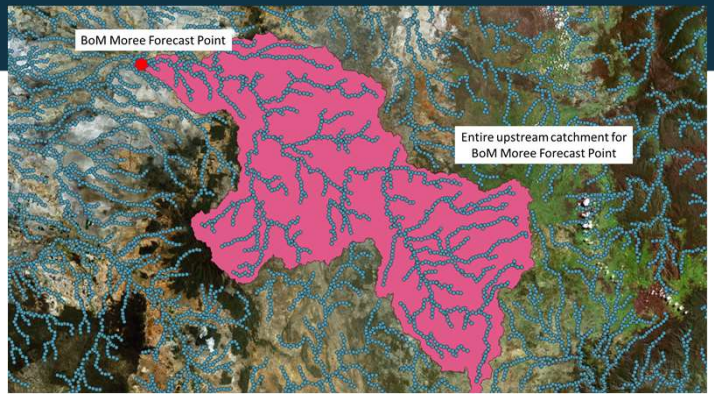


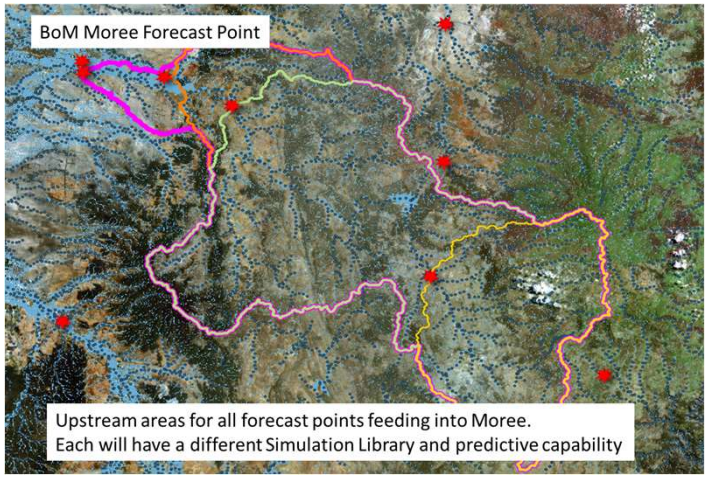




National level data

- Maps are being cut and assigned gauge triggers

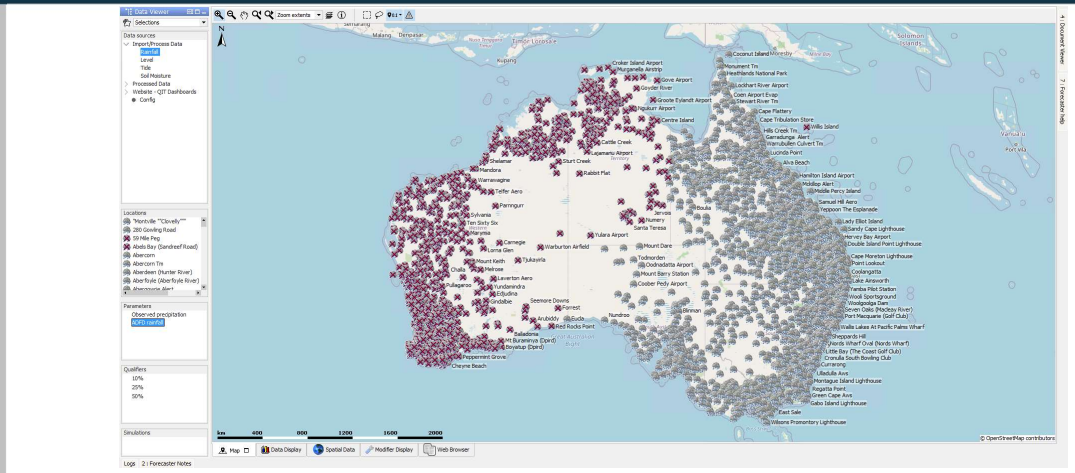


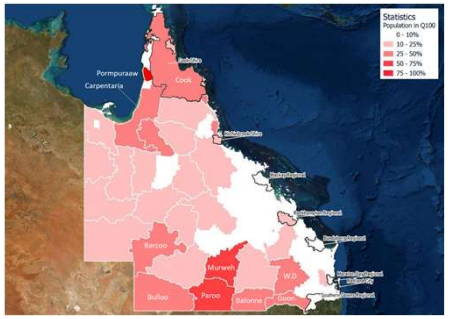


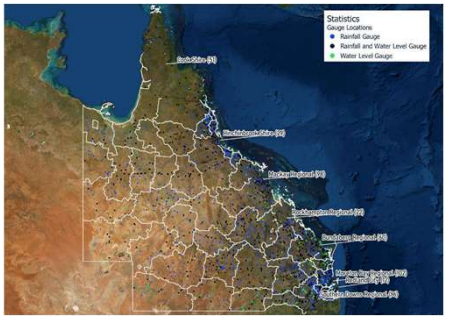
National level data

- To access greater datasets
  - We now access all BoM FTP station and gauge data as a base
  - ADFD forecasts
  - Microsoft Building Footprints

  - **Aim to produce forecast or real-time flood extents across Australia without traditional models.**

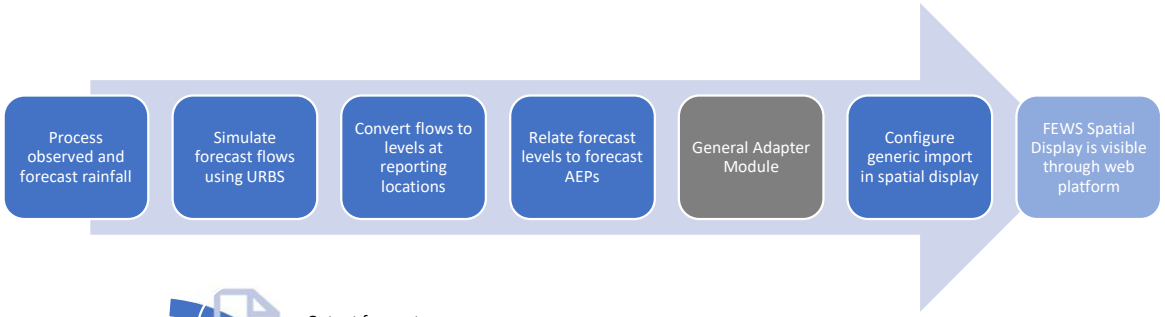


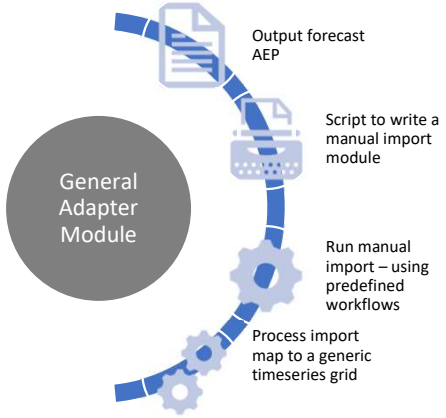


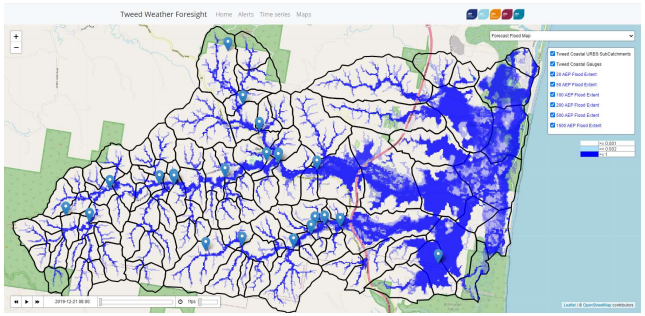


Real-time flood extents

- We want to see forecast flood extents within FEWS Spatial Display.
- Challenges:
  - How to configure the Spatial Display with a single grid, which is varying depending on the forecast.
- Approach
  - Create pre-configured batch workflows for each AEP extent
  - Post-process the imported grid to a “generic” grid, displaying a single time-series to present the most recent forecast flood extent.
  - Created an “empty” no-flood flood extent so the Spatial Display timeseries was never empty (errors occur).
  - Workflows now run from batch files
  - Need to schedule this workflow regularly enough so that flood extents do not continue to be displayed when there is no longer a flood.

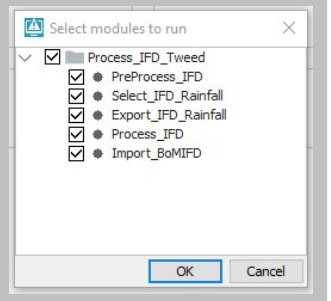


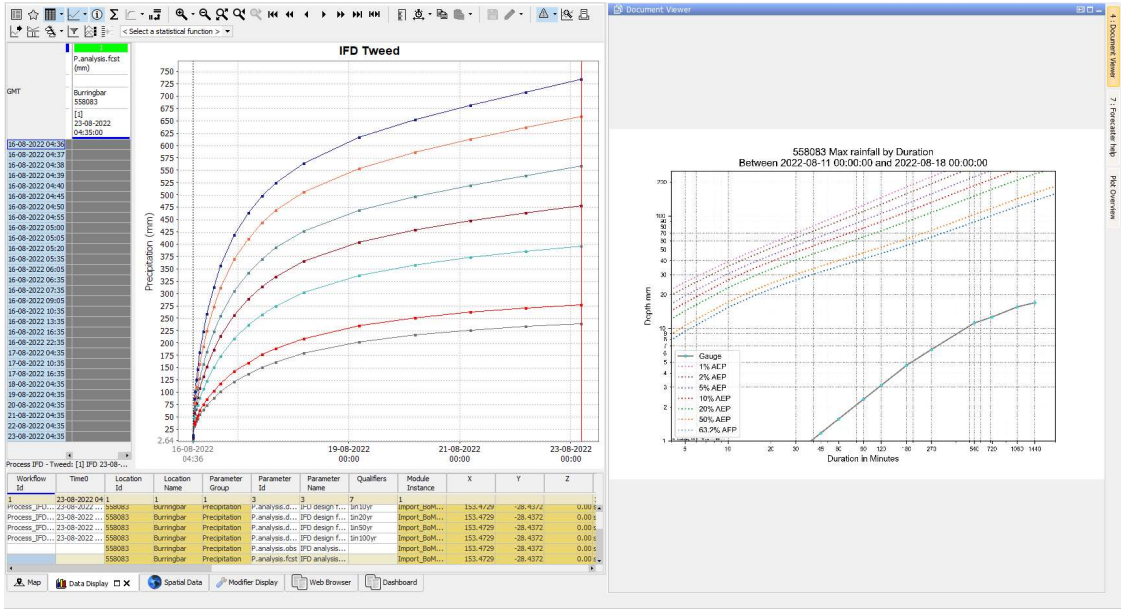




IFD Curves – Design, Observed and Forecast

- We wanted to see IFD plots in FEWS
- Approach:
  - Created a multi-step module
  - Processes rainfall timeseries
  - Runs an external python script
  - Brings the IFD picture back into Document Viewer
- Additional testing:
  - Trying to import the design and calculated IFD curves back into FEWS for viewing in the Plot Overview.

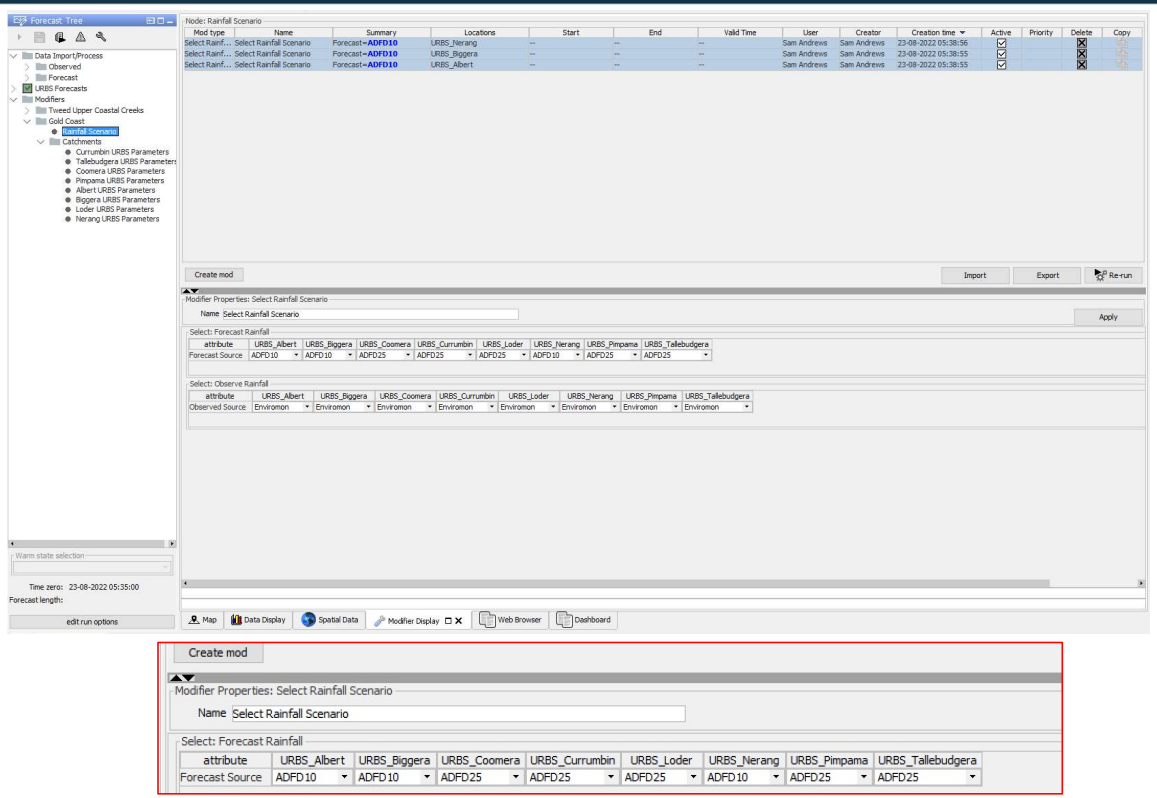




Modifiers – operational forecasting

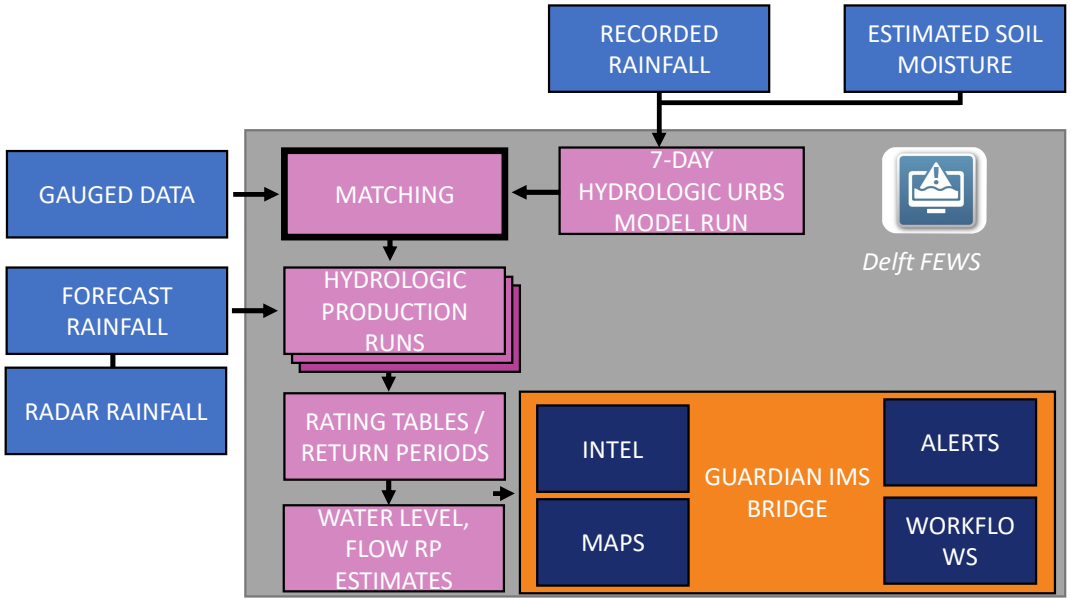
- Background :
  - Our systems are always running
  - Closer to the event switch back to BoM!
  - While we are not operational forecasters, we are still watching on during events.
  - What if we see something we want to test?

- Approach
  - Best not to change config during a live event
  - Implementation of a modifier from the FEWS client.
  - Apply temporarily with a pre-defined expiry time (or can be removed by a user)
  - Modifiers can be configured to change:
    - Storage IWLs
    - Gauge network outages
    - ICOLL levels
    - URBS Matching
    - Baseflow, rating curves
    - What would a forecast 1% rainfall do to forecast flows/levels? We could investigate this using modifiers



Toowoomba!

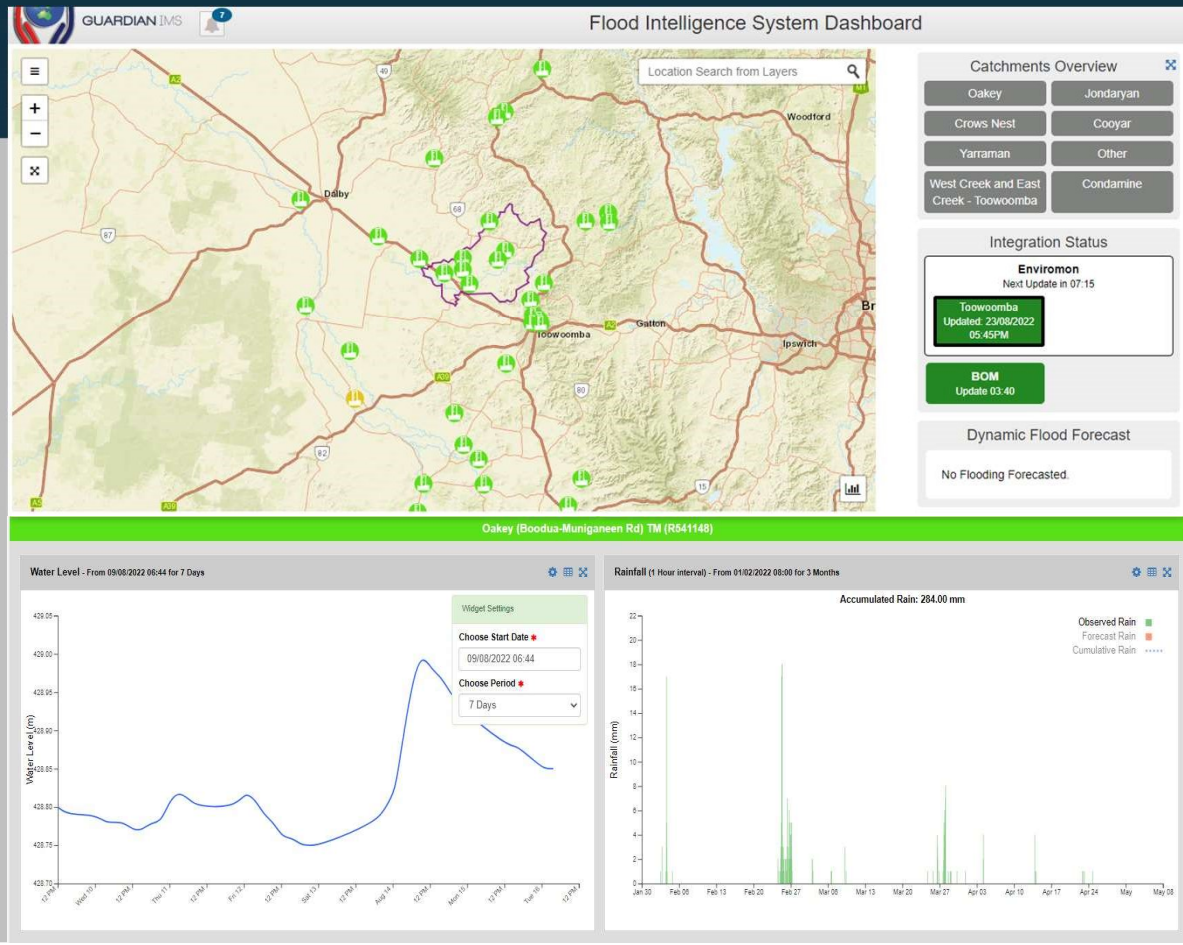
- Approach:
  - Clone DEV system
  - Create Offline FEWS:
    - All ENVIROMON data supplied
    - AWRA-L data used
    - ADFD 10th percentile grids used
    - URBS models supplied
    - New mapping merged with Aus Flood Map
    - Triggers set
  - Upload to DEV
  - Upload to PRD
  - Link with Guardian IMS



Toowoomba!

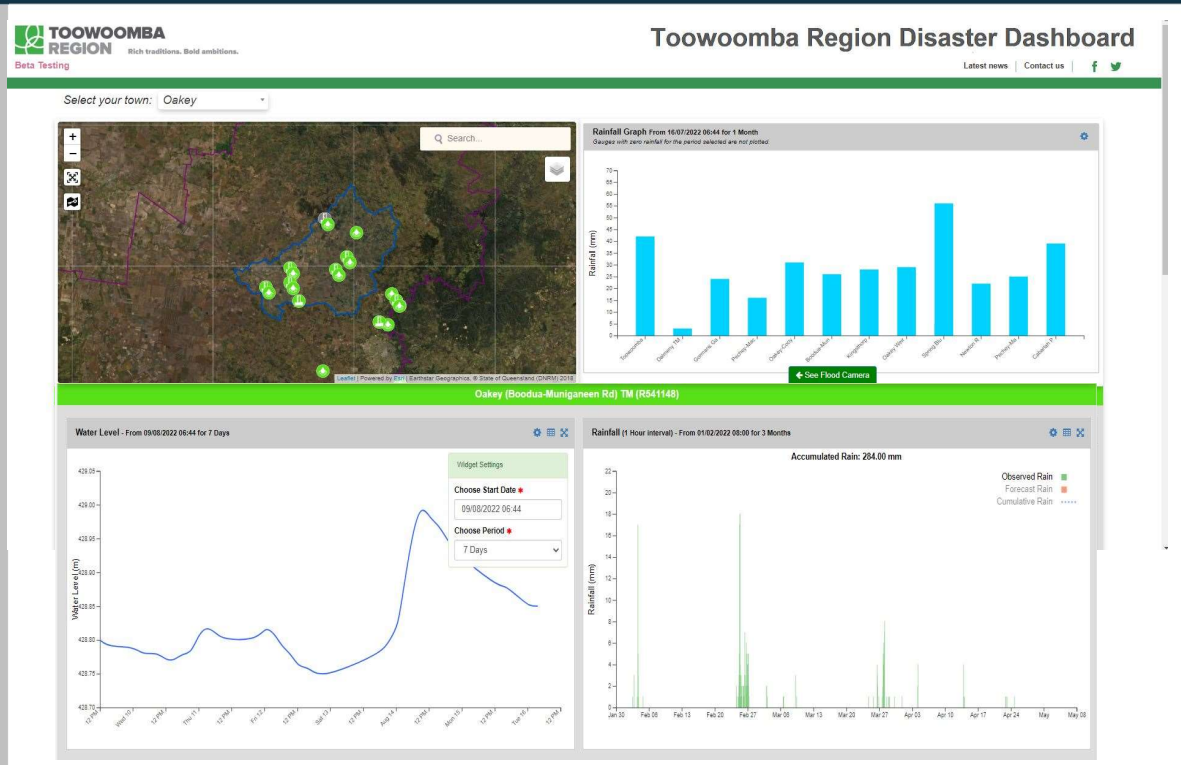
Rain: BoM ADFD t+7 day rainfall forecast
Wind: BoM ADFD and ACCESS-TC models
Infiltration: BoM AWRA-L
Rainfall: ENVIROMON & BoM FTP
Water levels: ENVIROMON & BoM FTP

Guardian IMS



Toowoomba!

- Council uses Guardian IMS to
  - Perform health checks/heart beats on gauges
  - View IFDs
  - View live flood maps
  - Assign inter-agency tasks
  - Push data to public portals



Thank you!

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