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Specialist Knowledge.
Practical Solutions.

Australian Water School
HEC-HMS

Prepared by – Martin Jacobs
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What’s new in HEC-HMS?

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- **Introduction of Storm Injector for ARR2019 and comparison with RORB**
- **Gridded rain**

What’s new in HEC-HMS?

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- **Where am I coming from?**
  - **My experience is mostly experimental**
  - **HEC-HMS is best regarded as a modelling platform**

    The challenge for new users is deciding which options, strategies, alternatives to use.
  - **The best reason to use HEC-HMS is that it teaches you hydrology**

RORB v HEC-HMS

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How does HEC-HMS compare with RORB?

- You can construct a RORB model from the parameters in ARR2019, but you need to go further afield for HEC-HMS
  - Auckland Regional Council TP108 (1999)
  - Harris County Flood Control District Hydrology and Hydraulics Guidance Manual (2009)
- HEC-HMS has many more options than RORB, e.g.
  - Options for loss models (e.g. IL/CL)
  - Options for transform models (e.g. unit hydrographs)
  - Options for link routing (e.g. Muskingam, Puls)
  - [Like RORB, HEC-HMS has options for reservoirs]
- HEC-HMS is oriented to real space (GIS) and real time (Gregorian Calendar)
- HEC-HMS has advanced capabilities for
  - Parameter optimization
  - Monte Carlo

RORB v HEC-HMS - Transform Options

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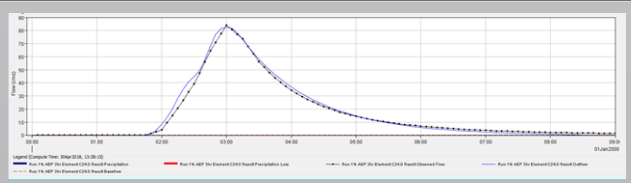
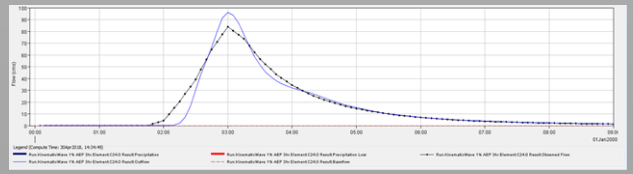
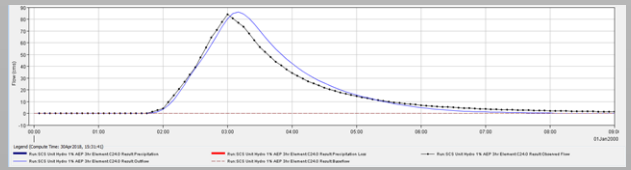
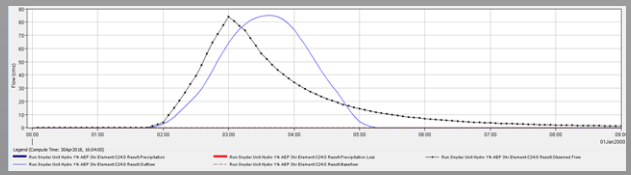
Clark Unit Hydrograph	
Kinematic Wave	
SCS Unit Hydrograph	
Snyder Unit Hydrograph	

HEC-HMS Example – Rufus Street Gauge on Darebin Creek, Melbourne

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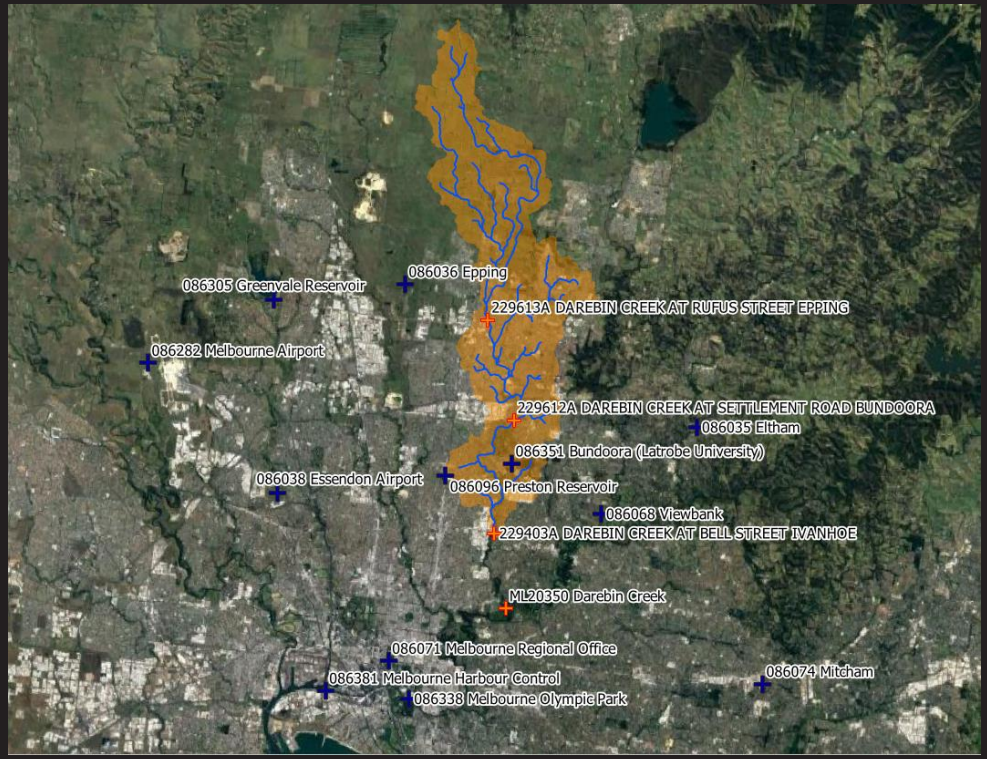
Primary sources of information

- ELVIS elevation data portal
  - https://elevation.fsdf.org.au/
- BoM water data online
  - http://www.bom.gov.au/waterdata/
- HEC-HMS model is a single node model reporting to Gauge 229613A



HEC-HMS Example – Rufus Street Gauge on Darebin Creek, Melbourne

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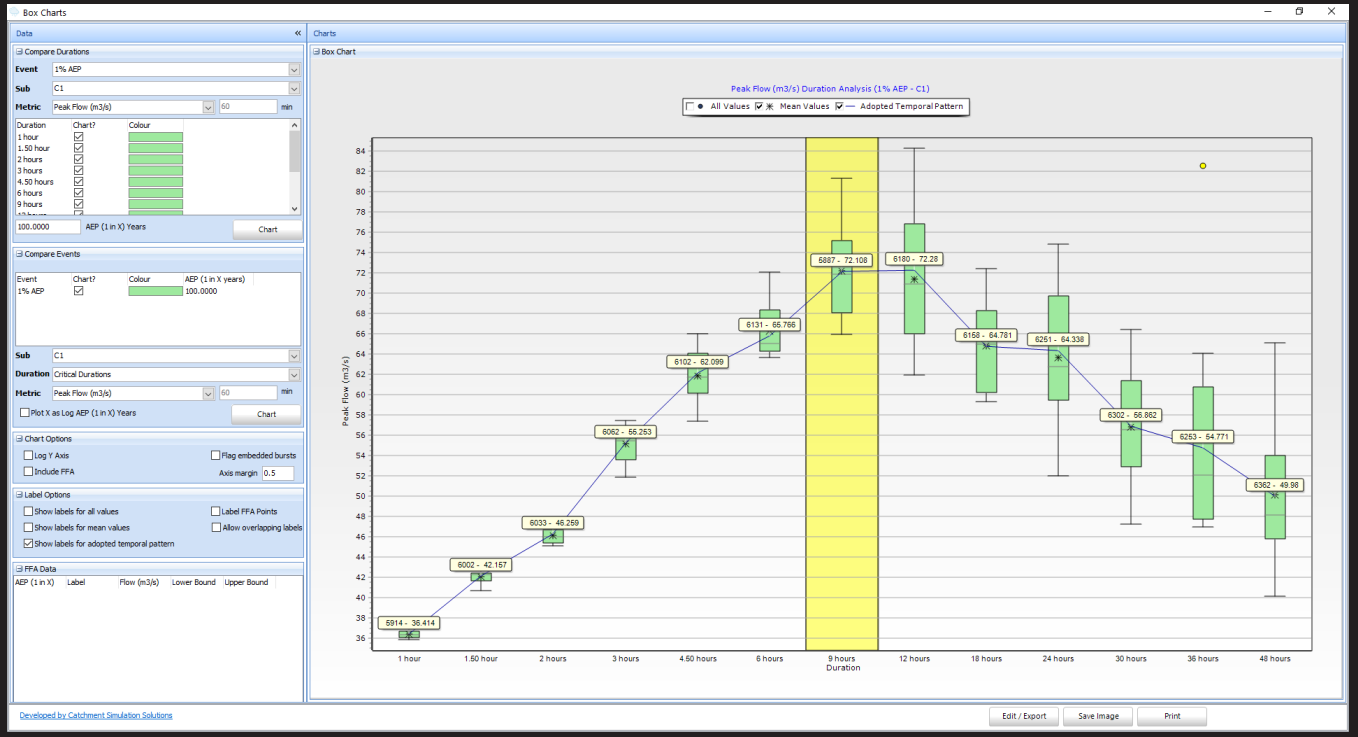
Storm Injector

- Initial loss
- Continuing loss
- Pre-bursts



HEC-HMS Example – Rufus Street Gauge on Darebin Creek, Melbourne

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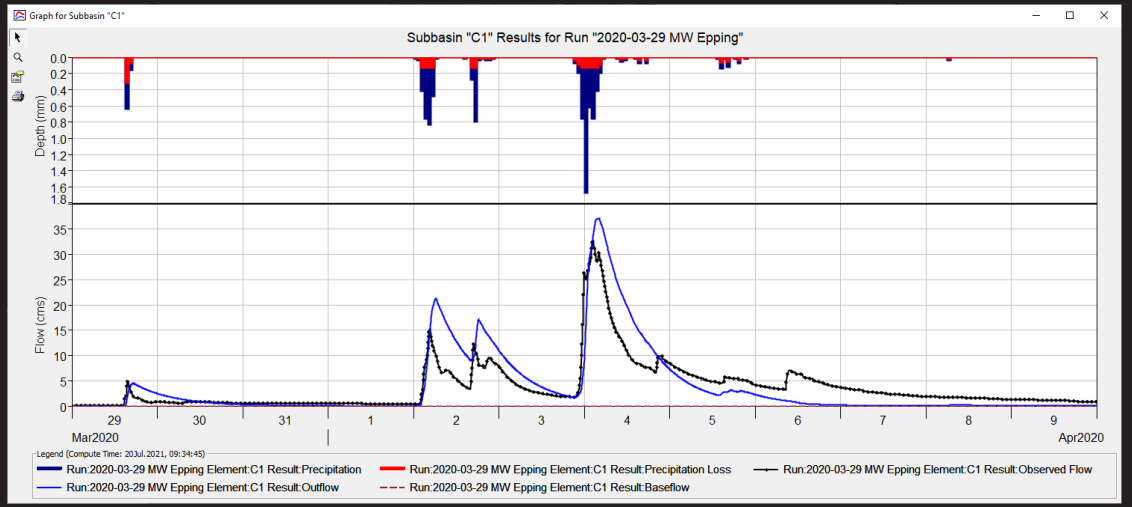
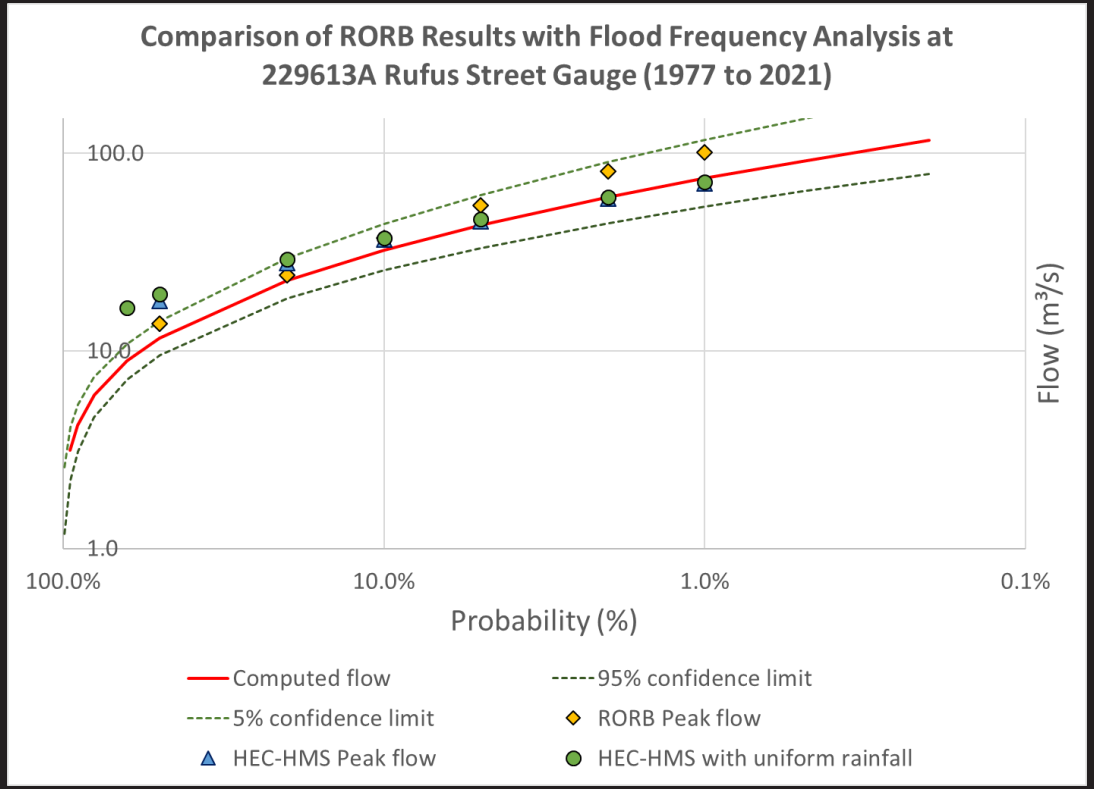
Optimised parameters

Parameter	Value
Percent impervious	50%
Clark Unit Hydrograph – Storage Coefficient	11.13 hours
Clark Unit Hydrograph – Time of concentration	0.34 hours
Initial and constant – constant rate	2.6 mm/hour
Initial and constant – initial loss	7.65 mm



HEC-HMS Example – Rufus Street Gauge on Darebin Creek, Melbourne

Flood frequency analysis



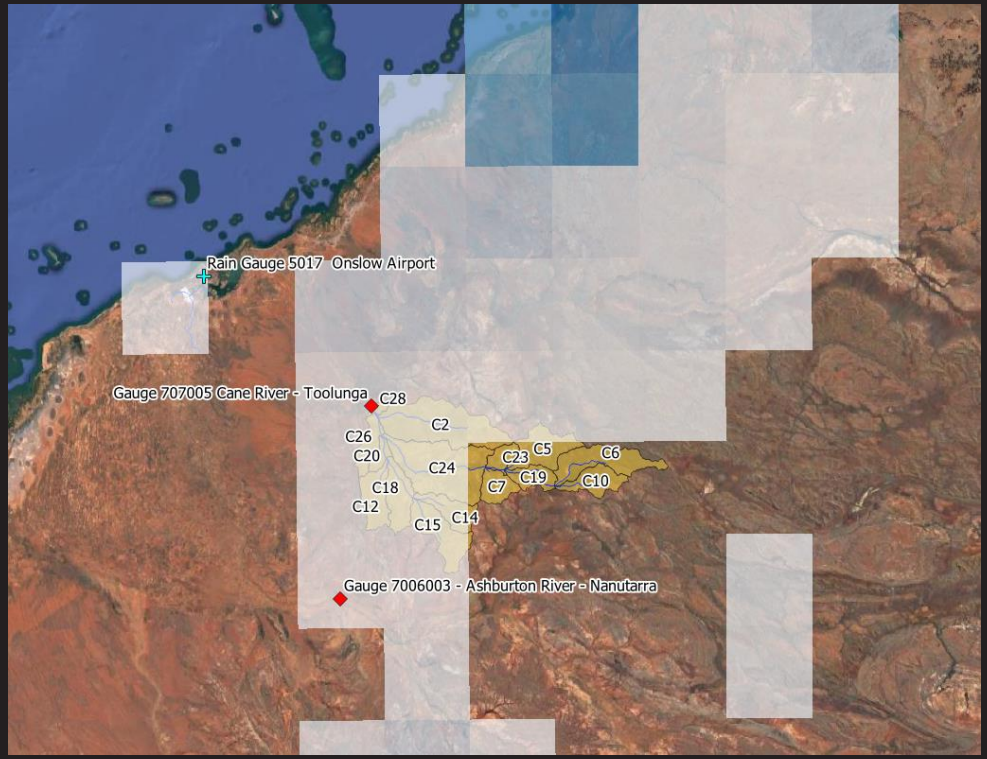
HEC-HMS Example – Cane River, WA

Primary sources of information

- ELVIS elevation data portal
  - https://elevation.fsdf.org.au/
- BoM water data online
  - http://www.bom.gov.au/waterdata/
- HEC-HMS model is a multi-node model with links reporting to Gauge 229613A

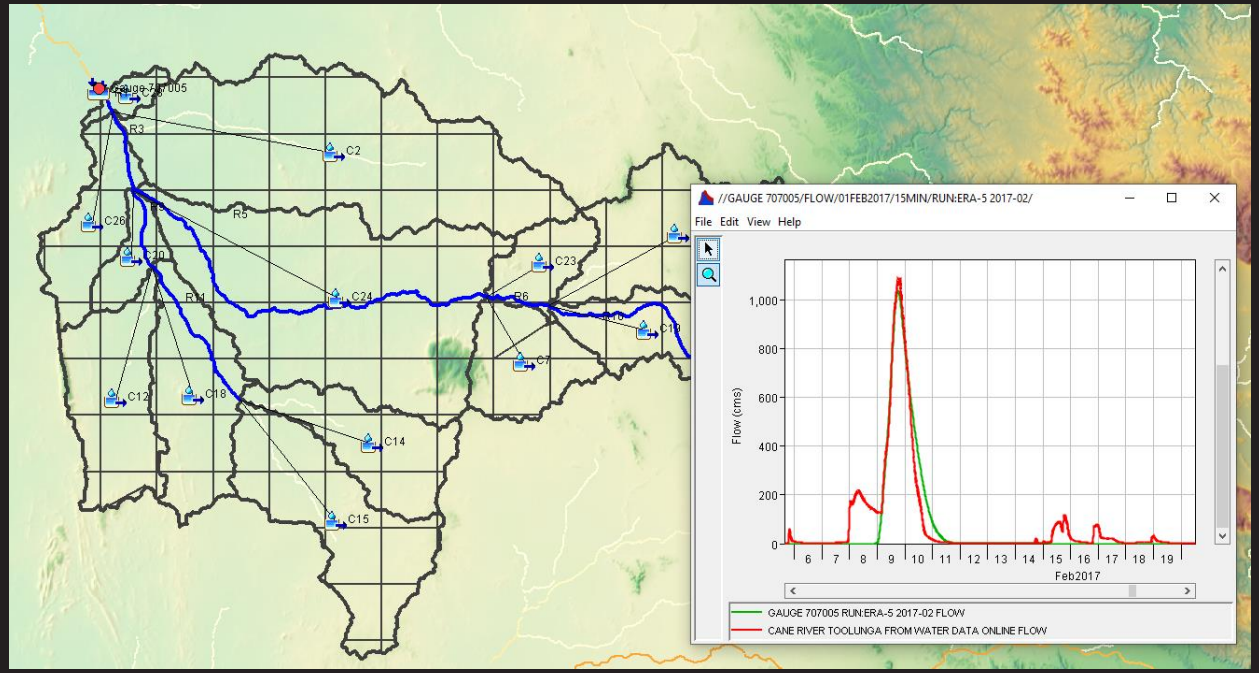
HEC-HMS Example – Cane River, WA

Gridded Rain – ERA-5 (adjusted)



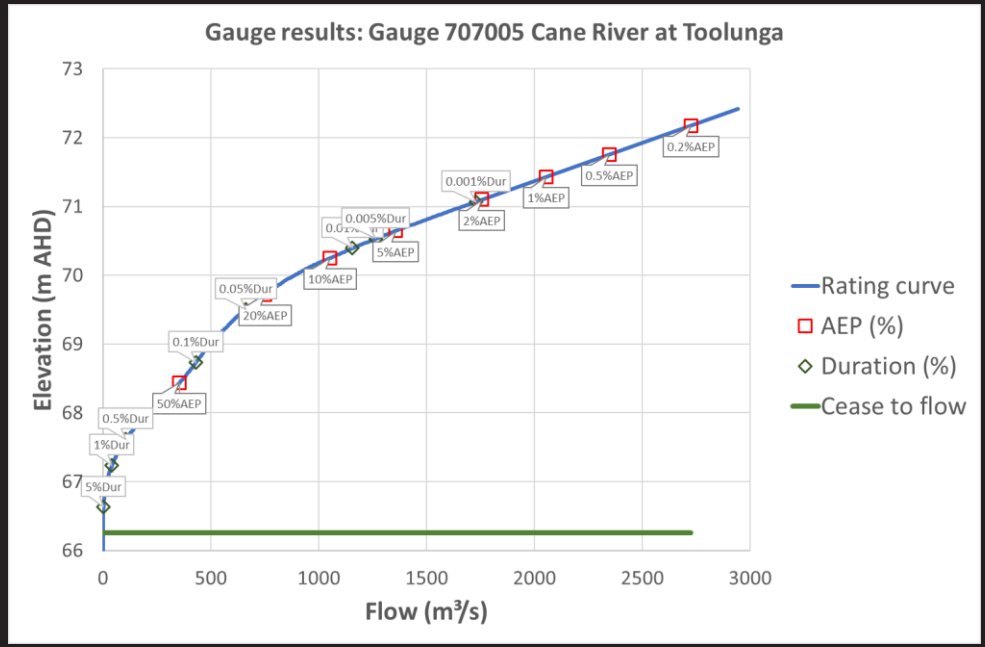
HEC-HMS Example – Cane River, WA

Discretization and results after parameter optimisation.



HEC-HMS Example – Cane River, WA

Using long term continuous simulation to develop a combined rating curve at river crossing.



HEC-HMS in Australia

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Conclusions

- We have the technology
- It is not difficult to calibrate to single events. It is much more difficult to calibrate to a range of events.
- To get meaningful calibration to the gauges, the biggest current need is for 1-hour long-term rainfall series
  - 1-hour point data
  - 1-hour gridded series …
    - **Hot off the press** - the leading contender for Australia rain and evaporation grids is BoM's BARRA data, which can be acquired from BoM on request (BoM is currently setting up a mechanism for users to acquire the data)
- With gridded data, you can calibrate any catchment at any scale. Refinements to the grid (smaller cell size, smaller time intervals) will mean better calibration. The grids mean you can get your data from a single source.
- The future is gridded

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Questions

Contact Martin Jacobs
Contact 0427 670 395
Contact mjacobs@pittsh.com.au