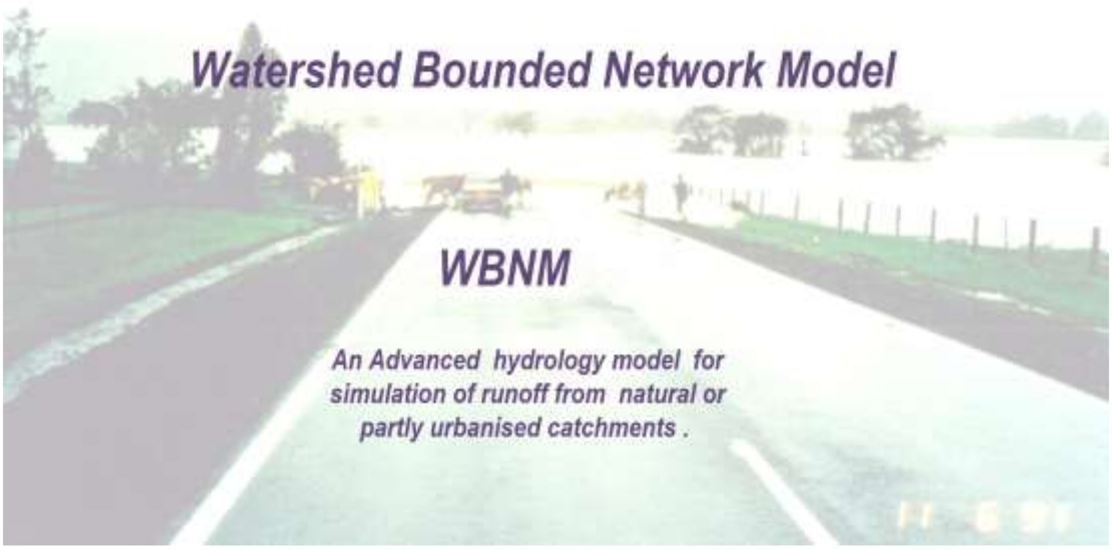


Examples of WBNM Validation on Real Storms

For all other details See:
WBNM_History.pdf
WBNM_References.pdf
WBNM_Runfile.pdf
WBNM_Theory.pdf
WBNM_Tutorial.pdf
WBNM_UserGuide.pdf

This document shows some selected applications of WBNM to recorded storms. Because WBNM has built-in relations to allocate lag times to all subcatchments, depending on their size, as well as built-in urbanisation to model runoff from impervious surfaces, it can simulate flood hydrographs across a very wide range of catchments.

These examples range from very large natural catchments to very small portions of urban catchments. Because of the built-in relations, the main model parameter, the *Lag Parameter C*, does not vary greatly, despite this very large range of applications.

Calibration of WBNM to fit the recorded events shown in this document followed a straightforward procedure :

- The rain before the recorded hydrograph started to rise was treated as Initial Loss.

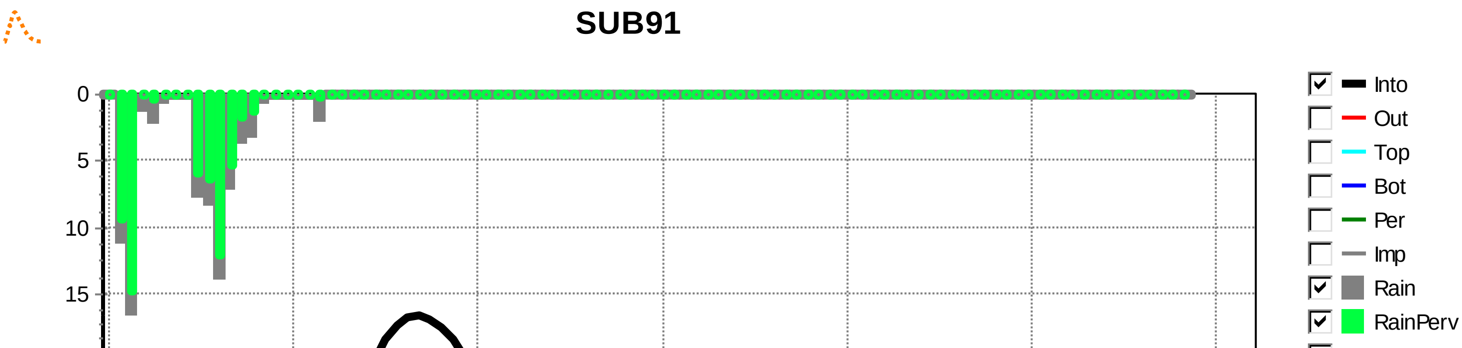
- The Continuing Loss Rate CLR (or Runoff Proportion RP where this was used) was adjusted so that the depth of excess rainfall equalled the recorded surface runoff depth (ie volumes were matched).

- The model's Lag Parameter C was adjusted to match hydrograph peak discharge.

Note that only 1 parameter was adjusted to calibrate WBNM. For the urban catchments, the Impervious Runoff Lag Factor was held at the recommended value of 0.10.

All plots have the time axis in minutes.

EXAMPLES ARE SHOWN ON THE FOLLOWING PAGES

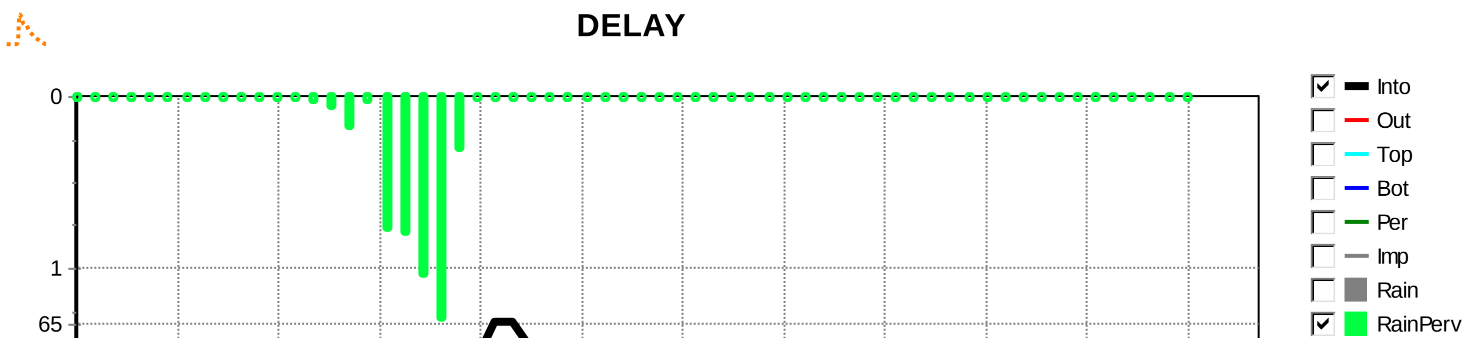


Herbert River at Gleneagle, QLD Australia National Station Number 116004

Area = 5370 km^2 91 subcatchments

Natural Catchment

Event of March 1997	Rainfall Depth	= 67 mm
Calculation time step = 60 minutes	Surface Runoff Depth	= 41.8 mm
	Peak Discharge	= 1590 m^3/s
	Loss Rate	= 1.85 mm/hour
	Lag Parameter C	= 1.93
	Stream lag factor	= 1.0 (default)

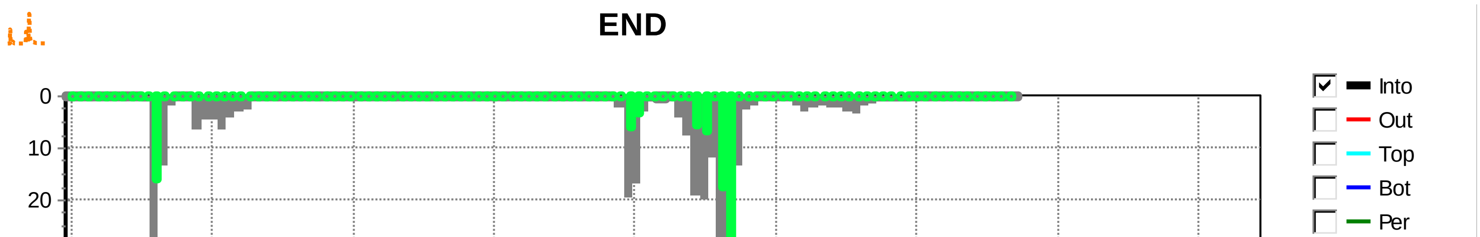


Murray River at Biggara, NSW Australia National Station Number 401012

Area = 1238 km^2 16 subcatchments

Natural Catchment

Event of January 1974	Rainfall Depth	= 68 mm
Calculation time step = 180 minutes	Surface Runoff Depth	= 10.4 mm
	Peak Discharge	= 65 m^3/s
	Runoff Proportion	= 0.15
	Lag Parameter C	= 1.85
	Stream Lag factor	= 1.0 (default)

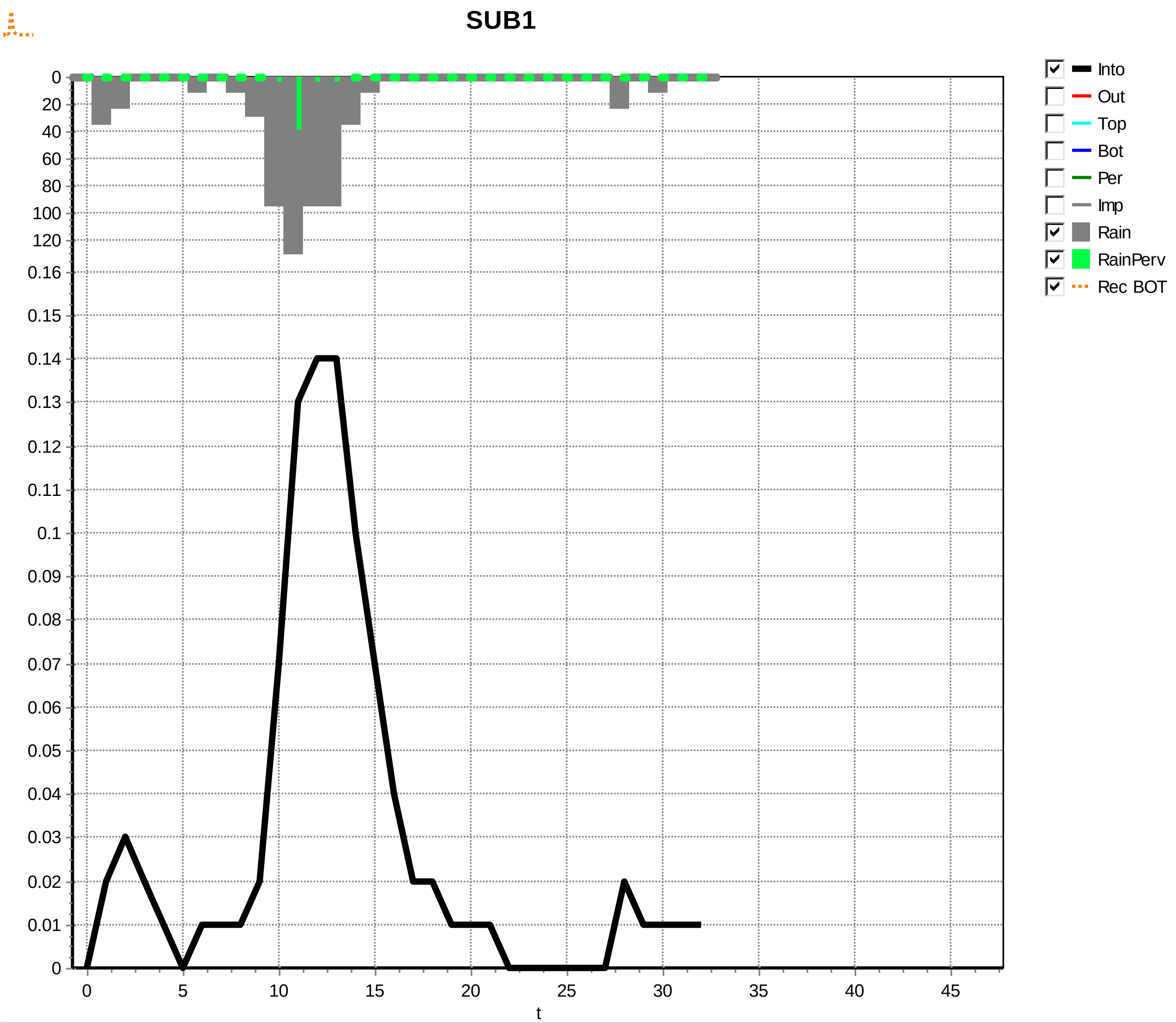


Giralang Urban Catchment, ACT Australia

Area = 0.96 km^2 13 subcatchments, 4 pipes with zero delay

Urban Catchment, Impervious range from 0 to 50% across the subcatchment (average 26%)

Event of 27 January 1978	Rainfall Depth	= 30.7 mm
Calculation time step = 6 minutes	Pervious surface runoff	= 8.5 mm
	Impervious surf. runoff	= 30.7 mm
	Peak discharge	= 4.7 m^3/s
	Pervious surface CLR	= 13.4 mm/hour
	Lag parameter C	= 1.70
	Impervious Lag factor	= 0.10 (default)



Giralang Urban Sub-Catchment, ACT Australia

Area = 1.54 hectares 1 subcatchment

14 house lots plus roadway 33% Impervious

Event of 5 April 1993
Calculation time step = 1minute

Rainfall Depth = 10.2 mm
Pervious surface runoff = 0.6 mm
Impervious surf. runoff = 10.2 mm
Peak discharge = 0.16 m^3/s
Lag parameter C = 1.10
Impervious Lag factor = 0.10 (default)

Reference : Goyen, A.G. and O'Loughlin, G.G. (2000). Examining the basic building blocks of urban runoff. 8th Intl. Confce. on Urban Storm Drainage, Sydney, Australia, pp. 1382-1390.