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National Water Grid®

River model calibration and scenario analysis for the Roper catchment: Supplementary material

A technical report from the CSIRO Roper River Water Resource Assessment for the National Water Grid

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Important disclaimer

CSIRO Roper River Water Resource Assessment acknowledgements

This report was funded through the National Water Grid's Science Program, which sits within the Australian Government's Department of Climate Change, Energy, the Environment and Water.

Aspects of the Assessment have been undertaken in conjunction with the Northern Territory Government.

The Assessment was guided by two committees:

i. The Assessment's Governance Committee: CRC for Northern Australia/James Cook University; CSIRO; National Water Grid (Department of Climate Change, Energy, the Environment and Water); NT Department of Environment, Parks and Water Security; NT Department of Industry, Tourism and Trade; Office of Northern Australia; Qld Department of Agriculture and Fisheries; Qld Department of Regional Development, Manufacturing and Water

ii. The Assessment's joint Roper and Victoria River catchments Steering Committee: Amateur Fishermen's Association of the NT; Austrade; Centrefarm; CSIRO, National Water Grid (Department of Climate Change, Energy, the Environment and Water); Northern Land Council; NT Cattlemen's Association; NT Department of Environment, Parks Australia; Parks and Water Security; NT Department of Industry, Tourism and Trade; Regional Development Australia; NT Farmers; NT Seafood Council; Office of Northern Australia; Roper Gulf Regional Council Shire

Responsibility for the Assessment's content lies with CSIRO. The Assessment's committees did not have an opportunity to review the Assessment results or outputs prior to its release.

This report was reviewed by Barry Croke (Associate Professor, Integrated Catchment Assessment and Management Centre (iCAM) and Institute for Water Futures, The Fenner School of Environment and Society and Mathematical Sciences Institute, ANU College of Science)

Acknowledgement of Country

CSIRO acknowledges the Traditional Owners of the lands, seas and waters, of the area that we live and work on across Australia. We acknowledge their continuing connection to their culture and pay our respects to their Elders past and present.

Photo

Roper Bar. Source: CSIRO – Nathan Dyer

Supplementary material 1: distribution of rainfall and streamflow data in the Roper River region, 1965 - 2018

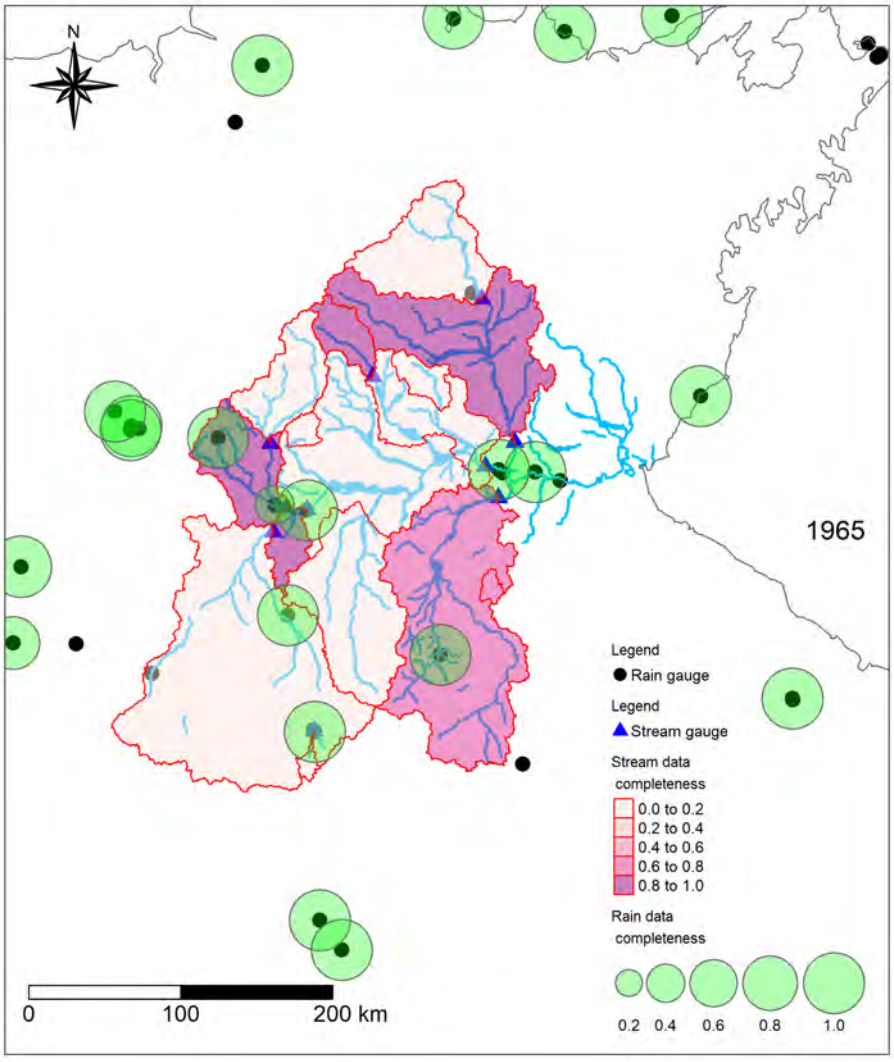


Figure 1: The distribution of rainfall and stream gauge data in the Roper River region in 1965. Size of the green circles indicates the completeness of rain gauge data at that site in the year while the colour ramp indicates the completeness of stream gauge data for contributing areas

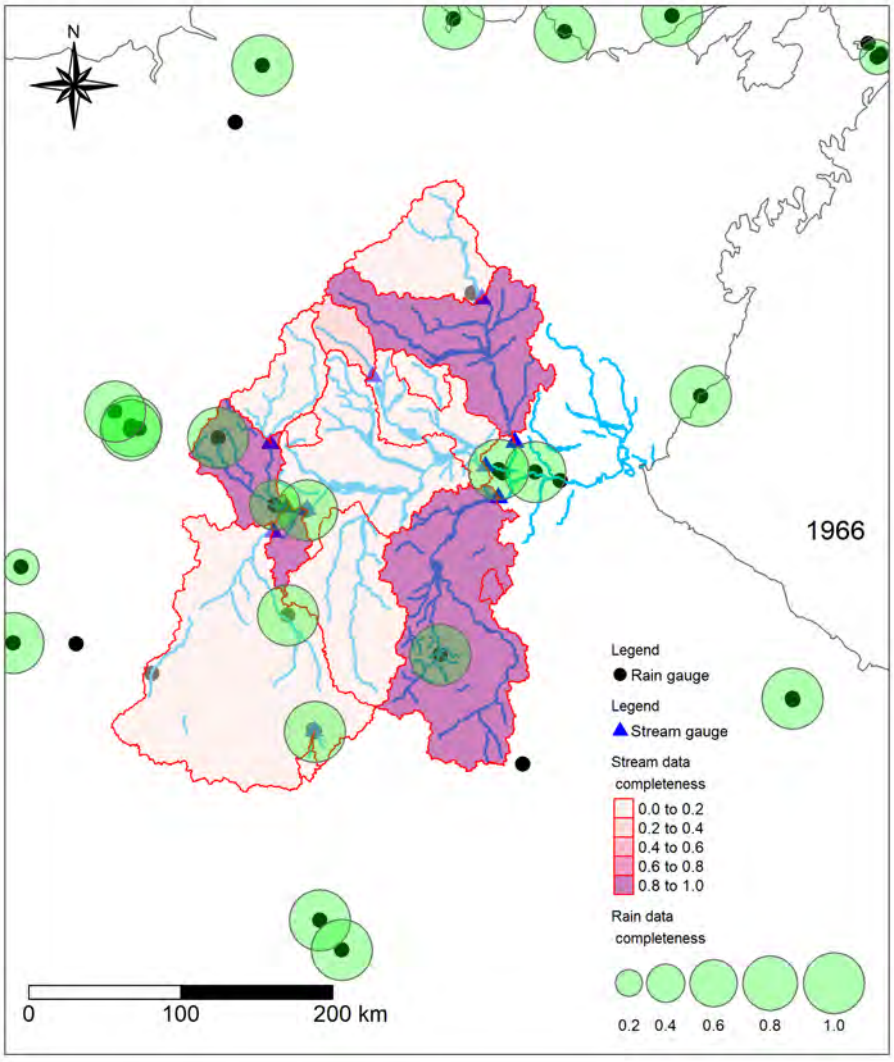


Figure 2: The distribution of rainfall and stream gauge data in the Roper River region in 1966. Size of the green circles indicates the completeness of rain gauge data at that site in the year while the colour ramp indicates the completeness of stream gauge data for contributing areas

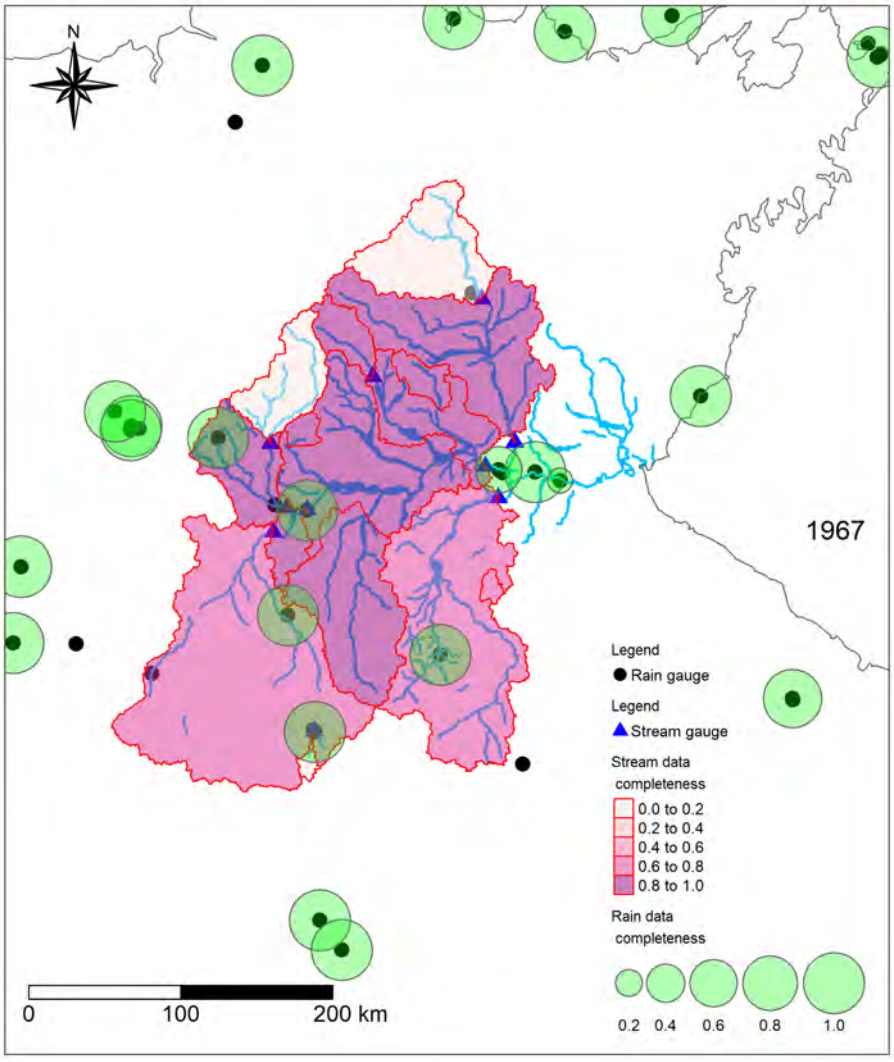


Figure 3: The distribution of rainfall and stream gauge data in the Roper River region in 1967. Size of the green circles indicates the completeness of rain gauge data at that site in the year while the colour ramp indicates the completeness of stream gauge data for contributing areas

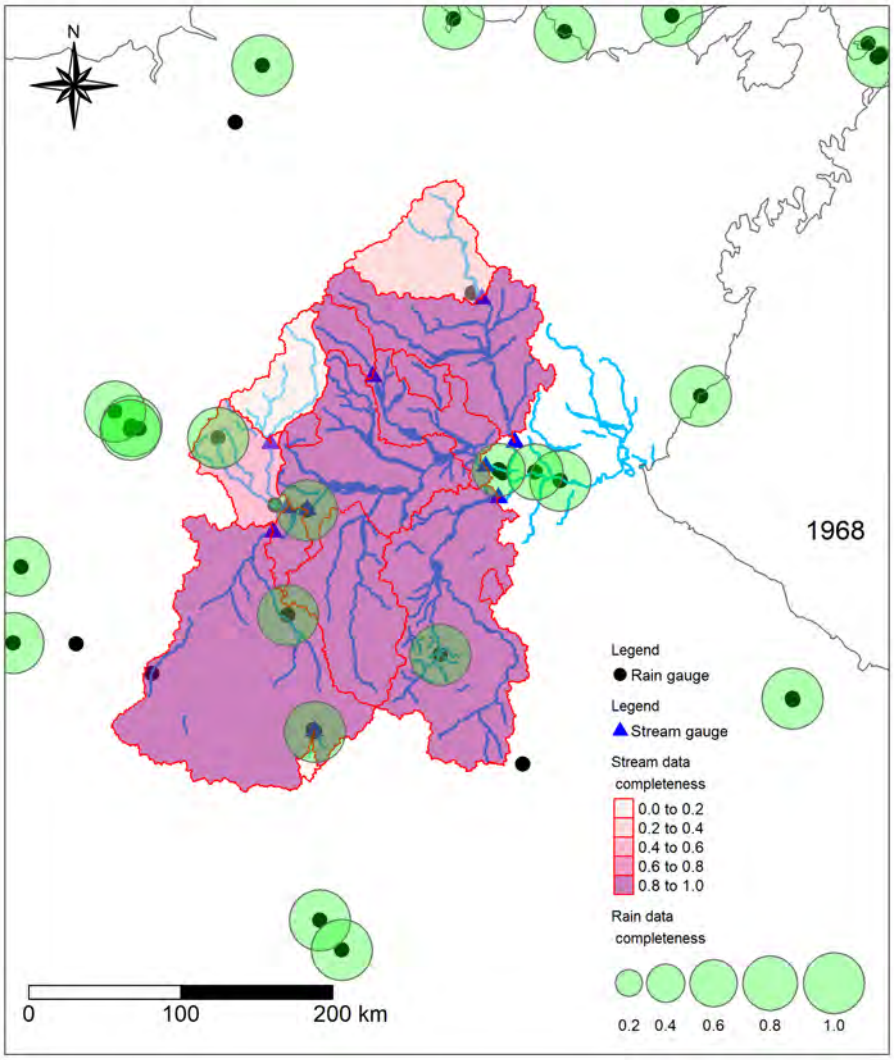


Figure 4: The distribution of rainfall and stream gauge data in the Roper River region in 1968. Size of the green circles indicates the completeness of rain gauge data at that site in the year while the colour ramp indicates the completeness of stream gauge data for contributing areas

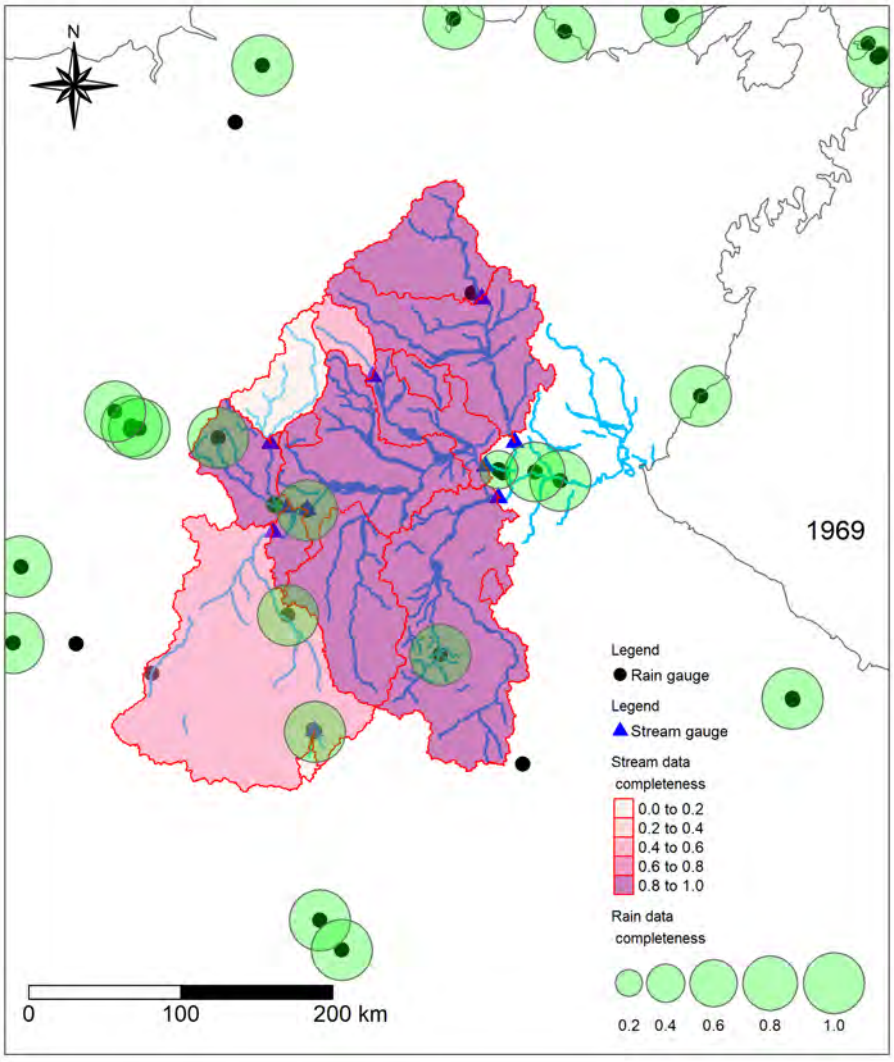


Figure 5: The distribution of rainfall and stream gauge data in the Roper River region in 1969. Size of the green circles indicates the completeness of rain gauge data at that site in the year while the colour ramp indicates the completeness of stream gauge data for contributing areas

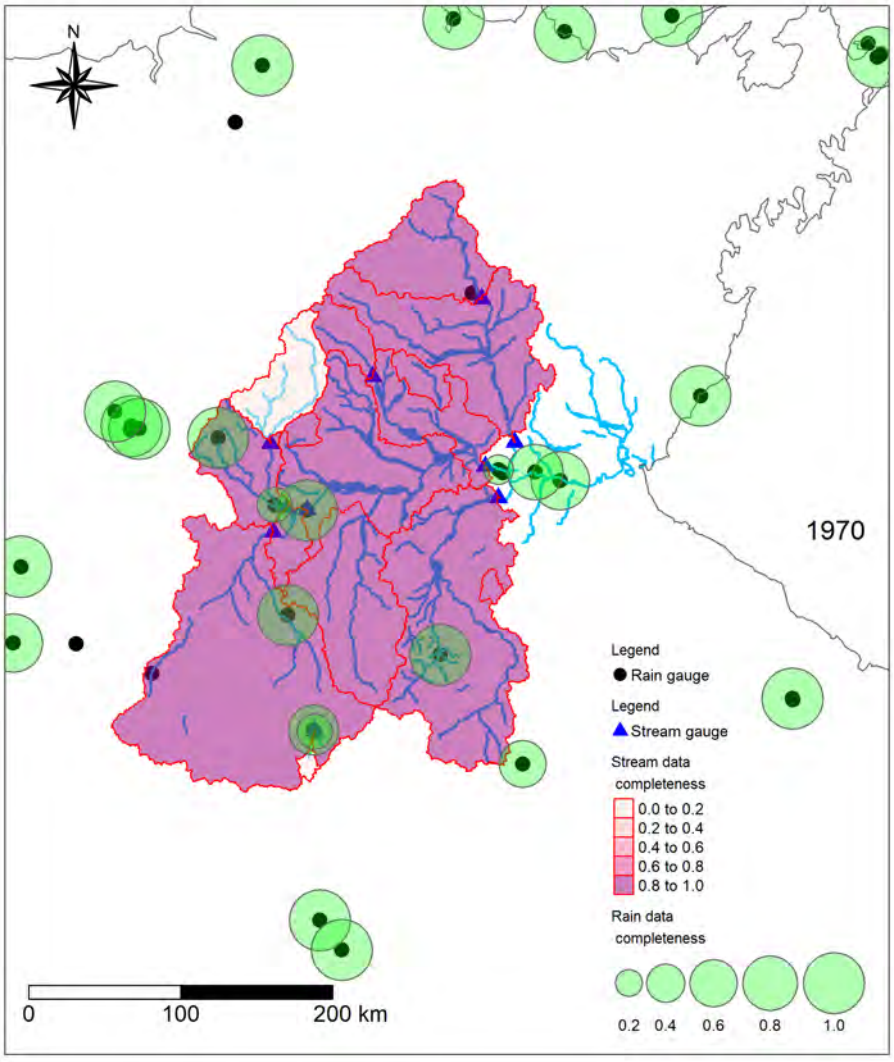


Figure 6: The distribution of rainfall and stream gauge data in the Roper River region in 1970. Size of the green circles indicates the completeness of rain gauge data at that site in the year while the colour ramp indicates the completeness of stream gauge data for contributing areas

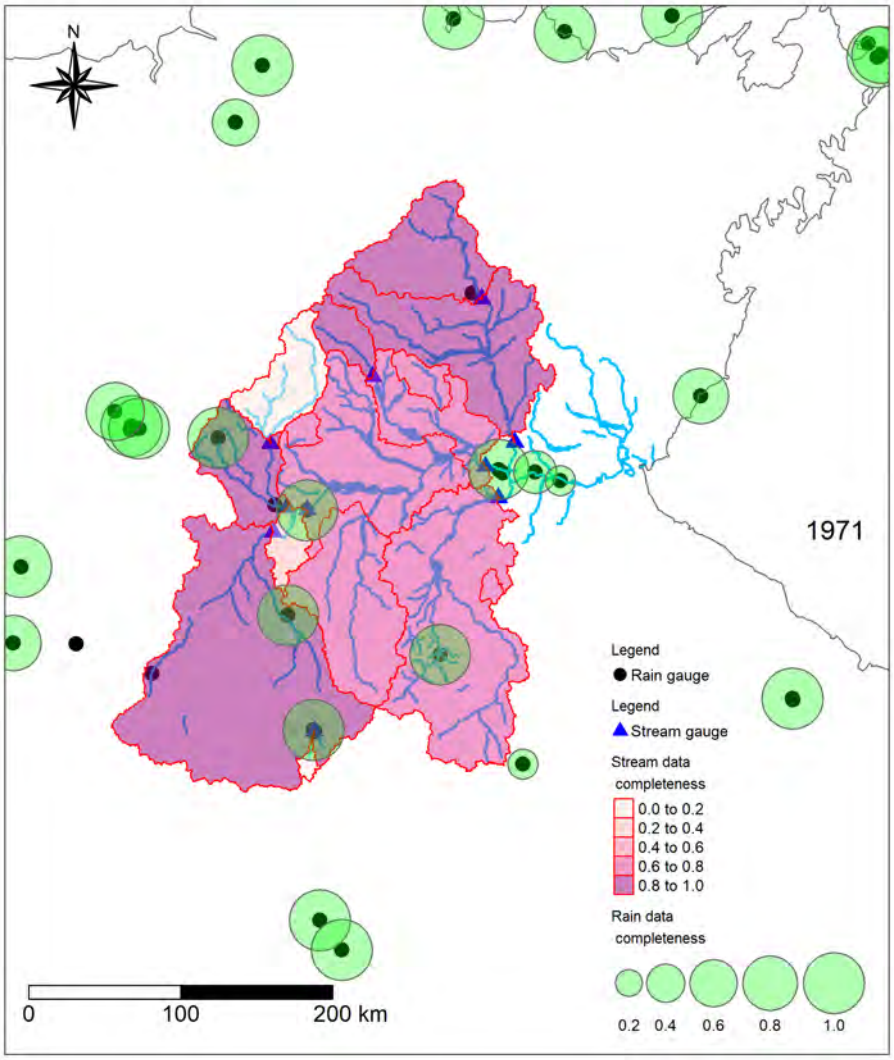


Figure 7: The distribution of rainfall and stream gauge data in the Roper River region in 1971. Size of the green circles indicates the completeness of rain gauge data at that site in the year while the colour ramp indicates the completeness of stream gauge data for contributing areas

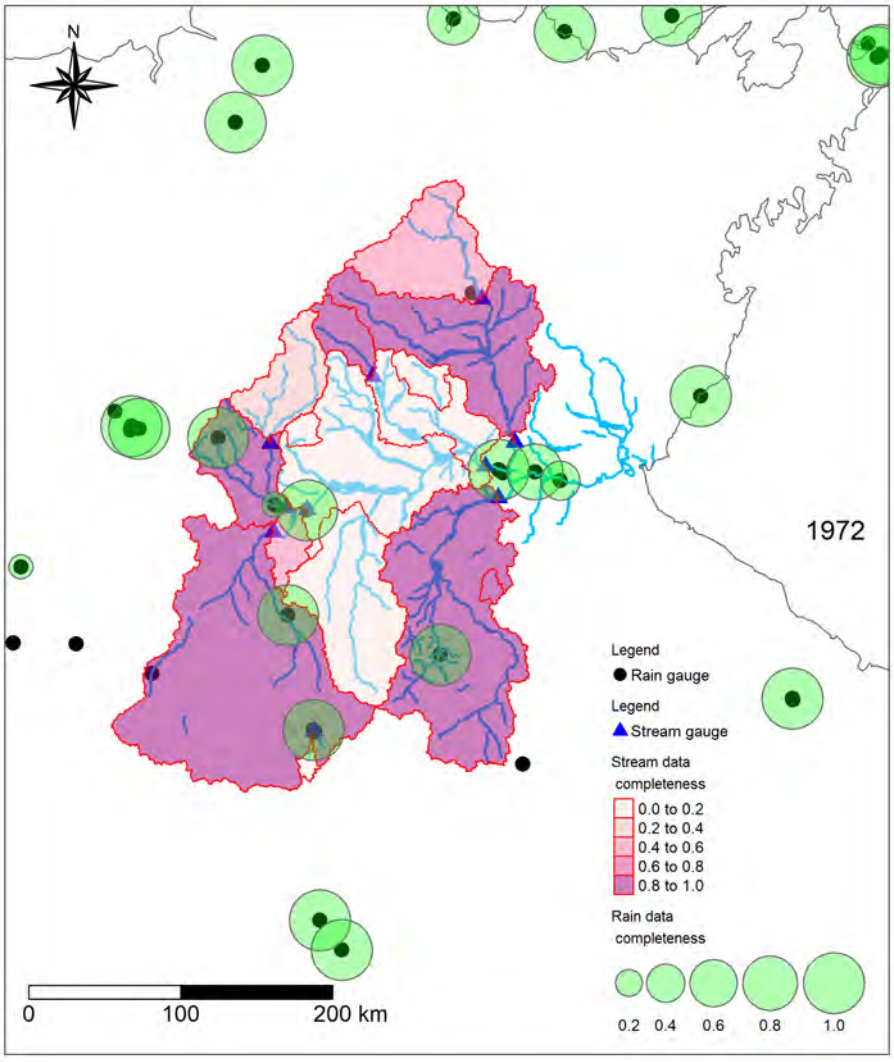


Figure 8: The distribution of rainfall and stream gauge data in the Roper River region in 1972. Size of the green circles indicates the completeness of rain gauge data at that site in the year while the colour ramp indicates the completeness of stream gauge data for contributing areas

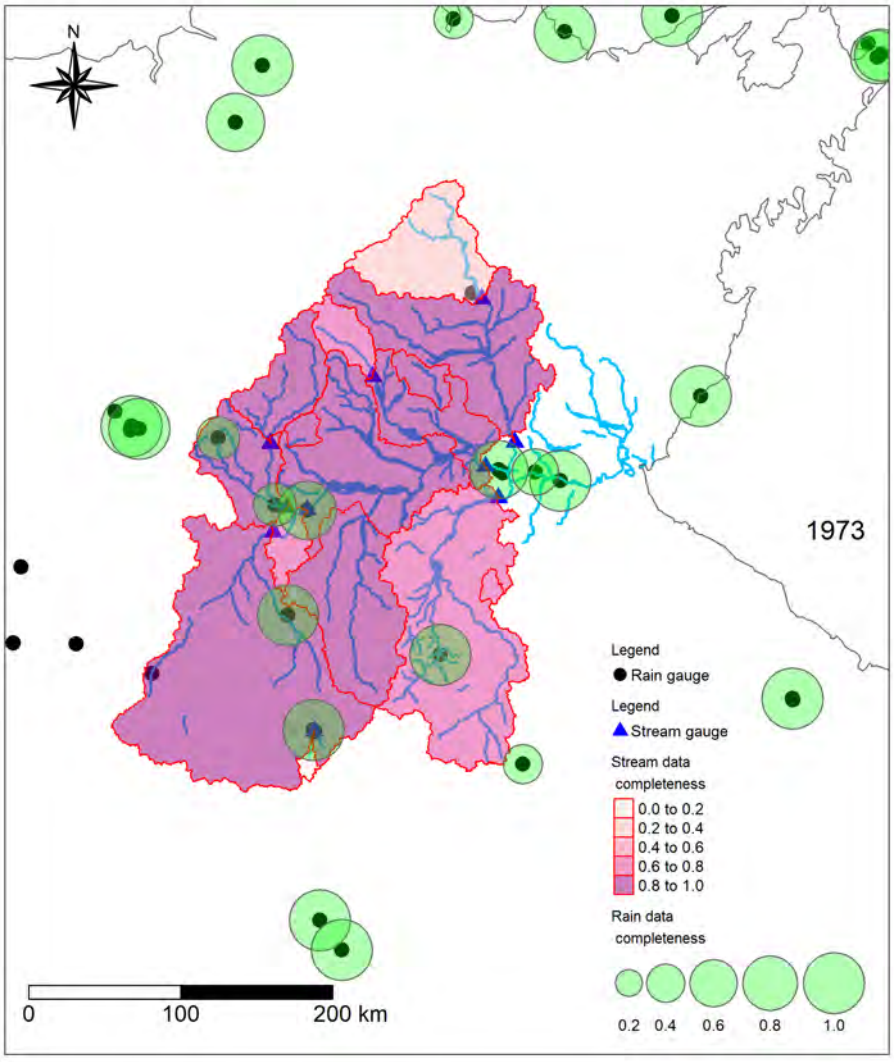


Figure 9: The distribution of rainfall and stream gauge data in the Roper River region in 1973. Size of the green circles indicates the completeness of rain gauge data at that site in the year while the colour ramp indicates the completeness of stream gauge data for contributing areas

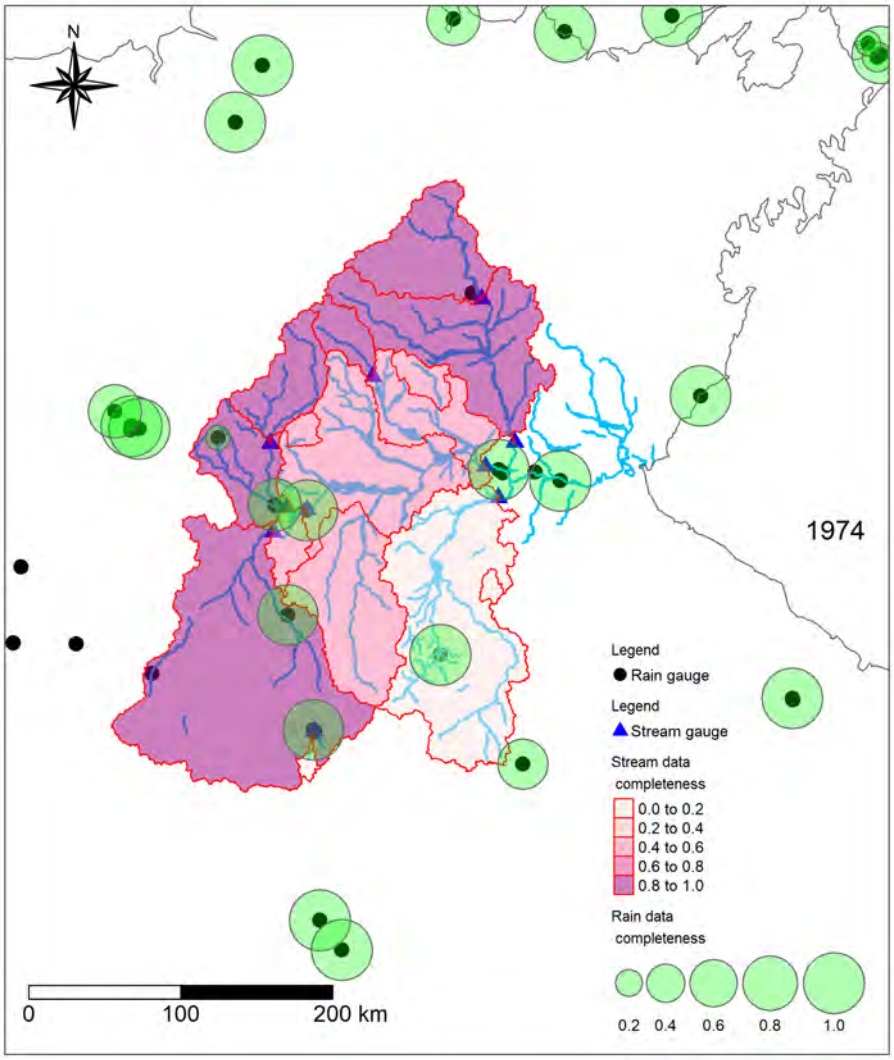


Figure 10: The distribution of rainfall and stream gauge data in the Roper River region in 1974. Size of the green circles indicates the completeness of rain gauge data at that site in the year while the colour ramp indicates the completeness of stream gauge data for contributing areas

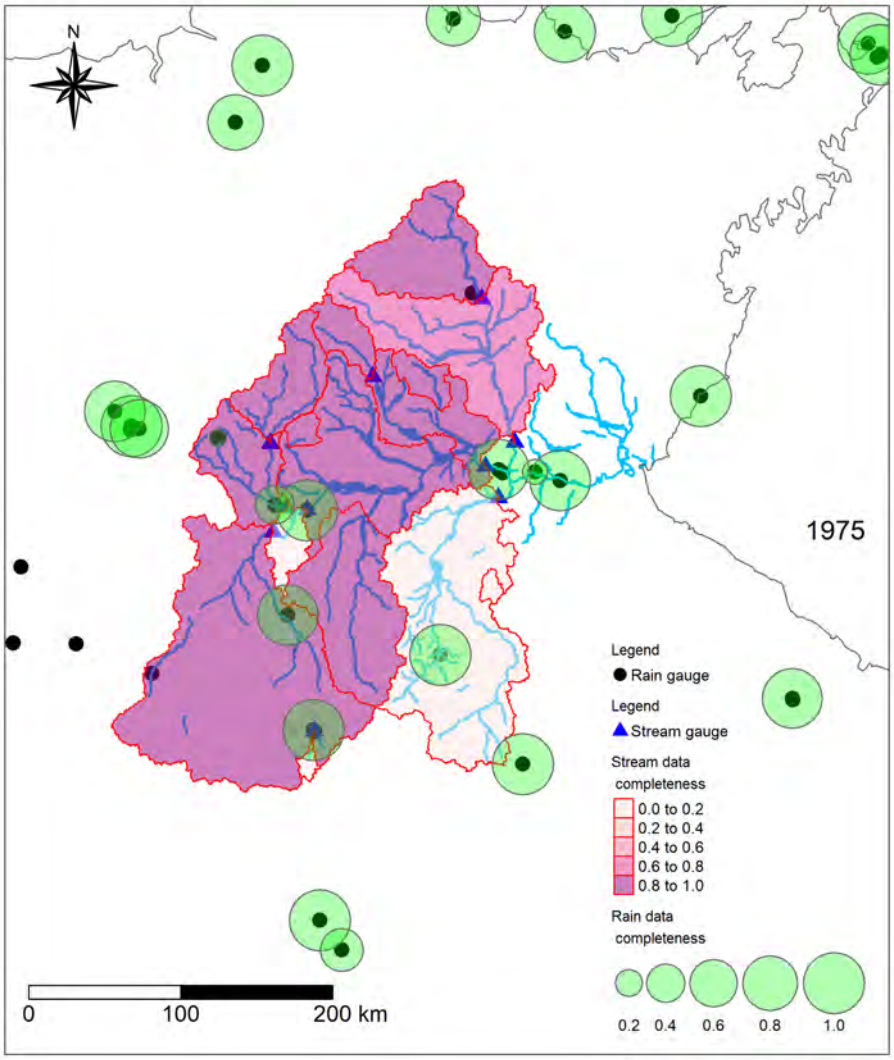


Figure 11: The distribution of rainfall and stream gauge data in the Roper River region in 1975. Size of the green circles indicates the completeness of rain gauge data at that site in the year while the colour ramp indicates the completeness of stream gauge data for contributing areas

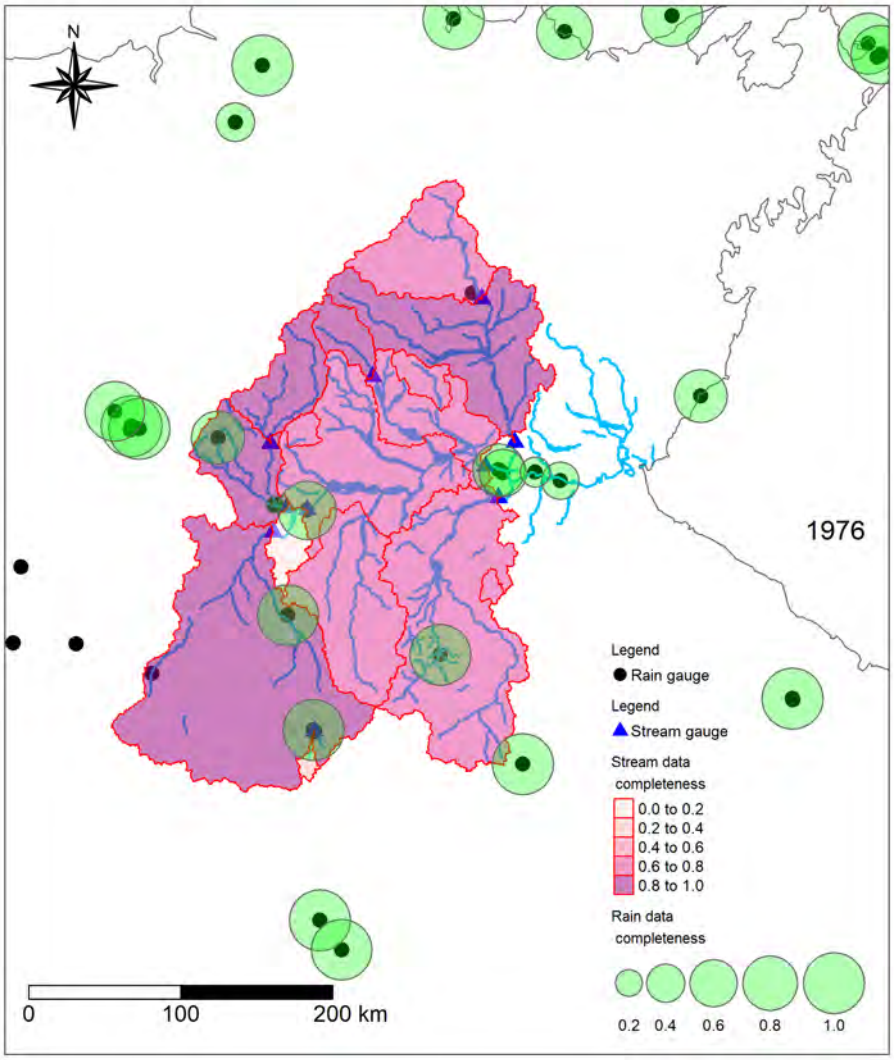


Figure 12: The distribution of rainfall and stream gauge data in the Roper River region in 1976. Size of the green circles indicates the completeness of rain gauge data at that site in the year while the colour ramp indicates the completeness of stream gauge data for contributing areas

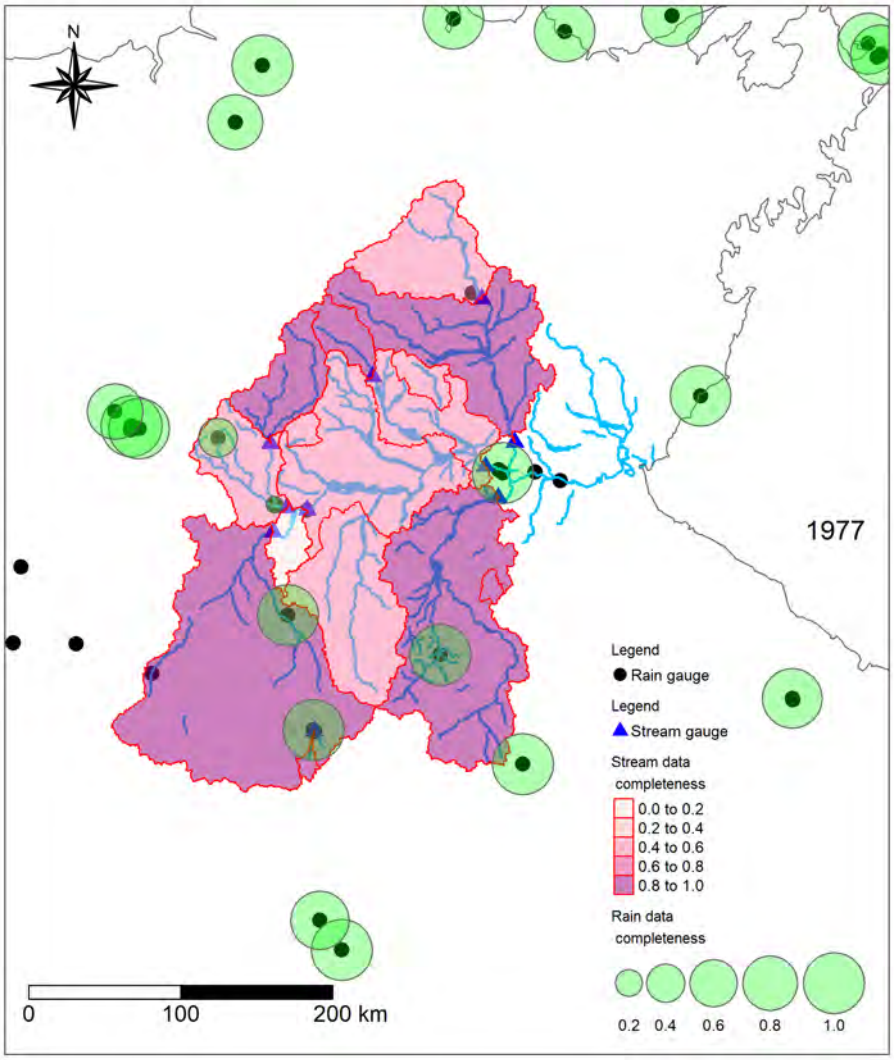


Figure 13: The distribution of rainfall and stream gauge data in the Roper River region in 1977. Size of the green circles indicates the completeness of rain gauge data at that site in the year while the colour ramp indicates the completeness of stream gauge data for contributing areas

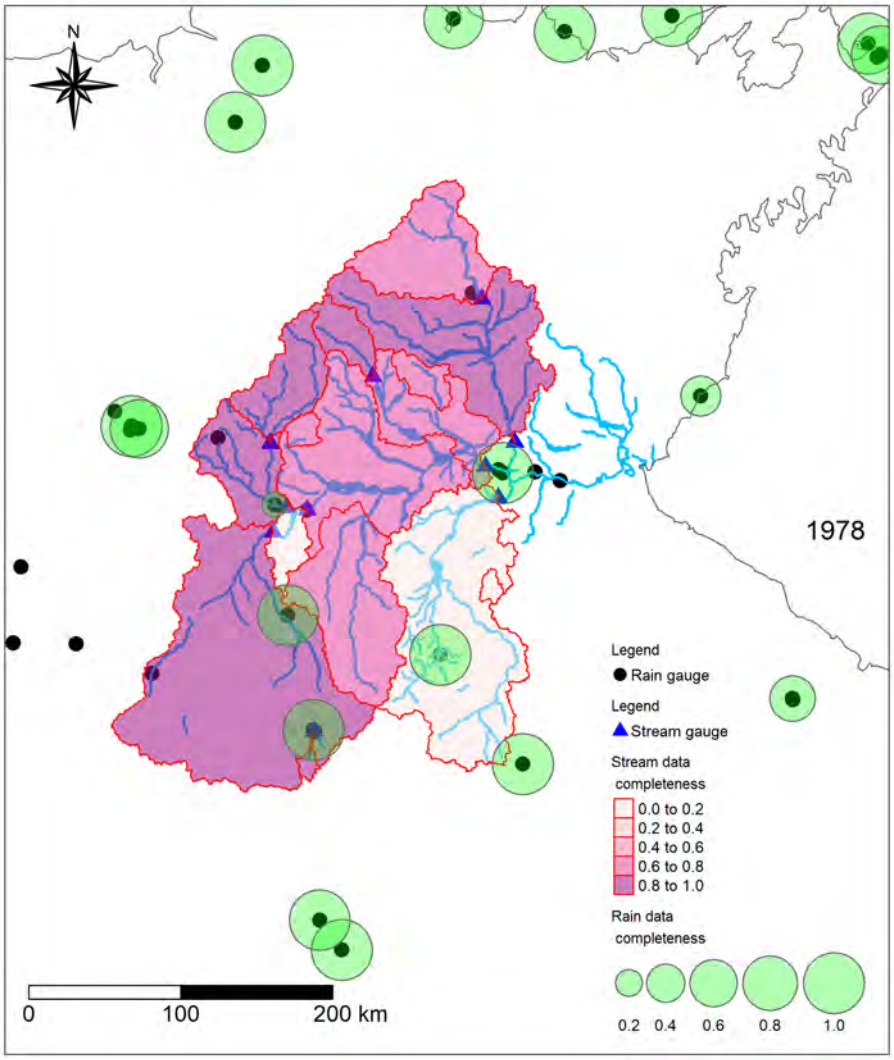


Figure 14: The distribution of rainfall and stream gauge data in the Roper River region in 1978. Size of the green circles indicates the completeness of rain gauge data at that site in the year while the colour ramp indicates the completeness of stream gauge data for contributing areas

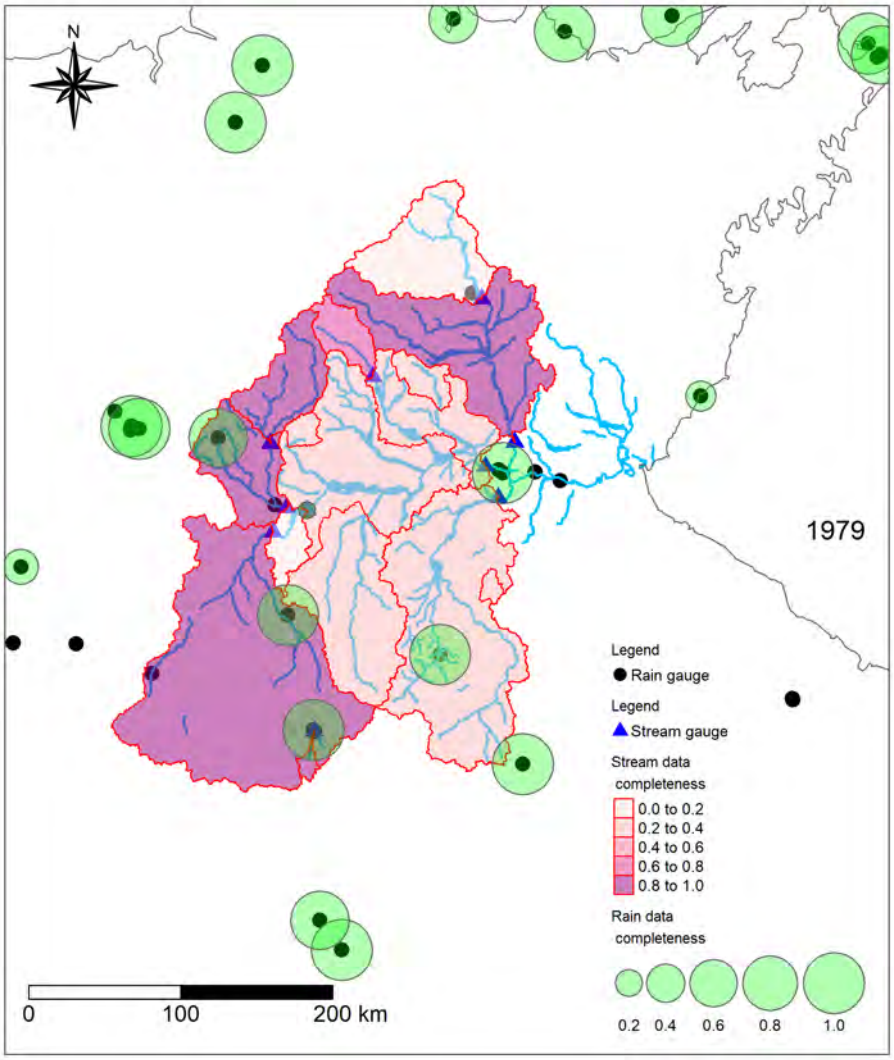


Figure 15: The distribution of rainfall and stream gauge data in the Roper River region in 1979. Size of the green circles indicates the completeness of rain gauge data at that site in the year while the colour ramp indicates the completeness of stream gauge data for contributing areas

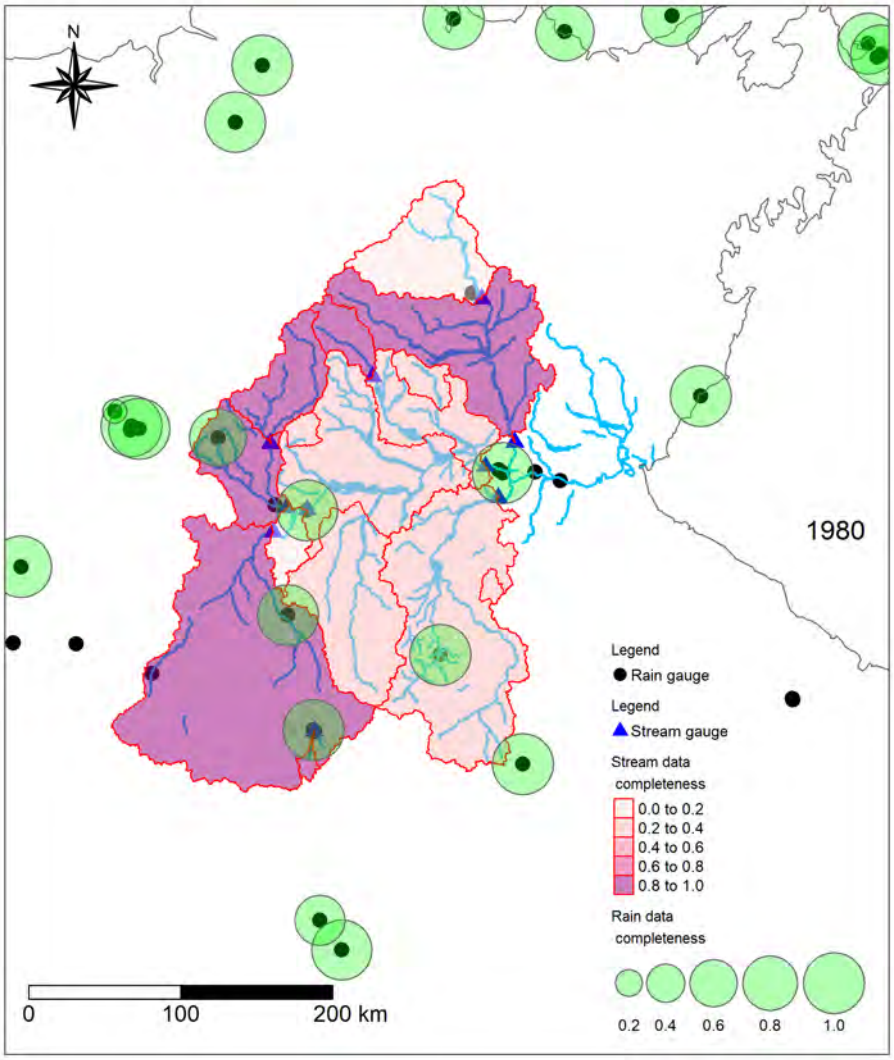


Figure 16: The distribution of rainfall and stream gauge data in the Roper River region in 1980. Size of the green circles indicates the completeness of rain gauge data at that site in the year while the colour ramp indicates the completeness of stream gauge data for contributing areas

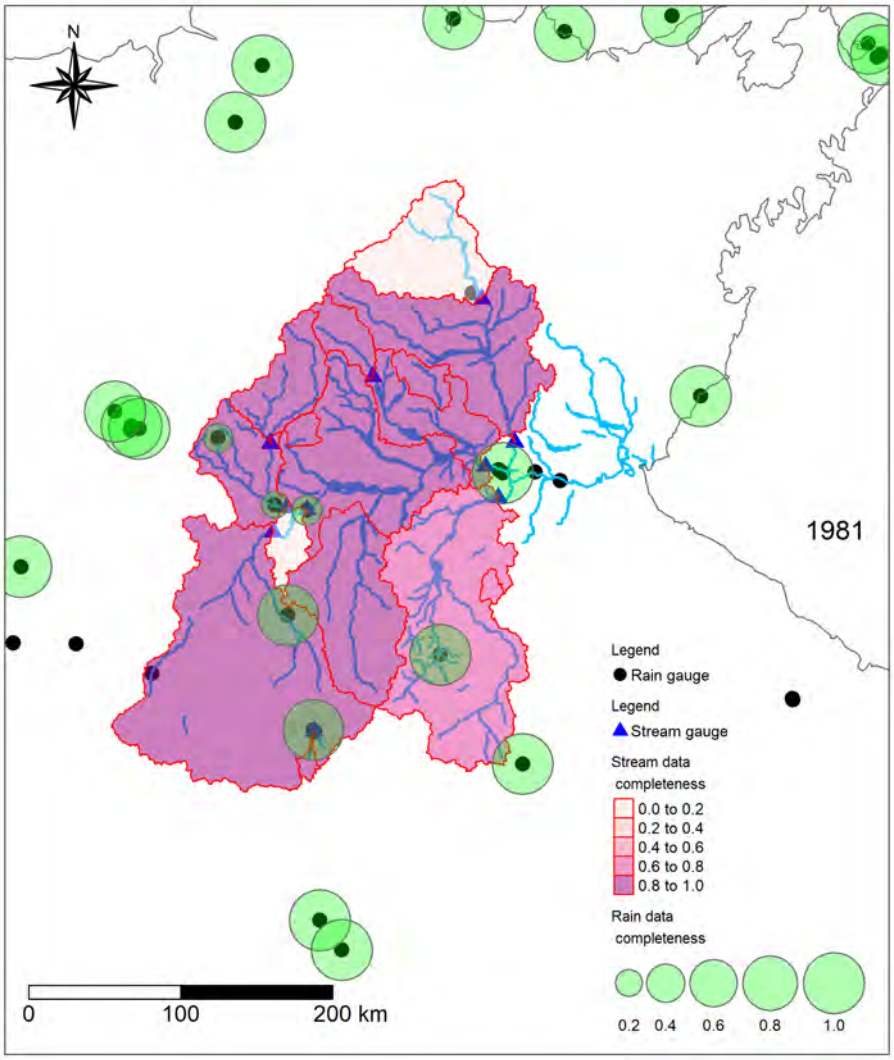


Figure 17: The distribution of rainfall and stream gauge data in the Roper River region in 1981. Size of the green circles indicates the completeness of rain gauge data at that site in the year while the colour ramp indicates the completeness of stream gauge data for contributing areas

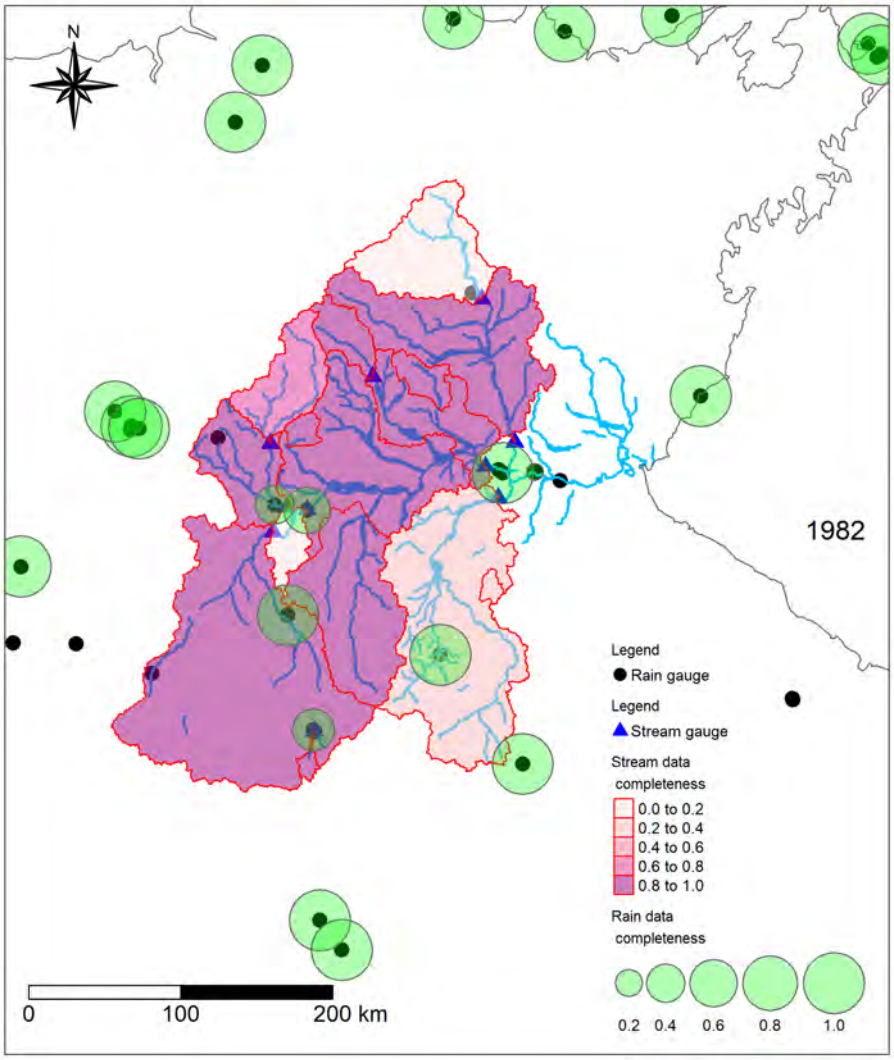


Figure 18: The distribution of rainfall and stream gauge data in the Roper River region in 1982. Size of the green circles indicates the completeness of rain gauge data at that site in the year while the colour ramp indicates the completeness of stream gauge data for contributing areas

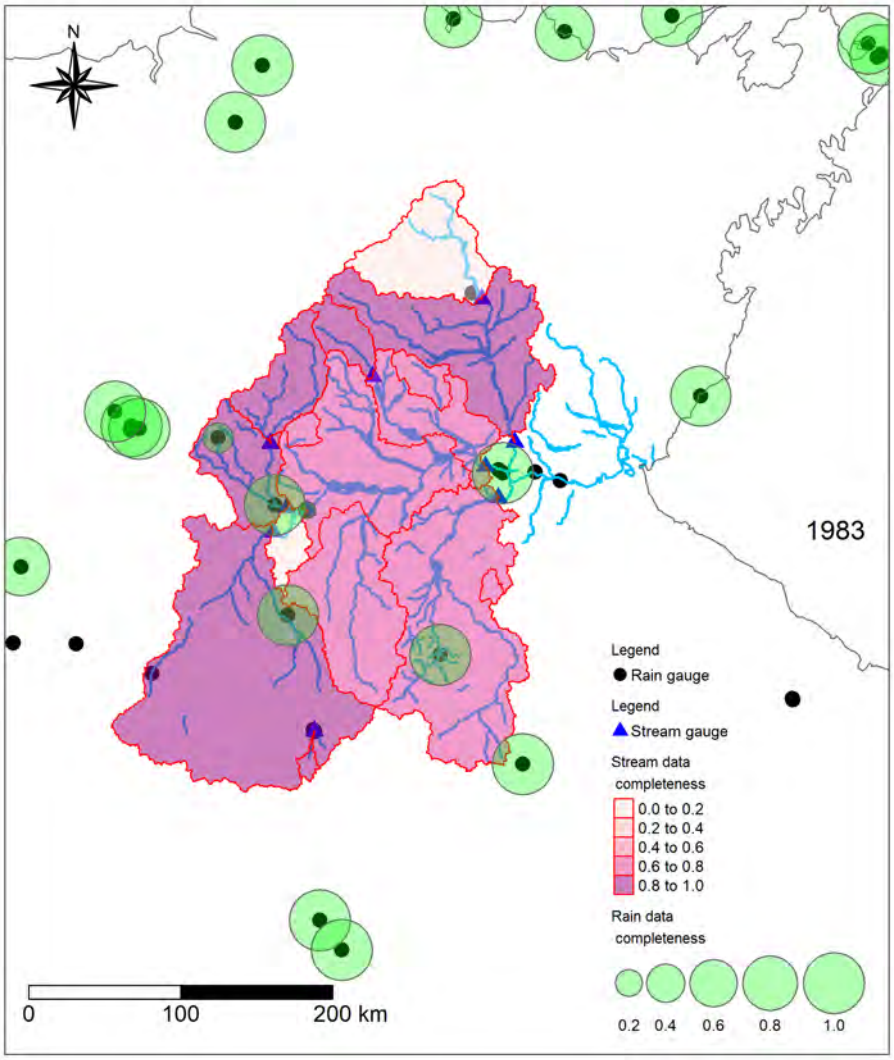


Figure 19: The distribution of rainfall and stream gauge data in the Roper River region in 1983. Size of the green circles indicates the completeness of rain gauge data at that site in the year while the colour ramp indicates the completeness of stream gauge data for contributing areas

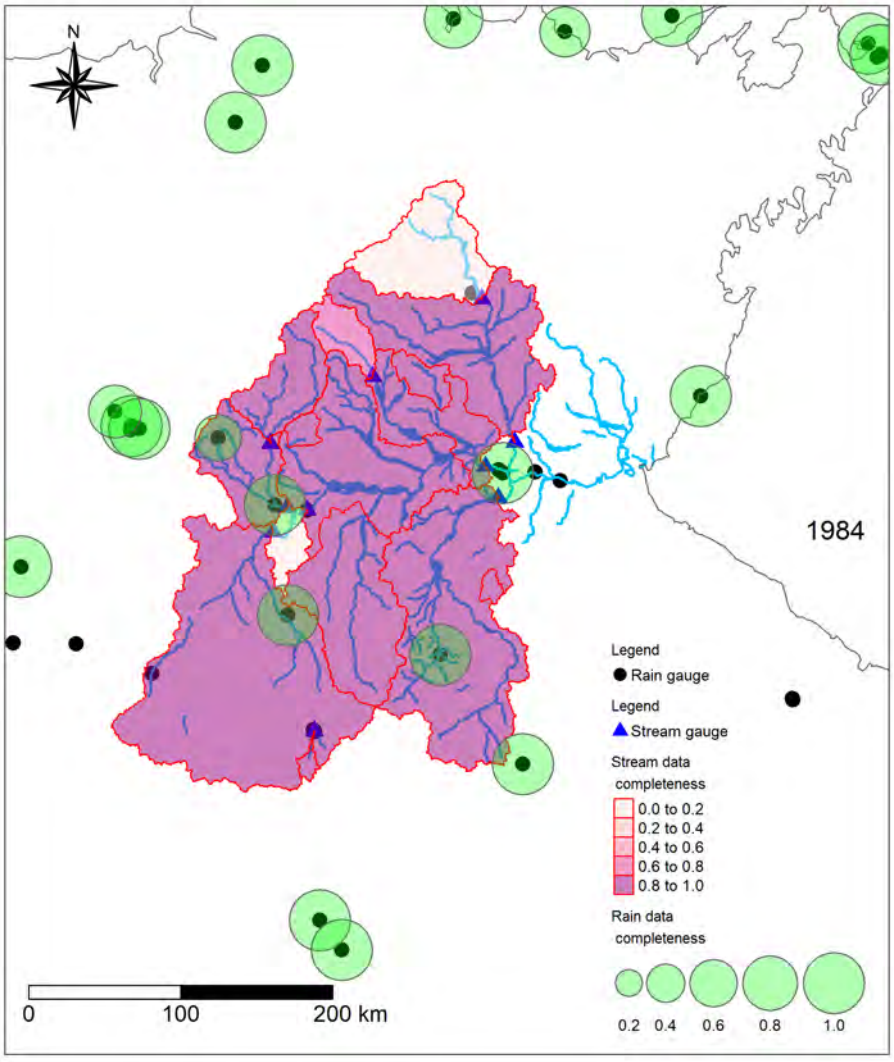


Figure 20: The distribution of rainfall and stream gauge data in the Roper River region in 1984. Size of the green circles indicates the completeness of rain gauge data at that site in the year while the colour ramp indicates the completeness of stream gauge data for contributing areas

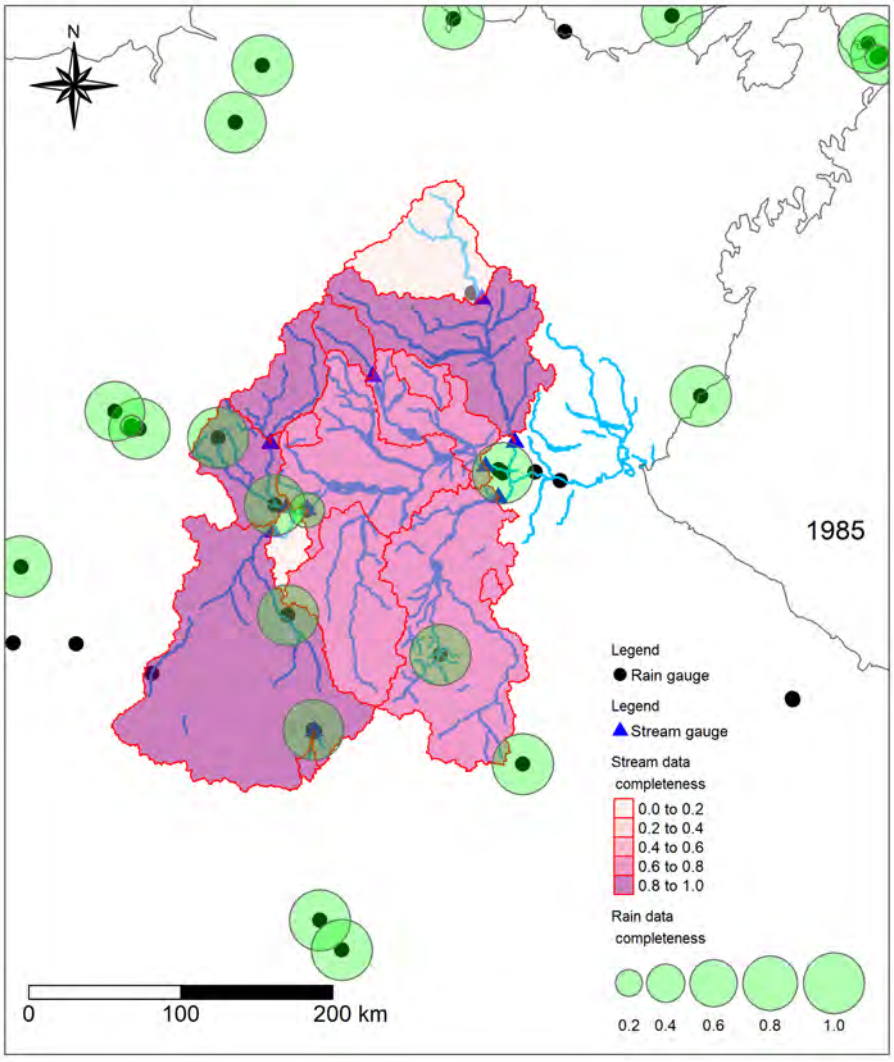


Figure 21: The distribution of rainfall and stream gauge data in the Roper River region in 1985. Size of the green circles indicates the completeness of rain gauge data at that site in the year while the colour ramp indicates the completeness of stream gauge data for contributing areas

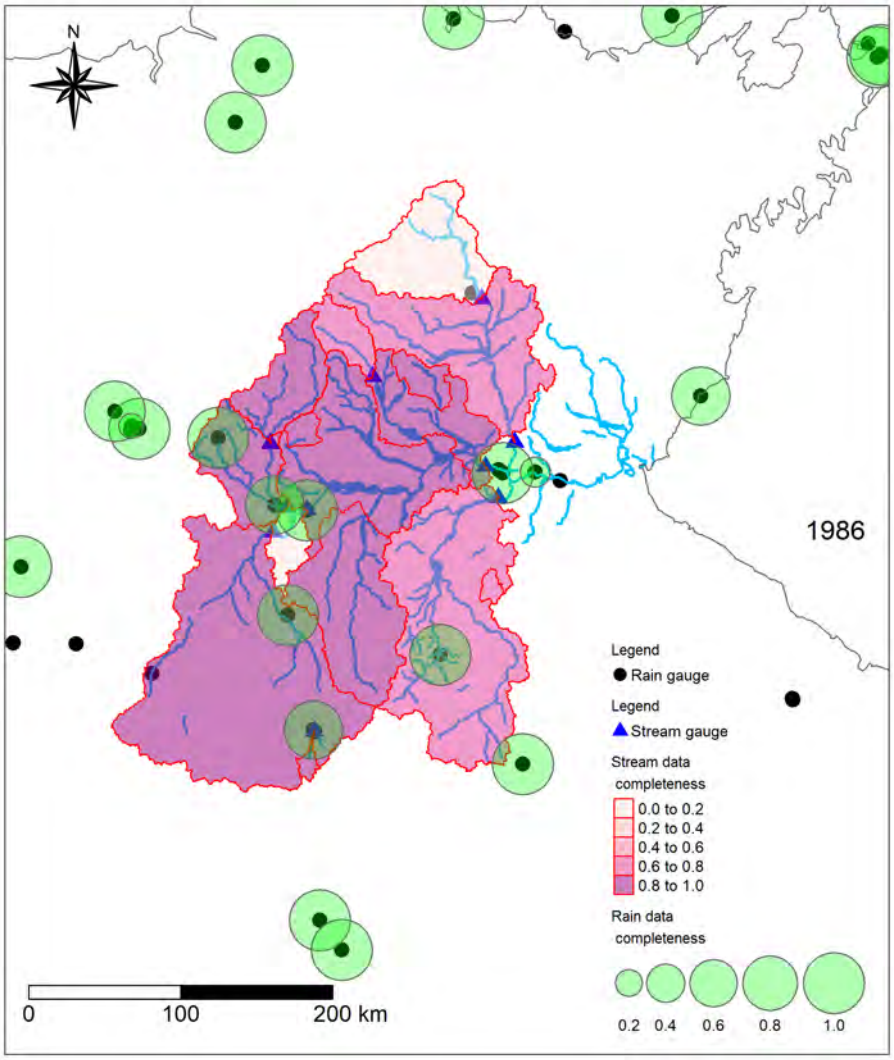


Figure 22: The distribution of rainfall and stream gauge data in the Roper River region in 1986. Size of the green circles indicates the completeness of rain gauge data at that site in the year while the colour ramp indicates the completeness of stream gauge data for contributing areas

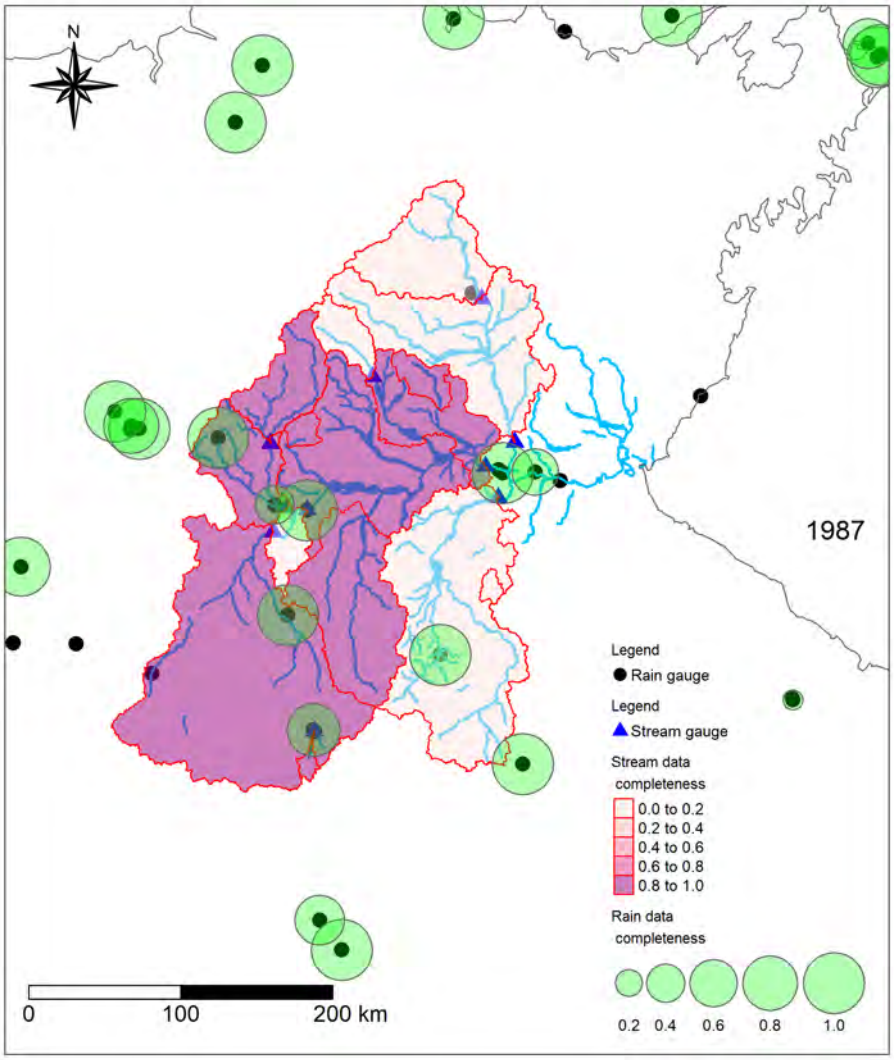


Figure 23: The distribution of rainfall and stream gauge data in the Roper River region in 1987. Size of the green circles indicates the completeness of rain gauge data at that site in the year while the colour ramp indicates the completeness of stream gauge data for contributing areas

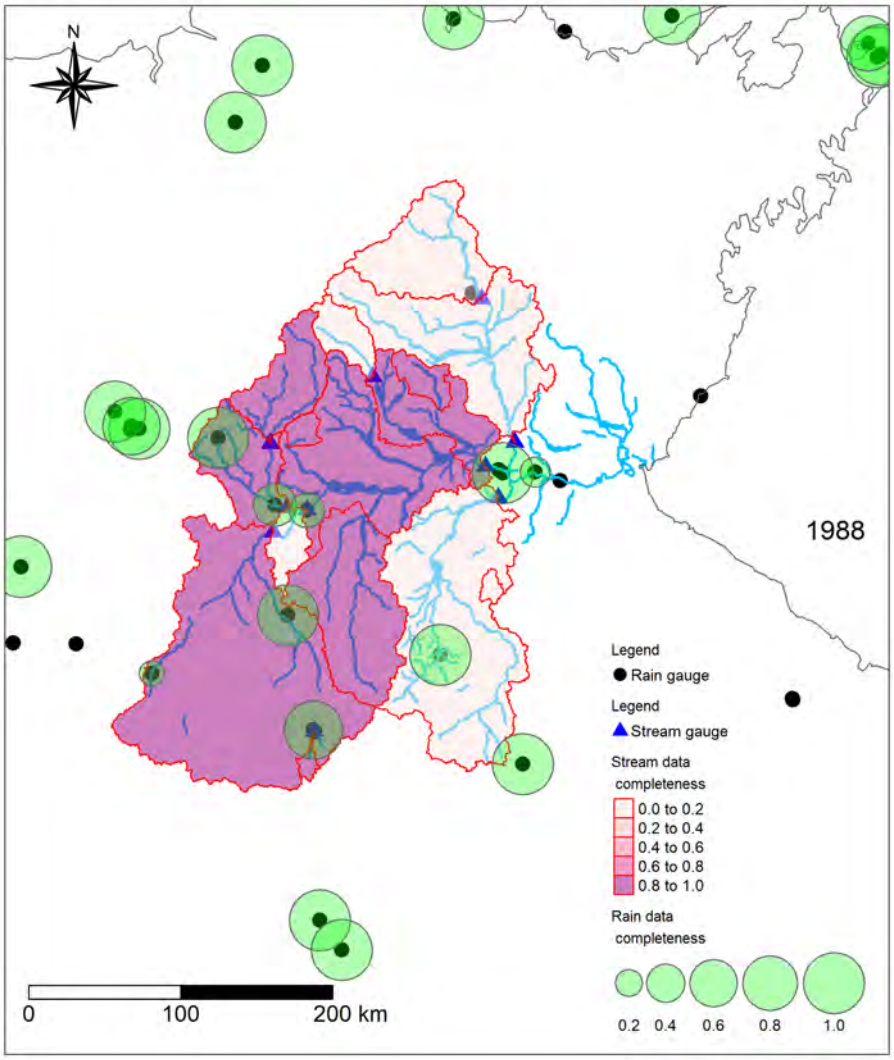


Figure 24: The distribution of rainfall and stream gauge data in the Roper River region in 1988. Size of the green circles indicates the completeness of rain gauge data at that site in the year while the colour ramp indicates the completeness of stream gauge data for contributing areas

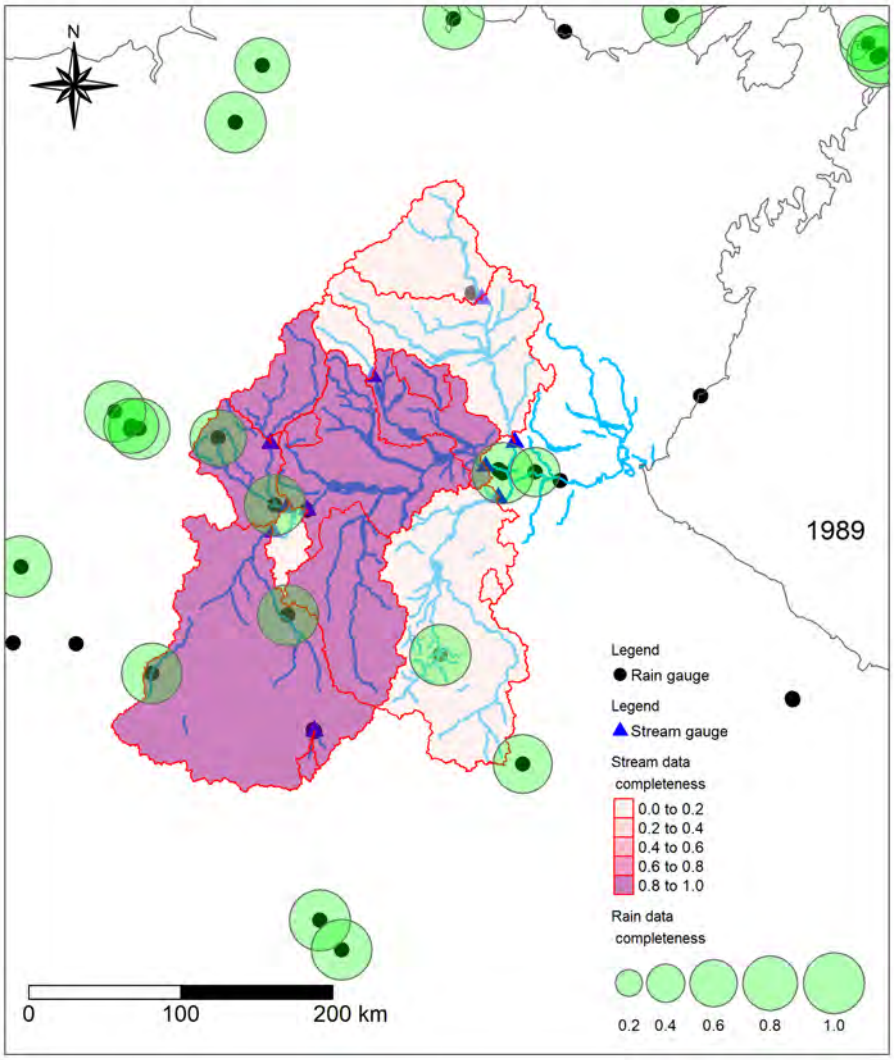


Figure 25: The distribution of rainfall and stream gauge data in the Roper River region in 1989. Size of the green circles indicates the completeness of rain gauge data at that site in the year while the colour ramp indicates the completeness of stream gauge data for contributing areas

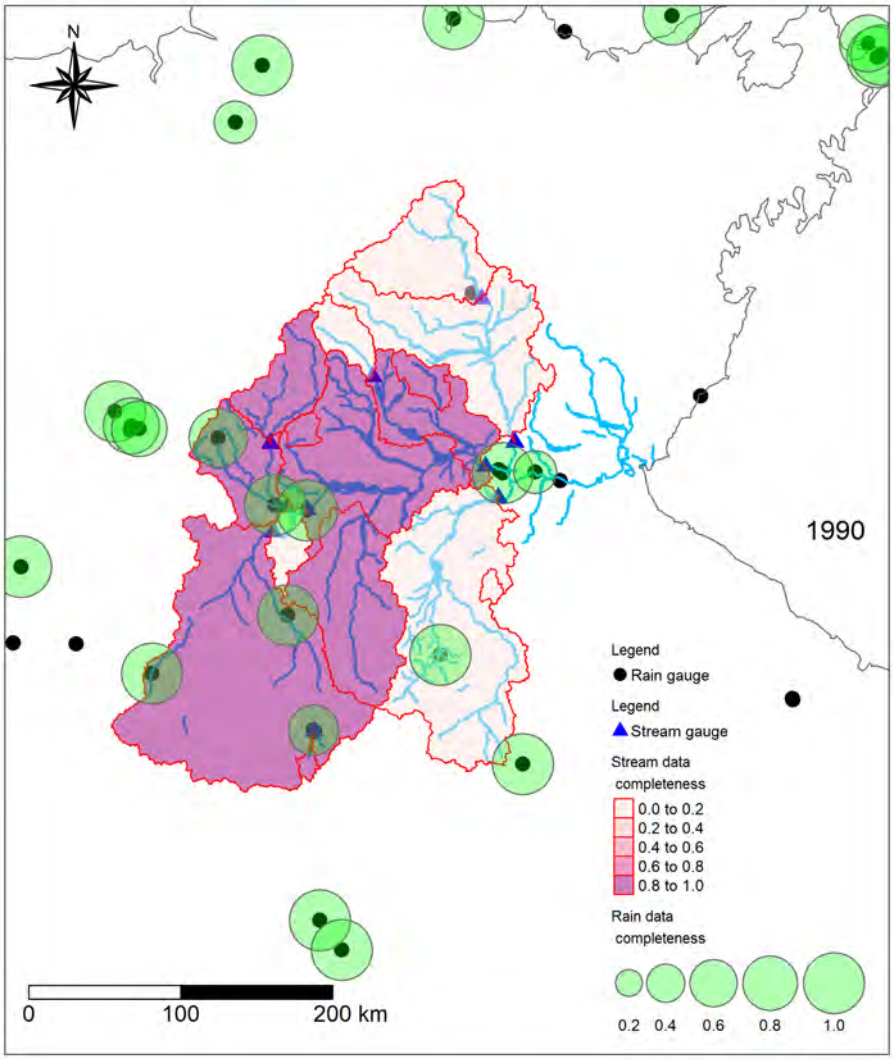


Figure 26: The distribution of rainfall and stream gauge data in the Roper River region in 1990. Size of the green circles indicates the completeness of rain gauge data at that site in the year while the colour ramp indicates the completeness of stream gauge data for contributing areas

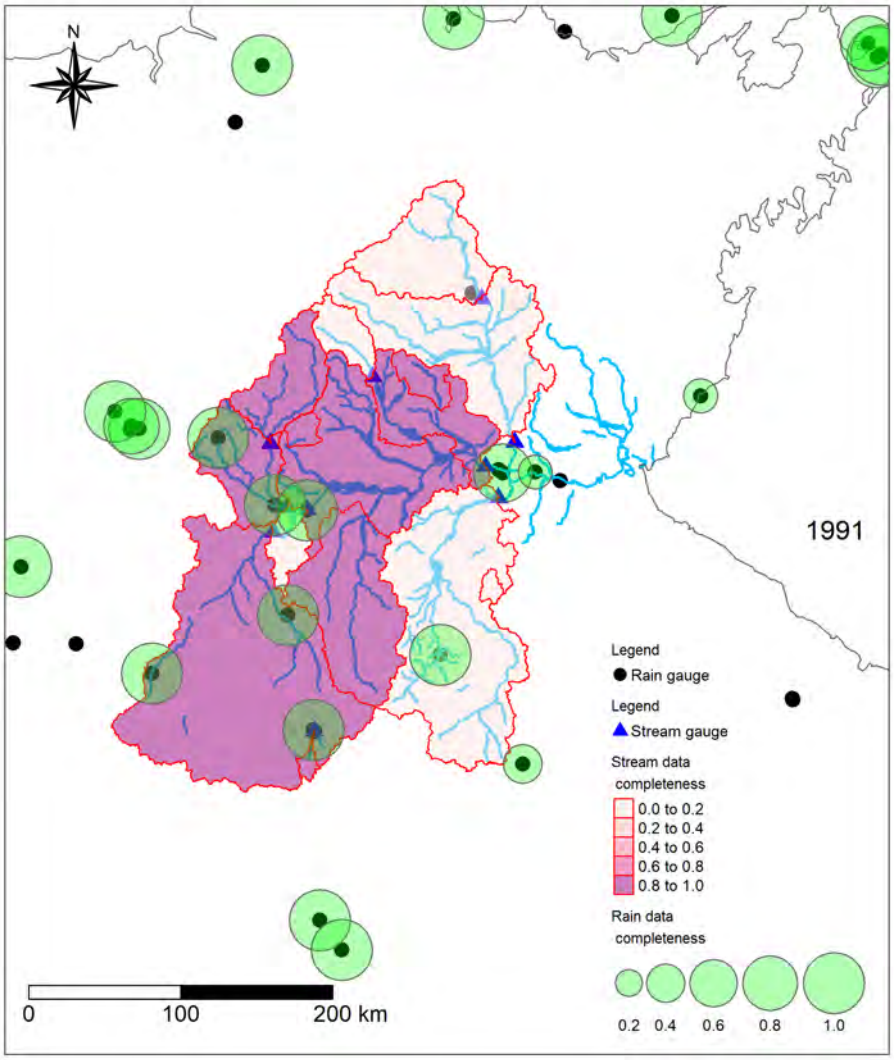


Figure 27: The distribution of rainfall and stream gauge data in the Roper River region in 1991. Size of the green circles indicates the completeness of rain gauge data at that site in the year while the colour ramp indicates the completeness of stream gauge data for contributing areas

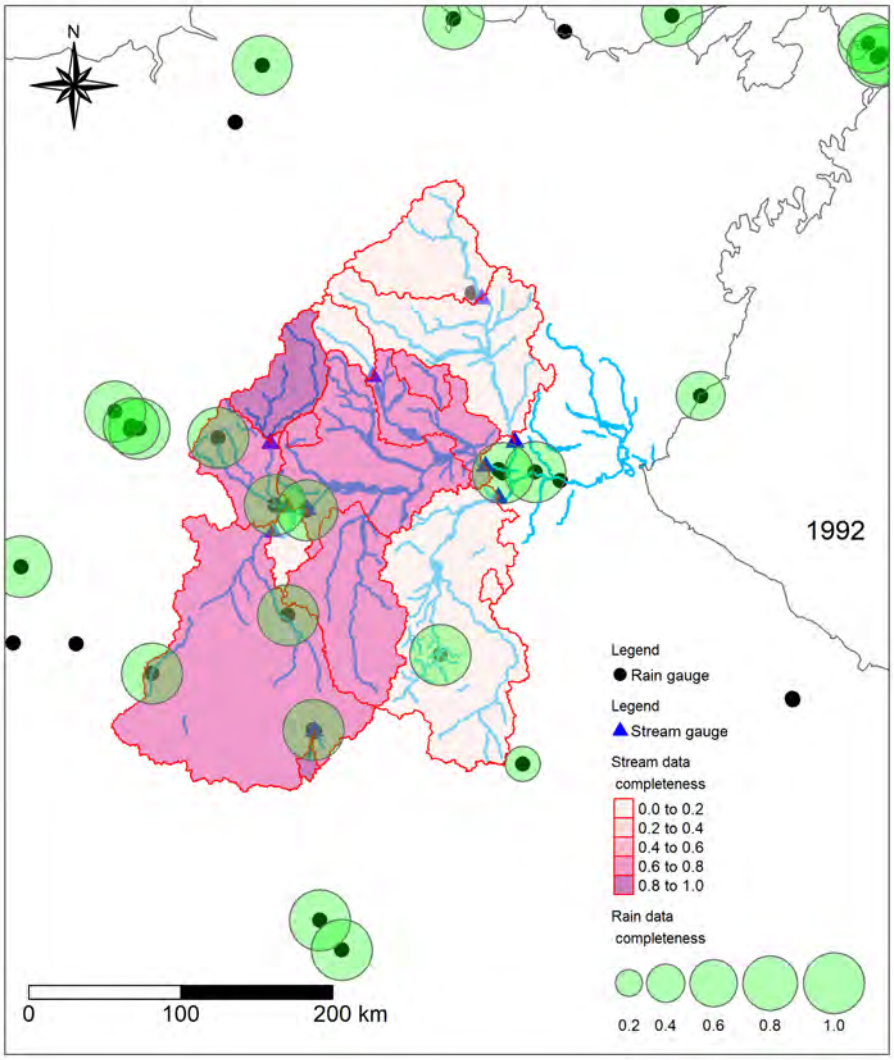


Figure 28: The distribution of rainfall and stream gauge data in the Roper River region in 1992. Size of the green circles indicates the completeness of rain gauge data at that site in the year while the colour ramp indicates the completeness of stream gauge data for contributing areas

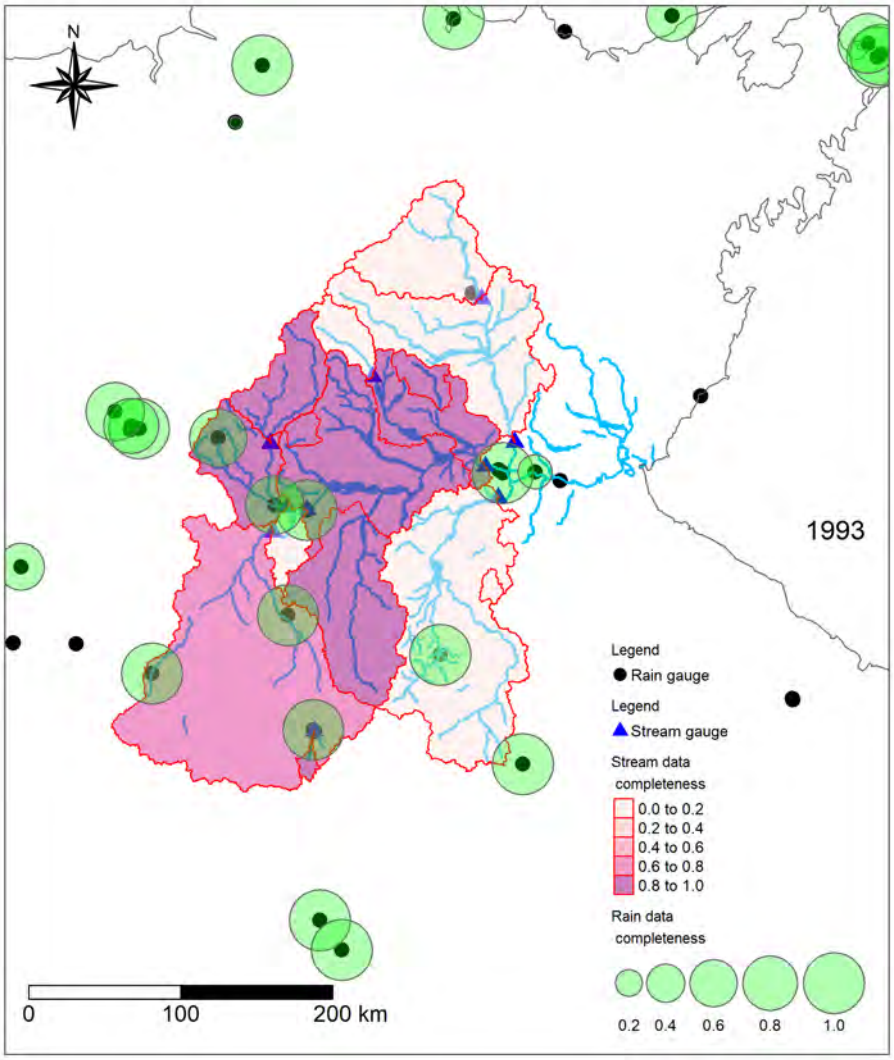


Figure 29: The distribution of rainfall and stream gauge data in the Roper River region in 1993. Size of the green circles indicates the completeness of rain gauge data at that site in the year while the colour ramp indicates the completeness of stream gauge data for contributing areas

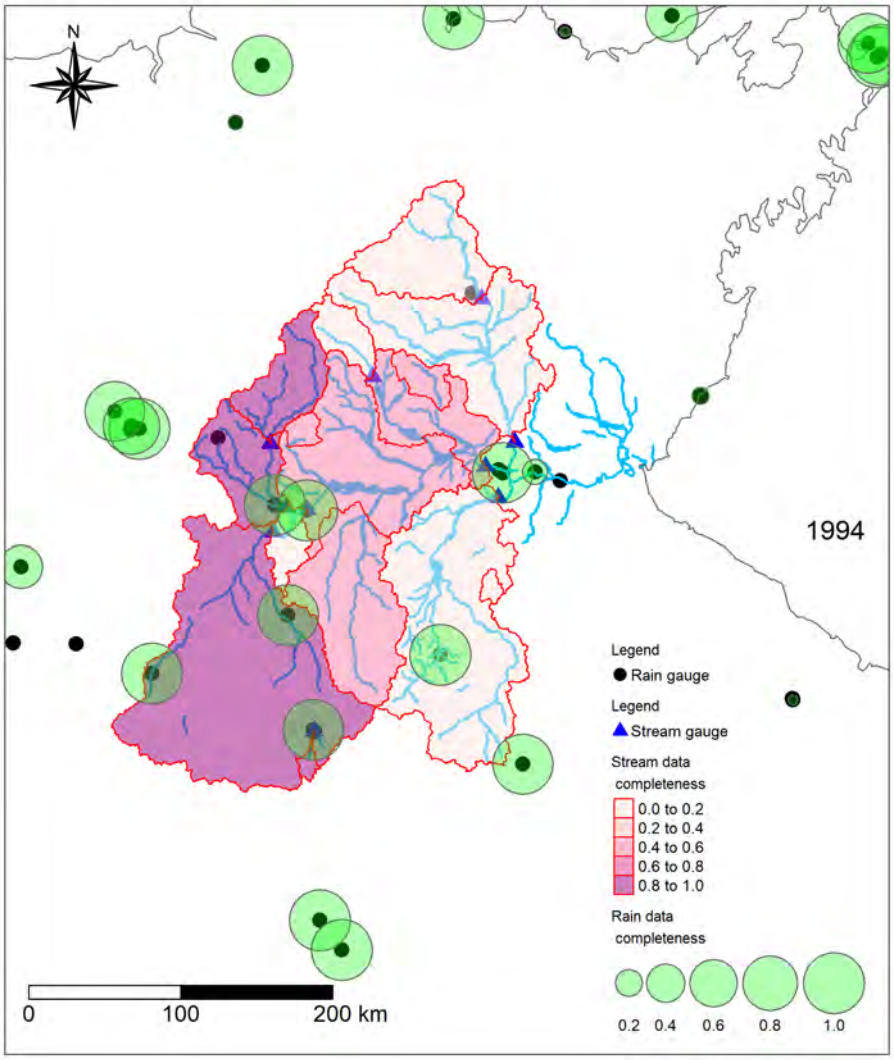


Figure 30: The distribution of rainfall and stream gauge data in the Roper River region in 1994. Size of the green circles indicates the completeness of rain gauge data at that site in the year while the colour ramp indicates the completeness of stream gauge data for contributing areas

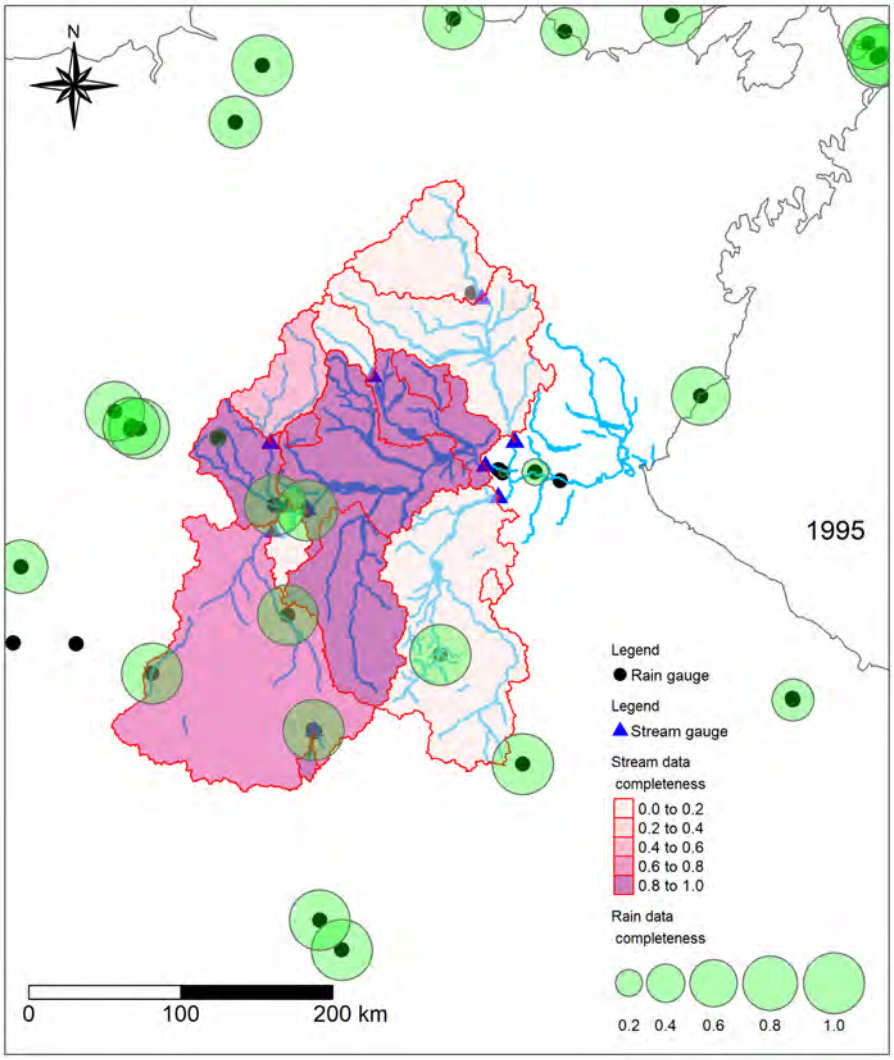


Figure 31: The distribution of rainfall and stream gauge data in the Roper River region in 1995. Size of the green circles indicates the completeness of rain gauge data at that site in the year while the colour ramp indicates the completeness of stream gauge data for contributing areas

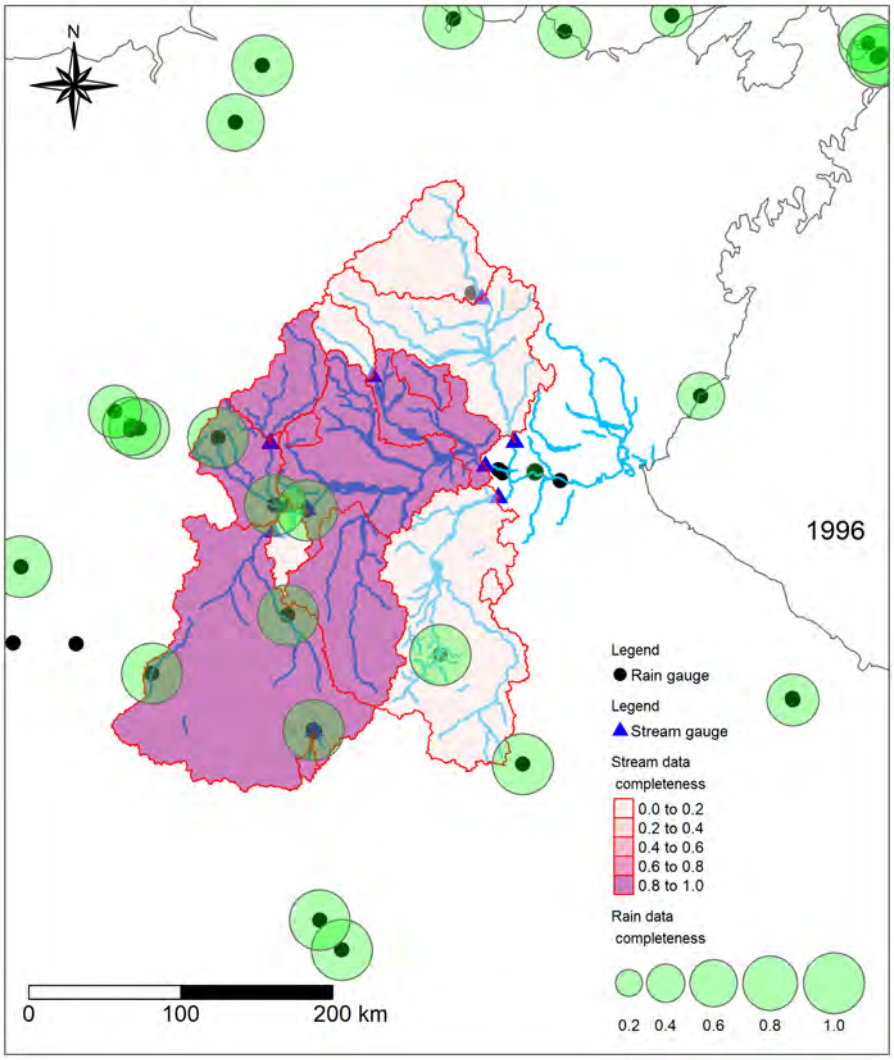


Figure 32: The distribution of rainfall and stream gauge data in the Roper River region in 1996. Size of the green circles indicates the completeness of rain gauge data at that site in the year while the colour ramp indicates the completeness of stream gauge data for contributing areas

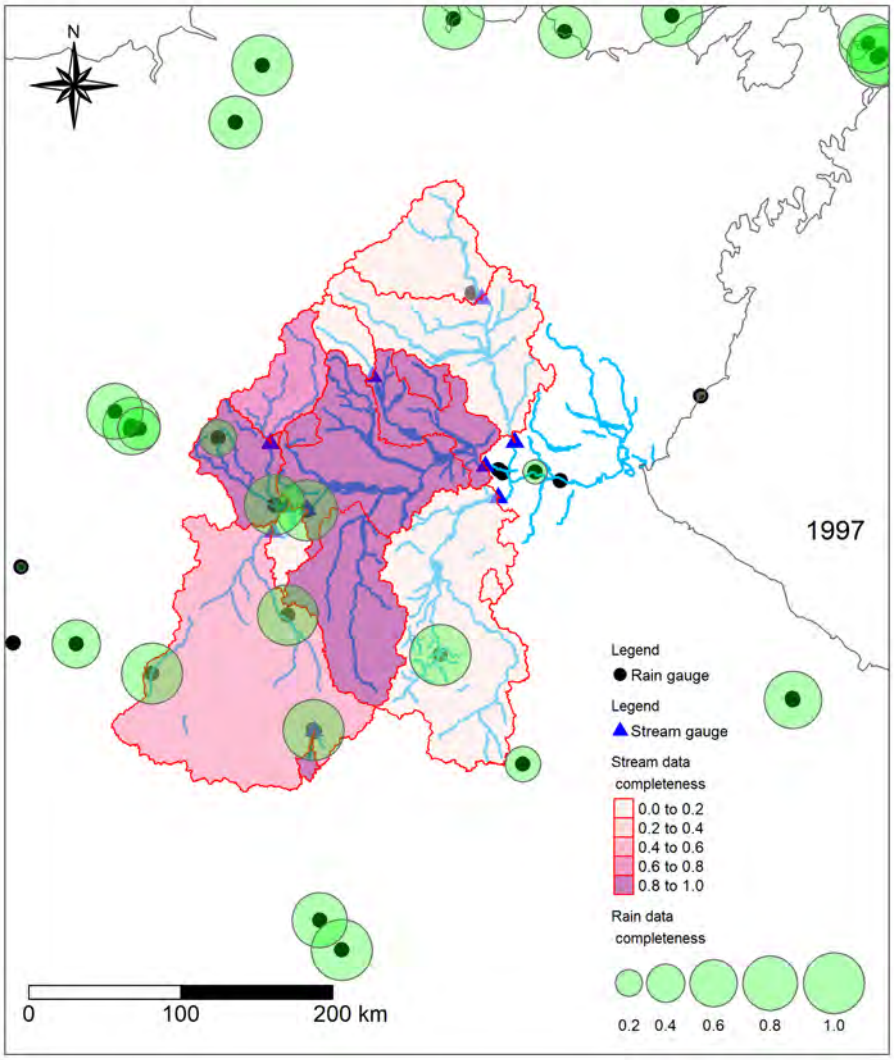


Figure 33: The distribution of rainfall and stream gauge data in the Roper River region in 1997. Size of the green circles indicates the completeness of rain gauge data at that site in the year while the colour ramp indicates the completeness of stream gauge data for contributing areas

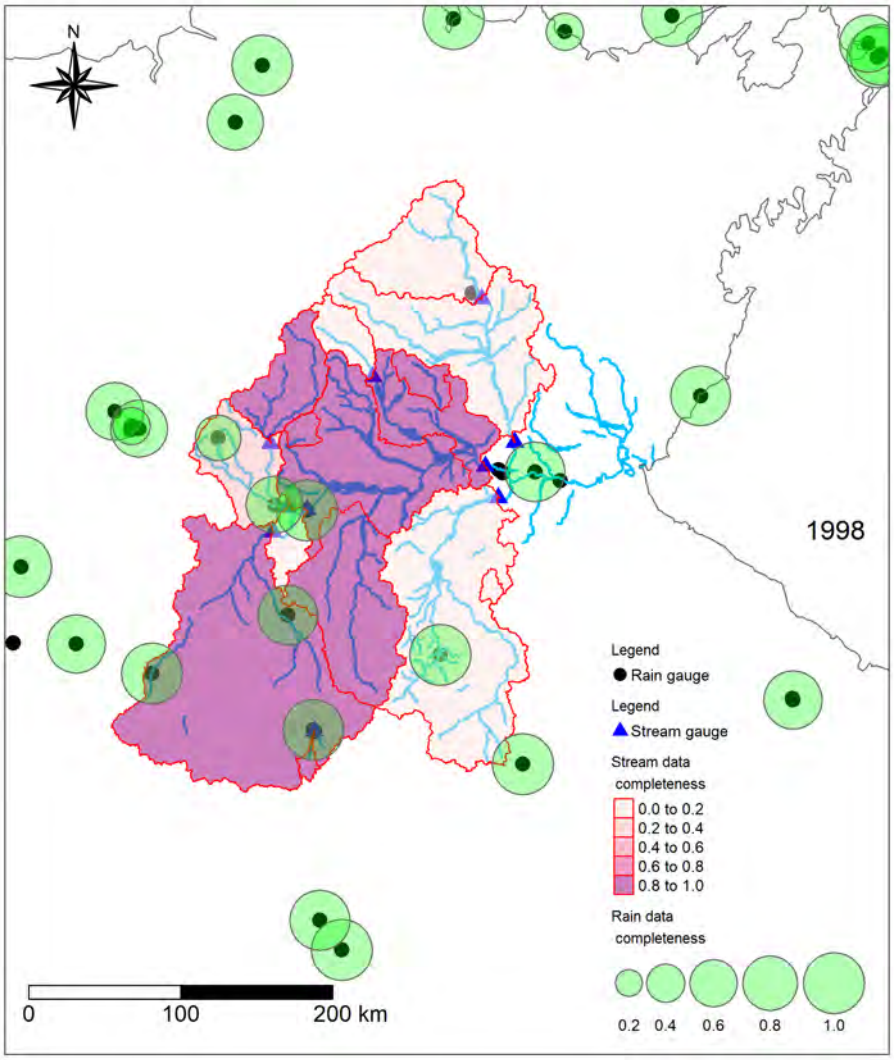


Figure 34: The distribution of rainfall and stream gauge data in the Roper River region in 1998. Size of the green circles indicates the completeness of rain gauge data at that site in the year while the colour ramp indicates the completeness of stream gauge data for contributing areas

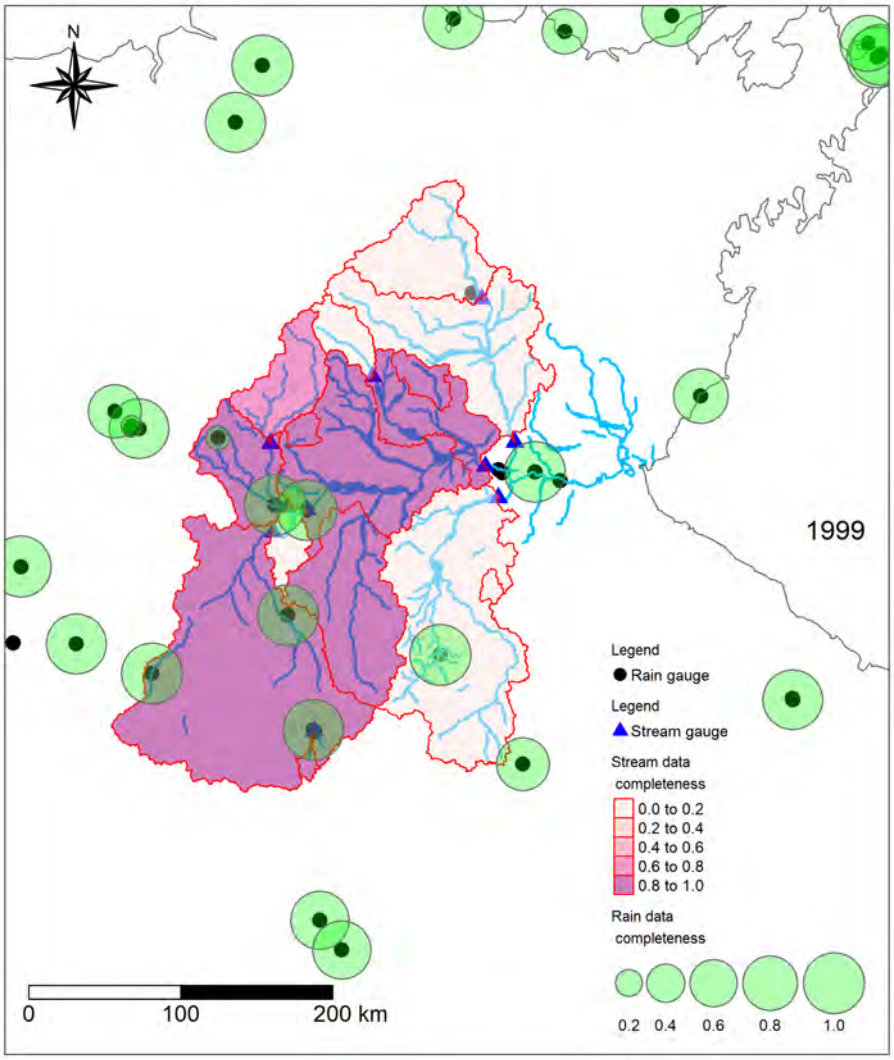


Figure 35: The distribution of rainfall and stream gauge data in the Roper River region in 1999. Size of the green circles indicates the completeness of rain gauge data at that site in the year while the colour ramp indicates the completeness of stream gauge data for contributing areas

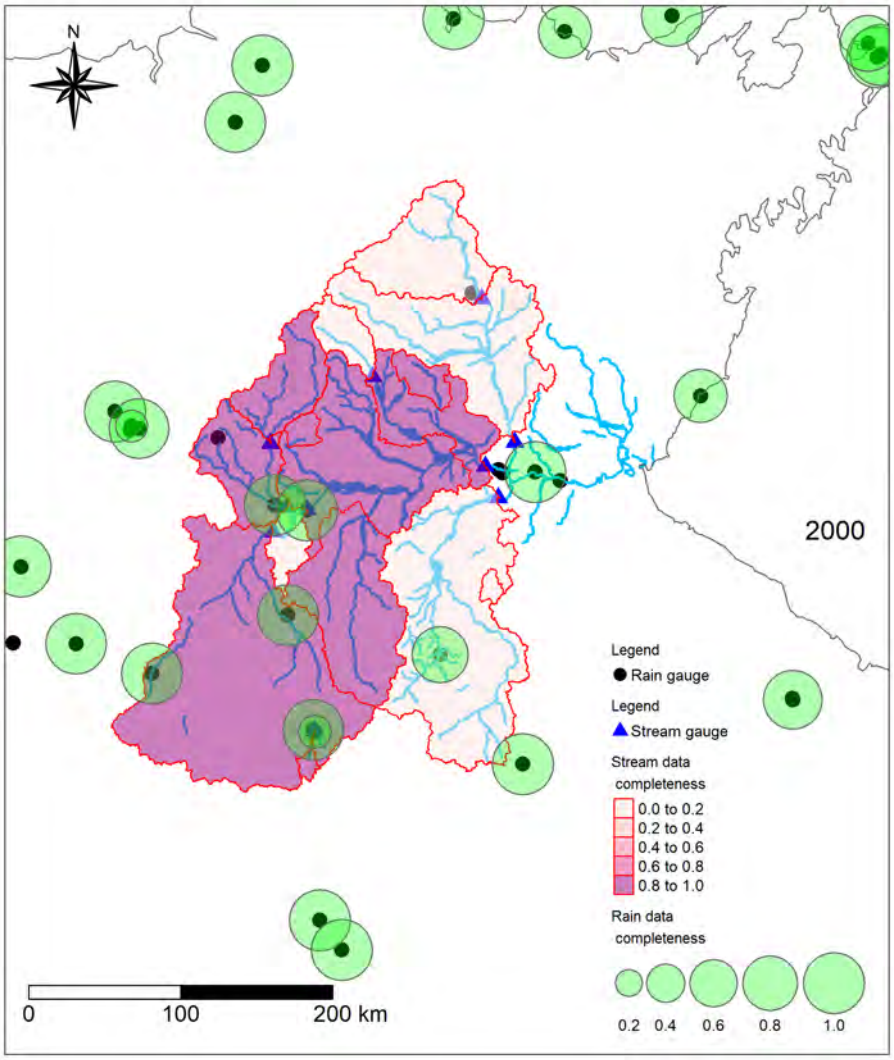


Figure 36: The distribution of rainfall and stream gauge data in the Roper River region in 2000. Size of the green circles indicates the completeness of rain gauge data at that site in the year while the colour ramp indicates the completeness of stream gauge data for contributing areas

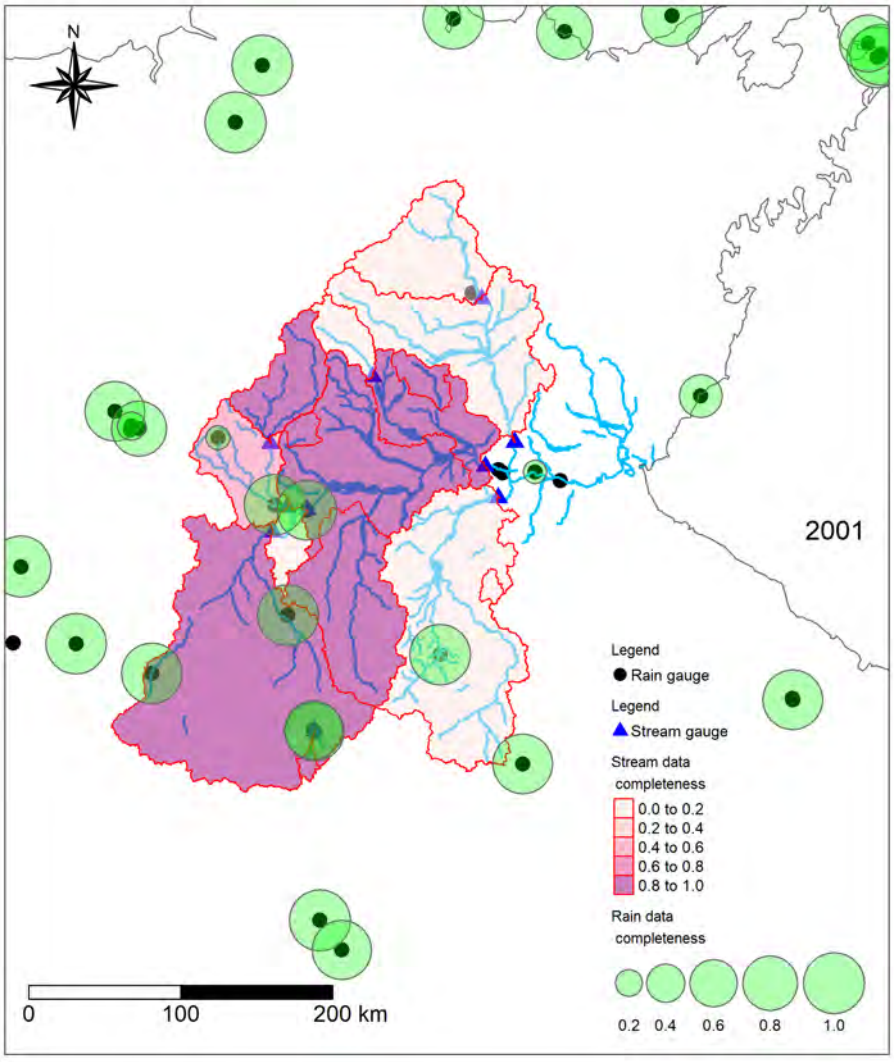


Figure 37: The distribution of rainfall and stream gauge data in the Roper River region in 2001. Size of the green circles indicates the completeness of rain gauge data at that site in the year while the colour ramp indicates the completeness of stream gauge data for contributing areas

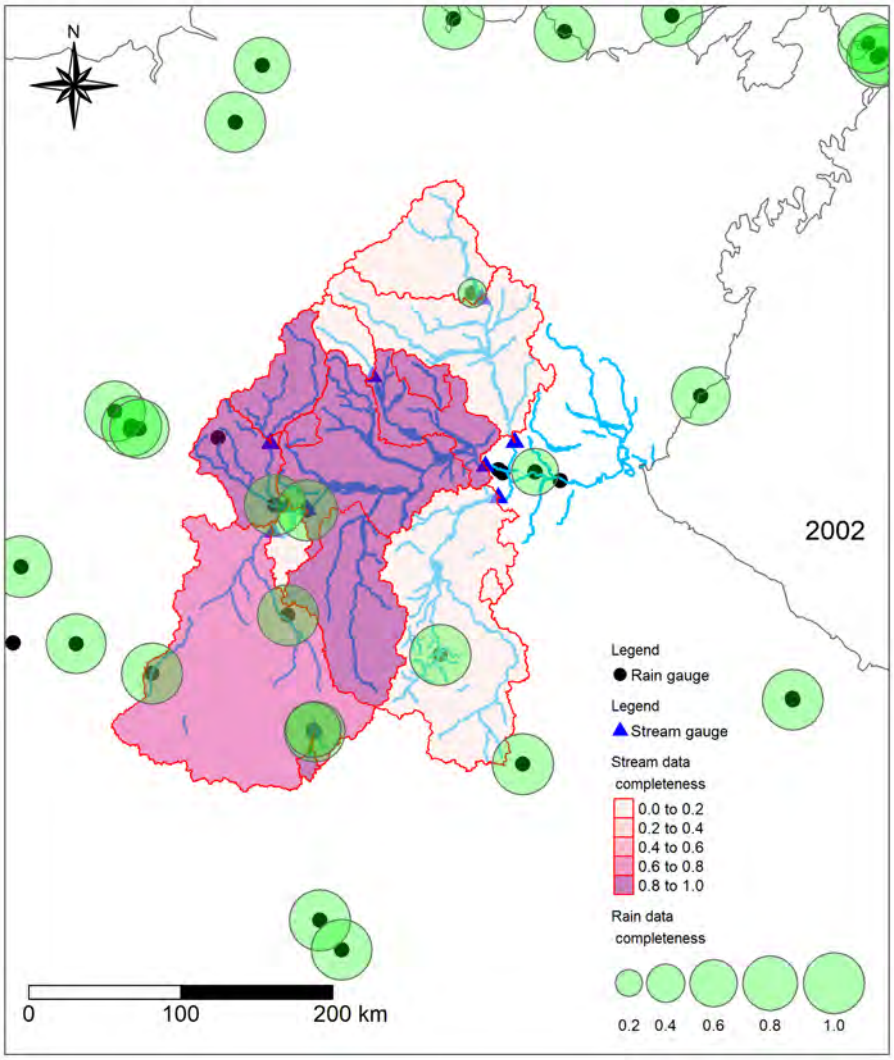


Figure 38: The distribution of rainfall and stream gauge data in the Roper River region in 2002. Size of the green circles indicates the completeness of rain gauge data at that site in the year while the colour ramp indicates the completeness of stream gauge data for contributing areas

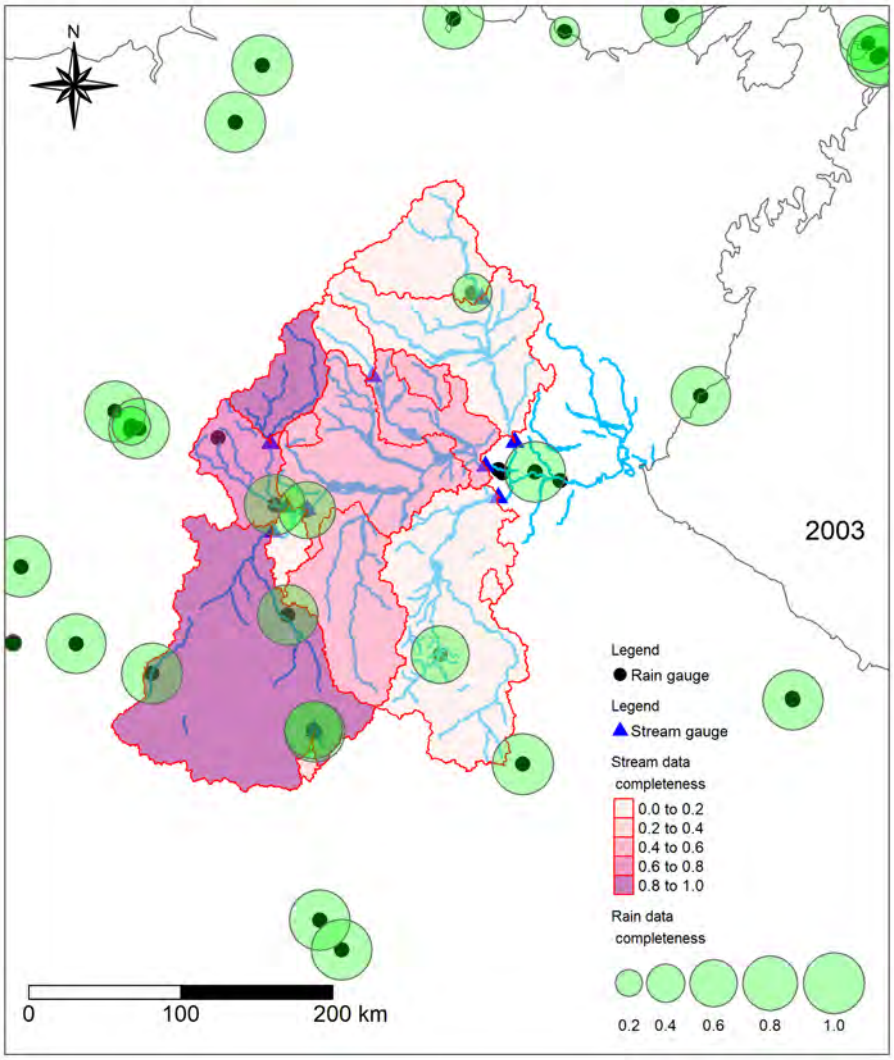


Figure 39: The distribution of rainfall and stream gauge data in the Roper River region in 2003. Size of the green circles indicates the completeness of rain gauge data at that site in the year while the colour ramp indicates the completeness of stream gauge data for contributing areas

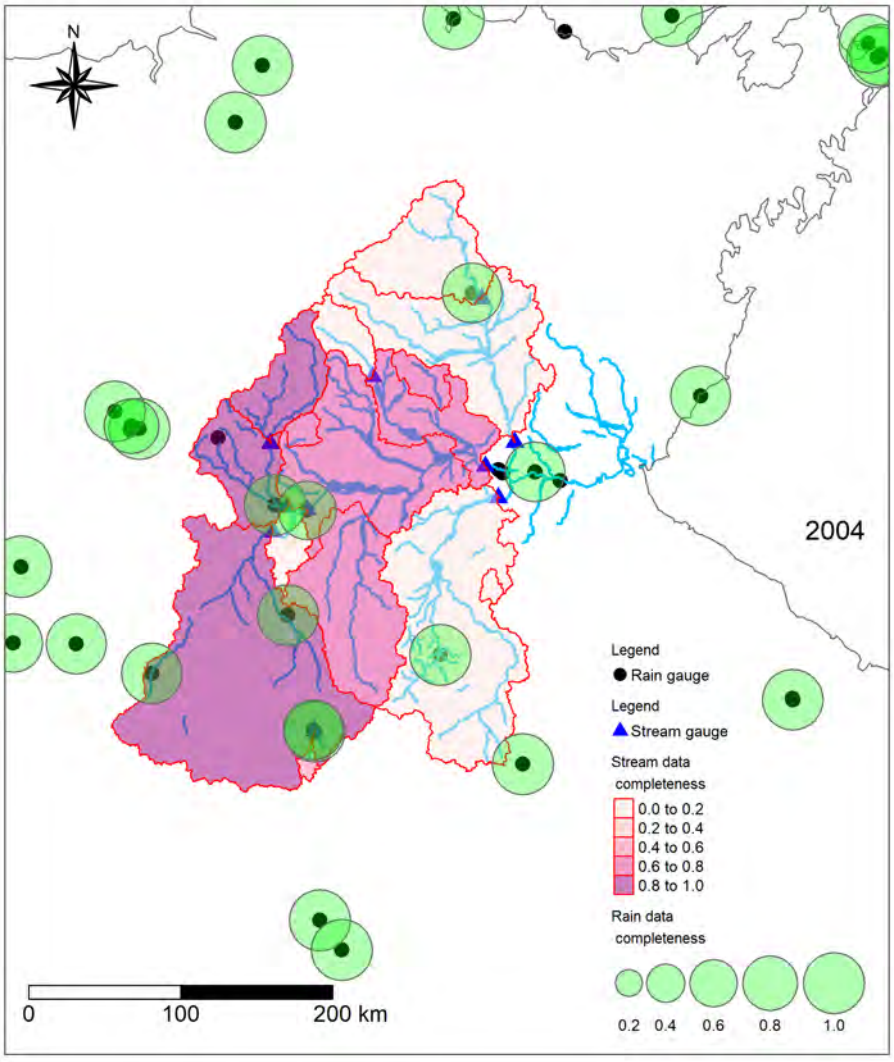


Figure 40: The distribution of rainfall and stream gauge data in the Roper River region in 2004. Size of the green circles indicates the completeness of rain gauge data at that site in the year while the colour ramp indicates the completeness of stream gauge data for contributing areas

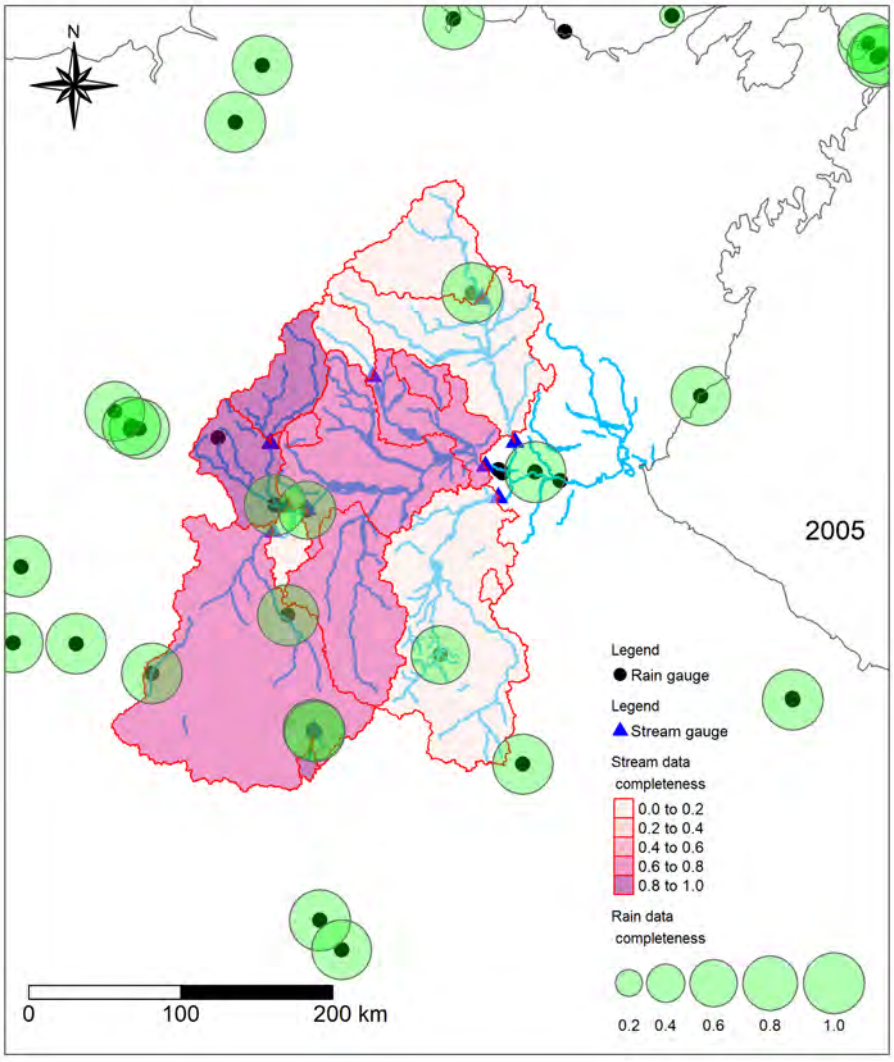


Figure 41: The distribution of rainfall and stream gauge data in the Roper River region in 2005. Size of the green circles indicates the completeness of rain gauge data at that site in the year while the colour ramp indicates the completeness of stream gauge data for contributing areas

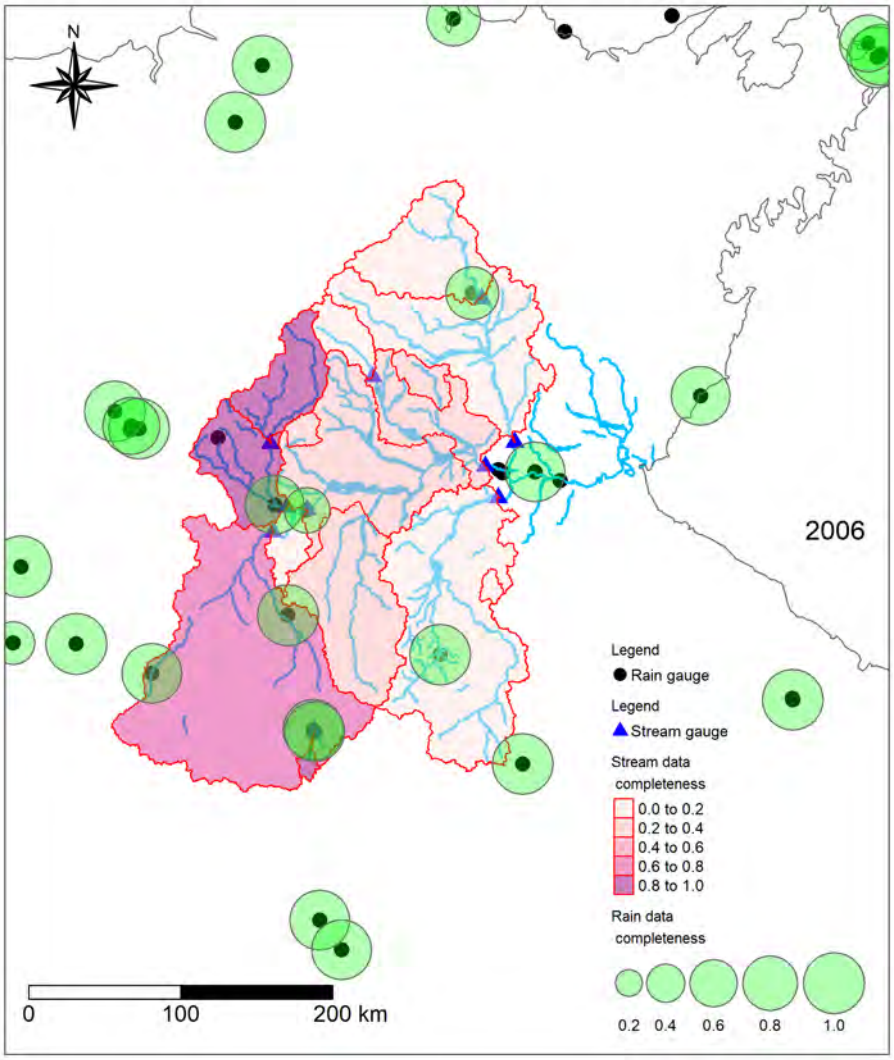


Figure 42: The distribution of rainfall and stream gauge data in the Roper River region in 2006. Size of the green circles indicates the completeness of rain gauge data at that site in the year while the colour ramp indicates the completeness of stream gauge data for contributing areas

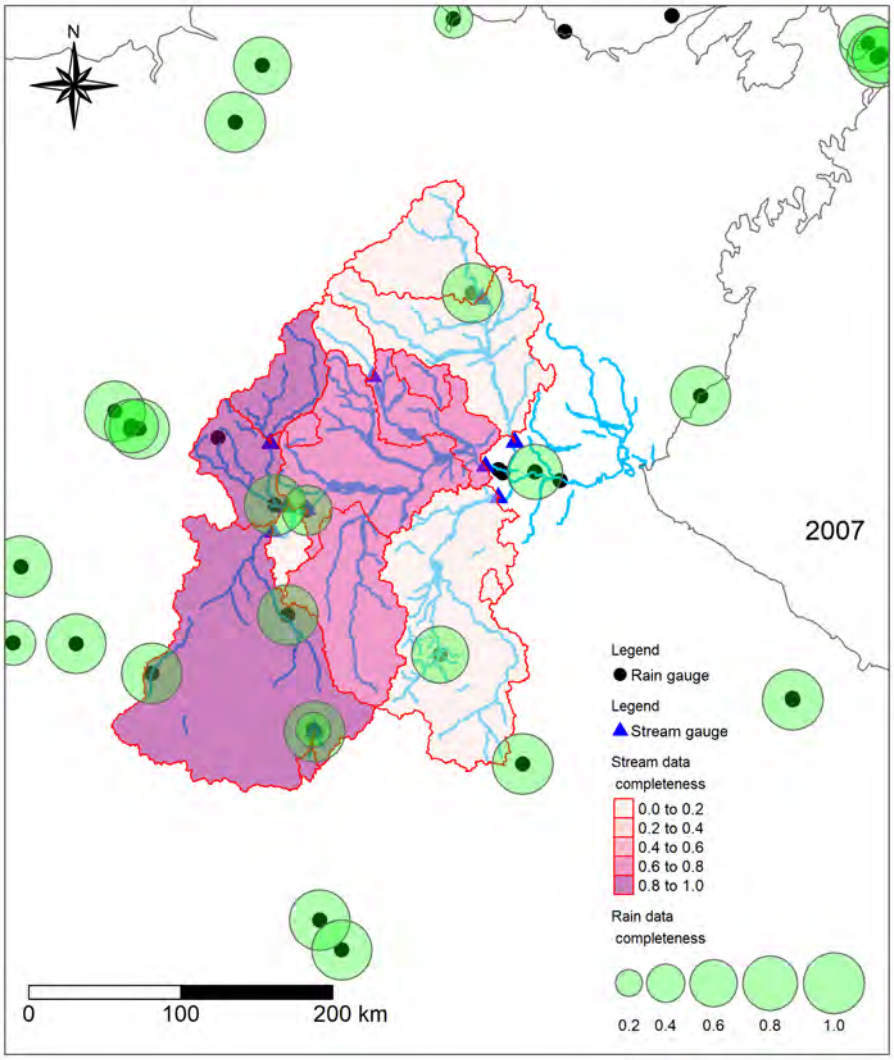


Figure 43: The distribution of rainfall and stream gauge data in the Roper River region in 2007. Size of the green circles indicates the completeness of rain gauge data at that site in the year while the colour ramp indicates the completeness of stream gauge data for contributing areas

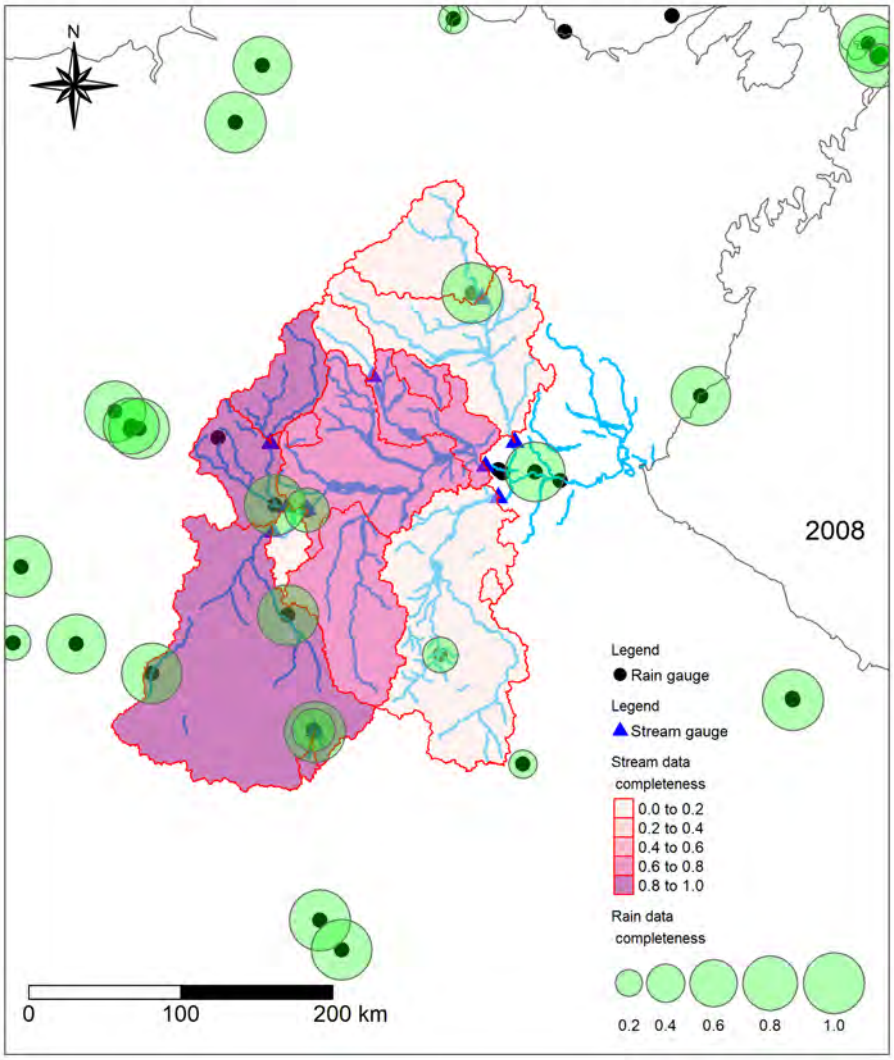


Figure 44: The distribution of rainfall and stream gauge data in the Roper River region in 2008. Size of the green circles indicates the completeness of rain gauge data at that site in the year while the colour ramp indicates the completeness of stream gauge data for contributing areas

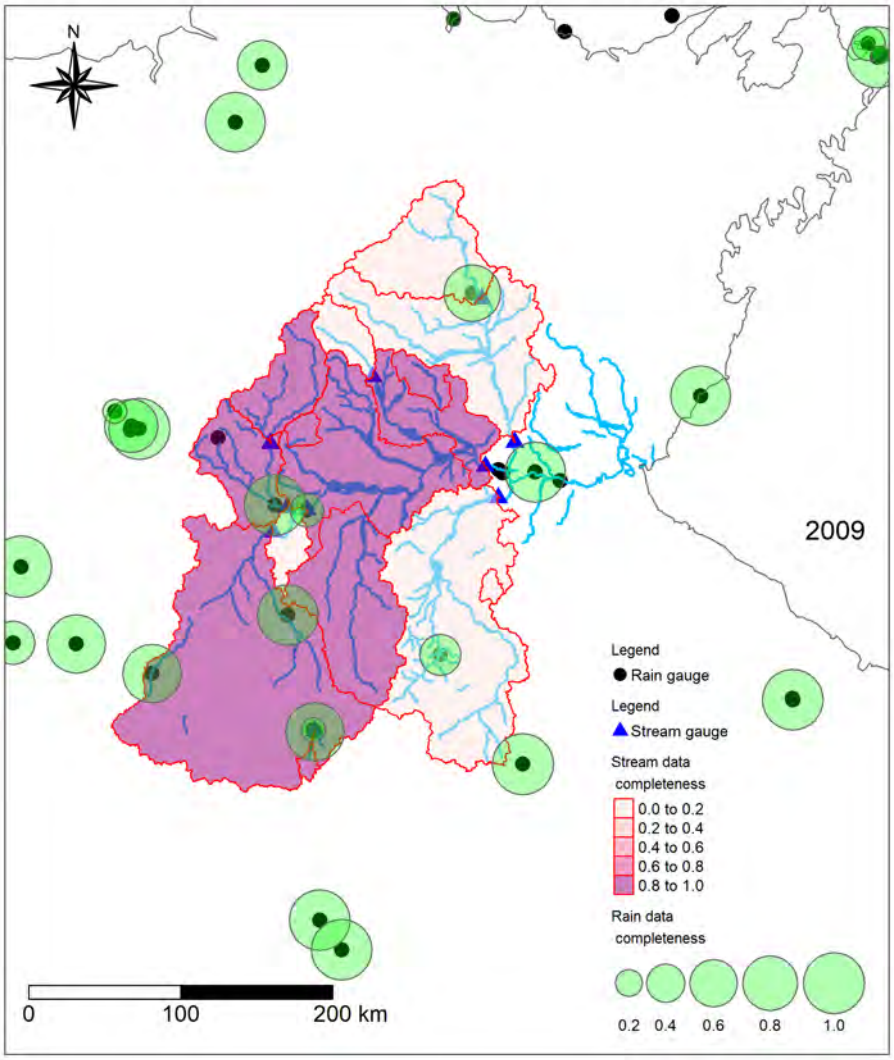


Figure 45: The distribution of rainfall and stream gauge data in the Roper River region in 2009. Size of the green circles indicates the completeness of rain gauge data at that site in the year while the colour ramp indicates the completeness of stream gauge data for contributing areas

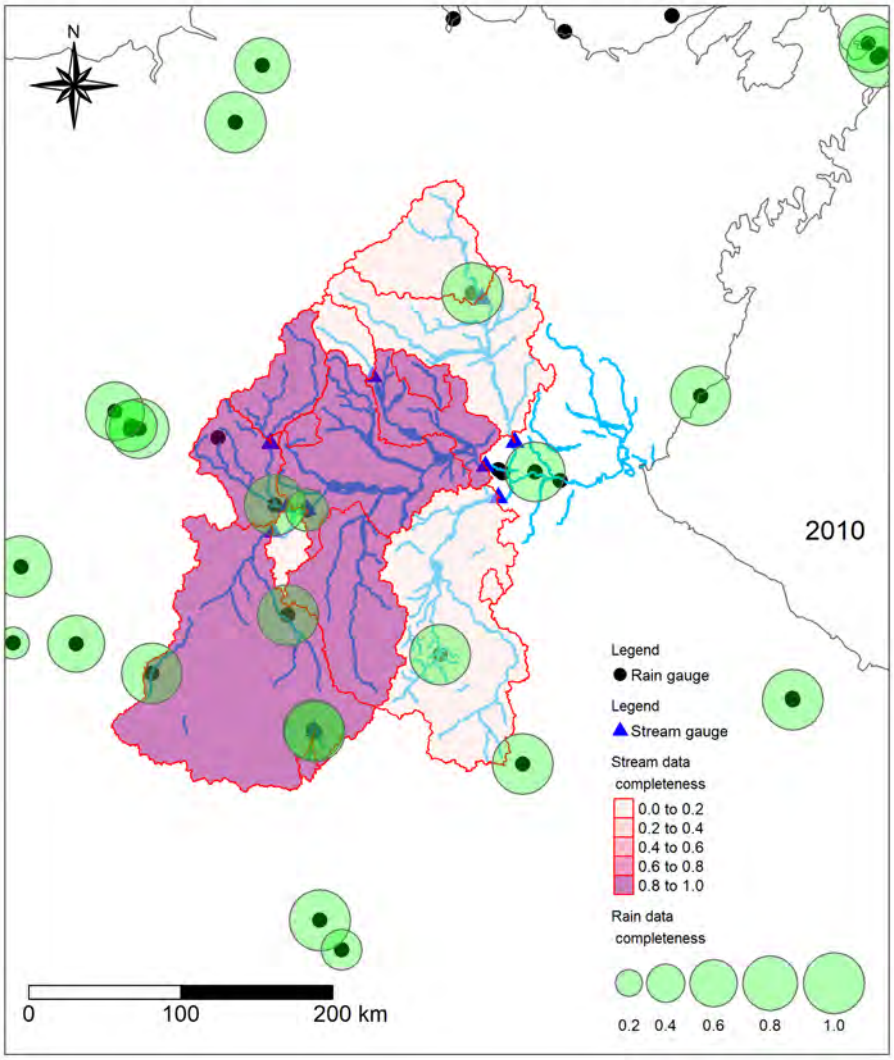


Figure 46: The distribution of rainfall and stream gauge data in the Roper River region in 2010. Size of the green circles indicates the completeness of rain gauge data at that site in the year while the colour ramp indicates the completeness of stream gauge data for contributing areas

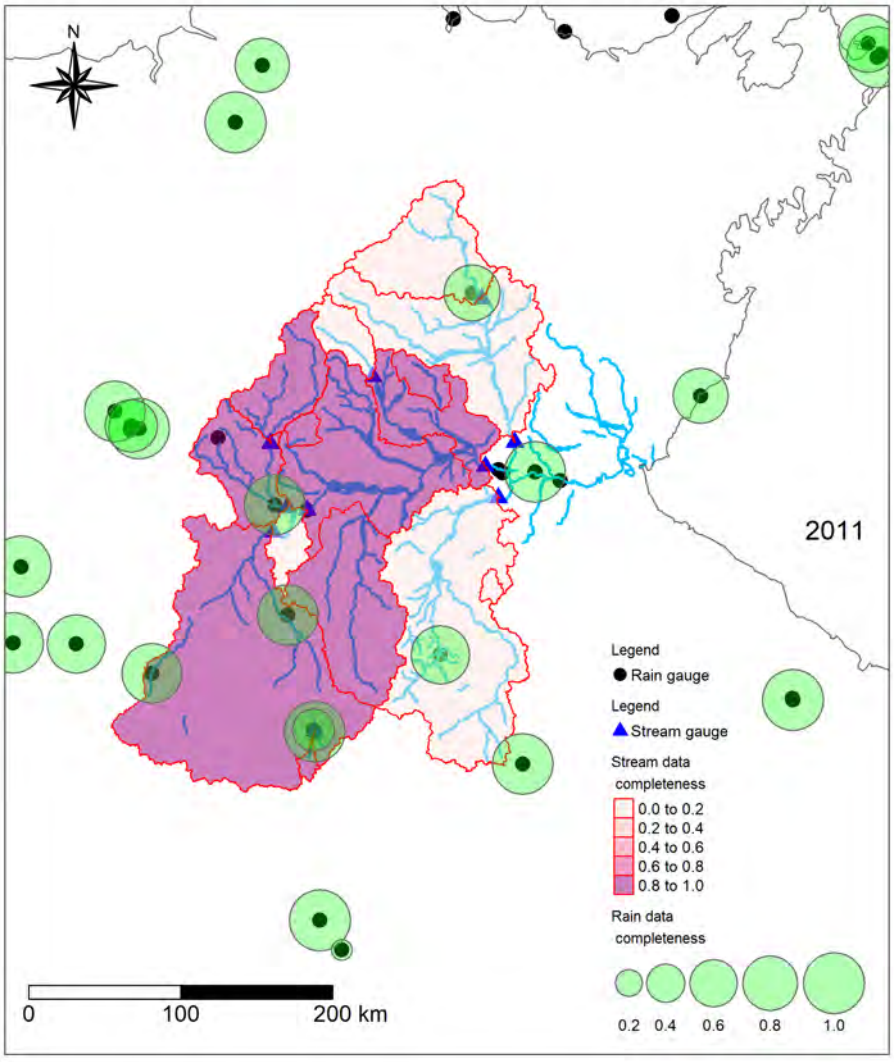


Figure 47: The distribution of rainfall and stream gauge data in the Roper River region in 2011. Size of the green circles indicates the completeness of rain gauge data at that site in the year while the colour ramp indicates the completeness of stream gauge data for contributing areas

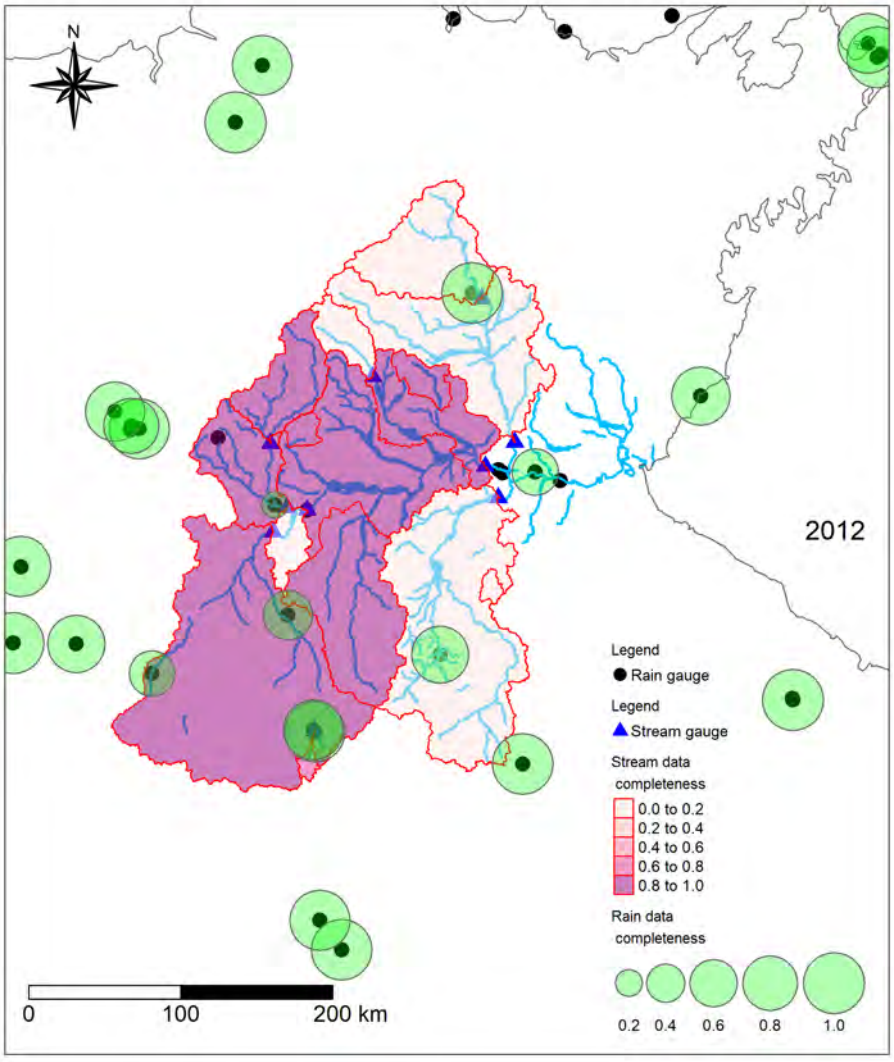


Figure 48: The distribution of rainfall and stream gauge data in the Roper River region in 2012. Size of the green circles indicates the completeness of rain gauge data at that site in the year while the colour ramp indicates the completeness of stream gauge data for contributing areas

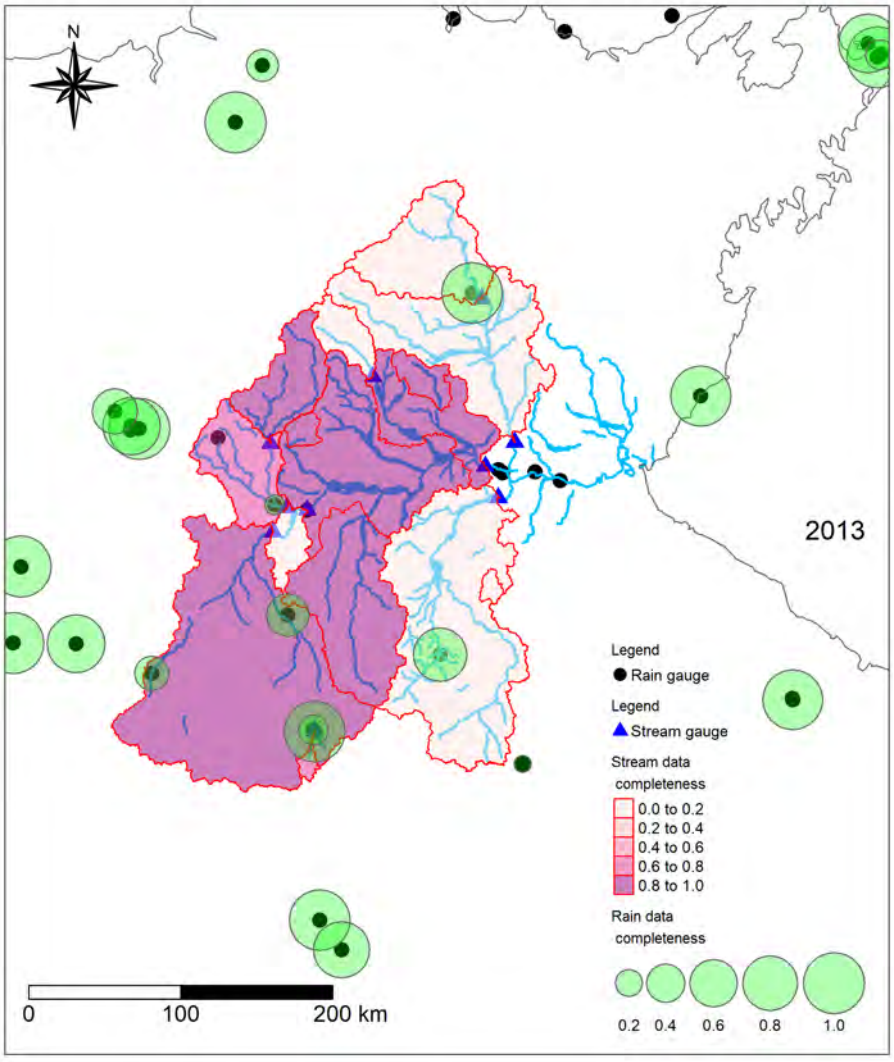


Figure 49: The distribution of rainfall and stream gauge data in the Roper River region in 2013. Size of the green circles indicates the completeness of rain gauge data at that site in the year while the colour ramp indicates the completeness of stream gauge data for contributing areas

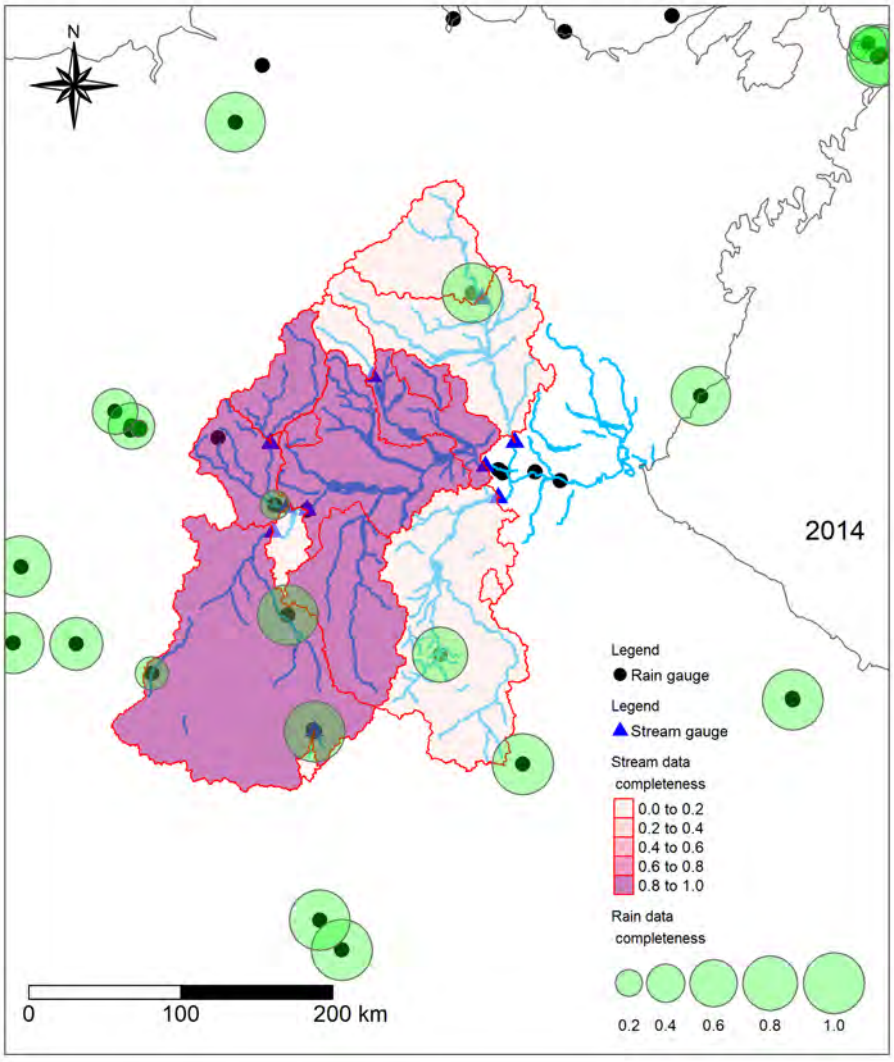


Figure 50: The distribution of rainfall and stream gauge data in the Roper River region in 2014. Size of the green circles indicates the completeness of rain gauge data at that site in the year while the colour ramp indicates the completeness of stream gauge data for contributing areas

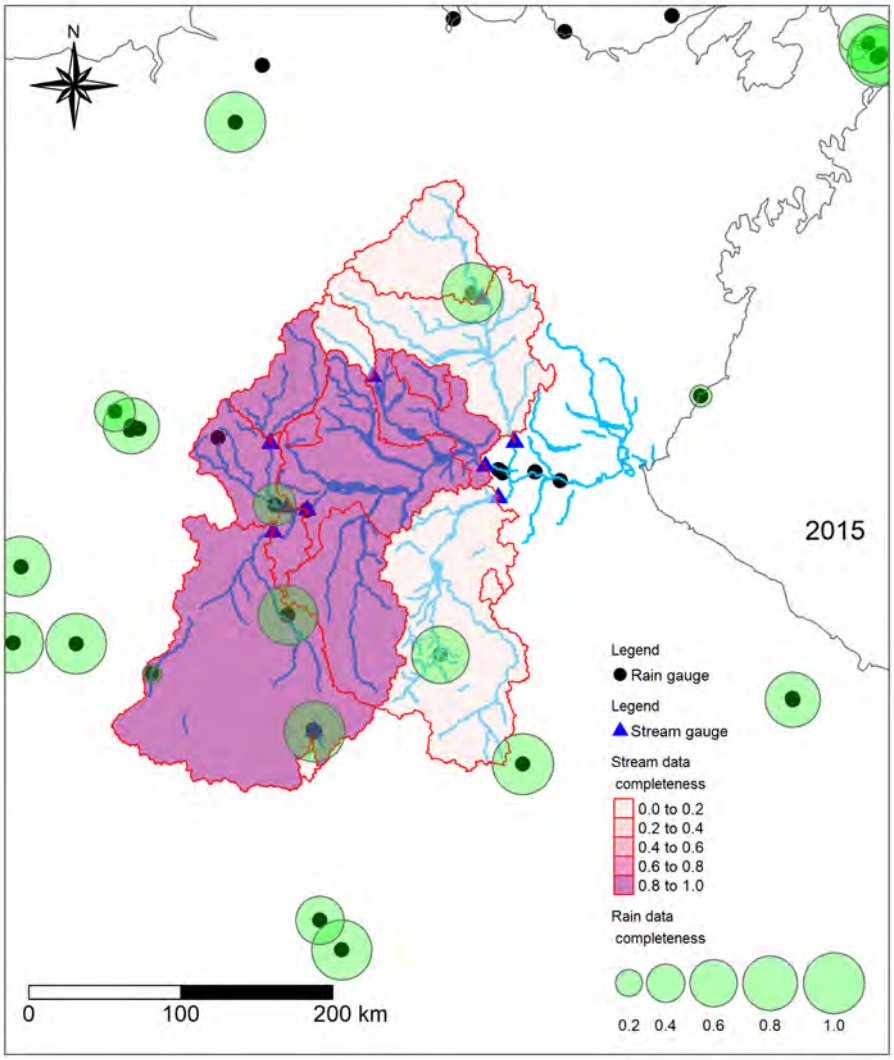


Figure 51: The distribution of rainfall and stream gauge data in the Roper River region in 2015. Size of the green circles indicates the completeness of rain gauge data at that site in the year while the colour ramp indicates the completeness of stream gauge data for contributing areas

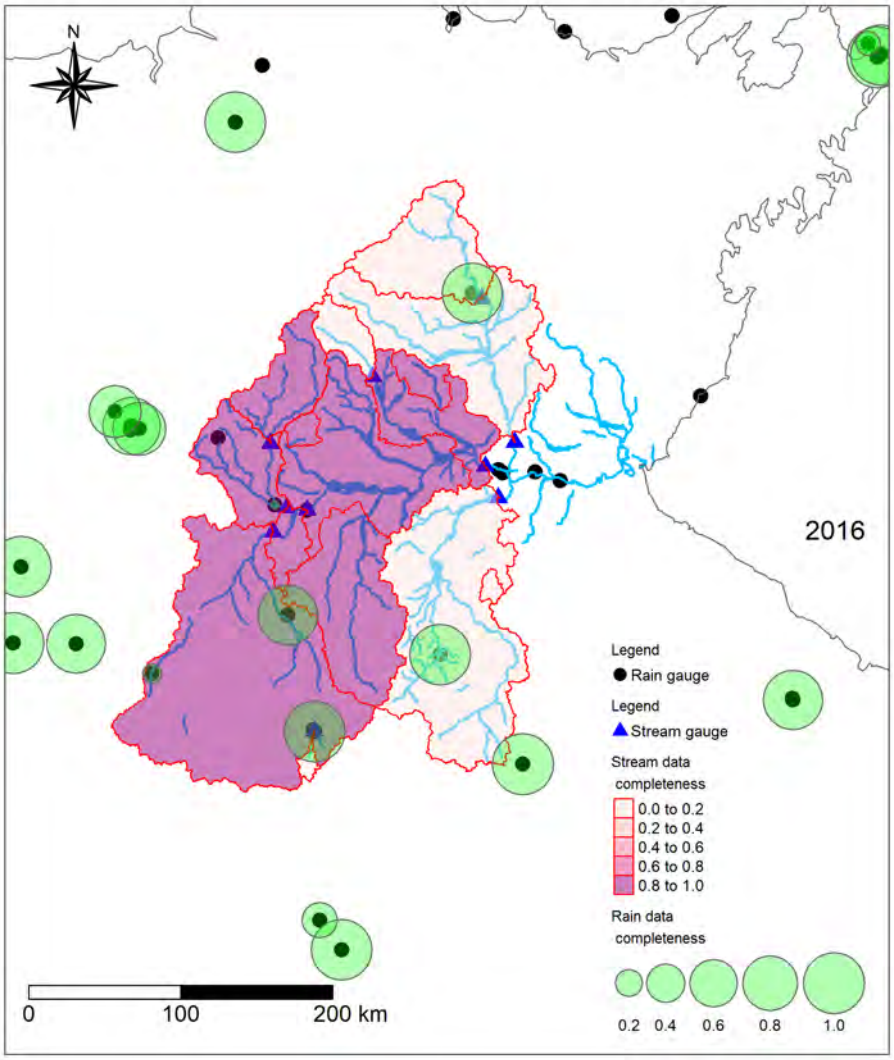


Figure 52: The distribution of rainfall and stream gauge data in the Roper River region in 2016. Size of the green circles indicates the completeness of rain gauge data at that site in the year while the colour ramp indicates the completeness of stream gauge data for contributing areas

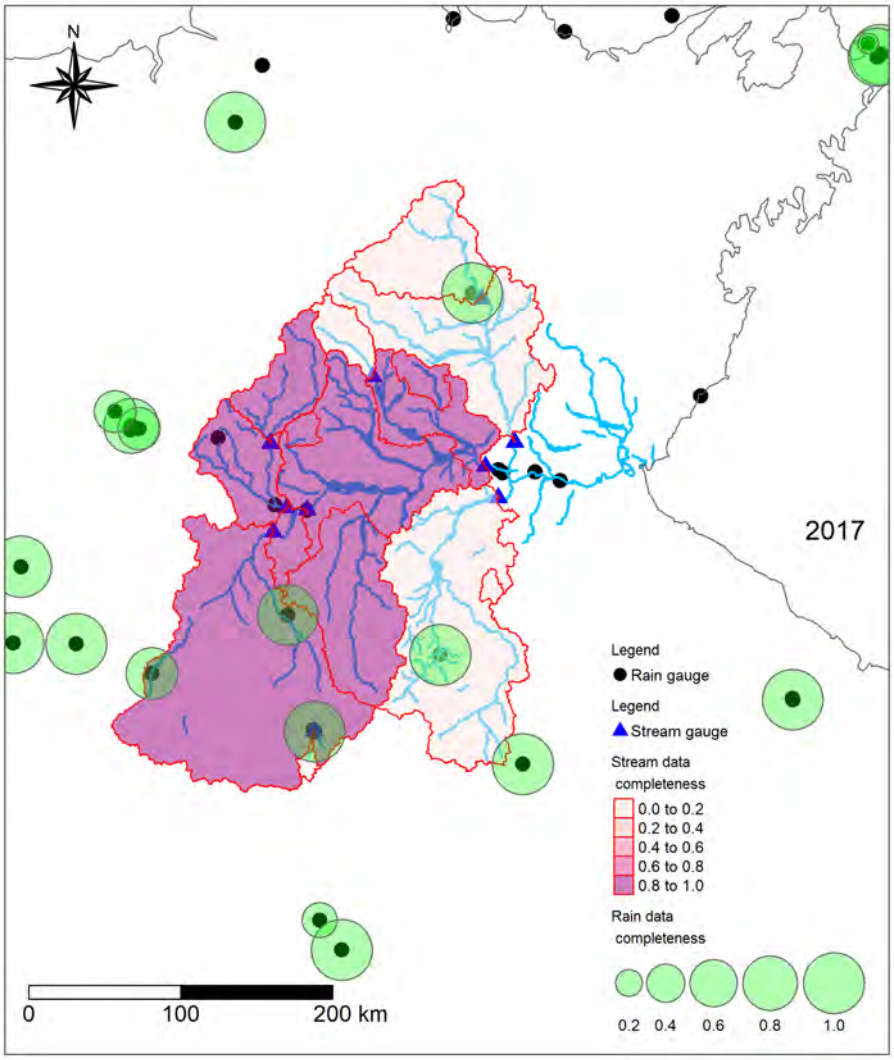


Figure 53: The distribution of rainfall and stream gauge data in the Roper River region in 2017. Size of the green circles indicates the completeness of rain gauge data at that site in the year while the colour ramp indicates the completeness of stream gauge data for contributing areas

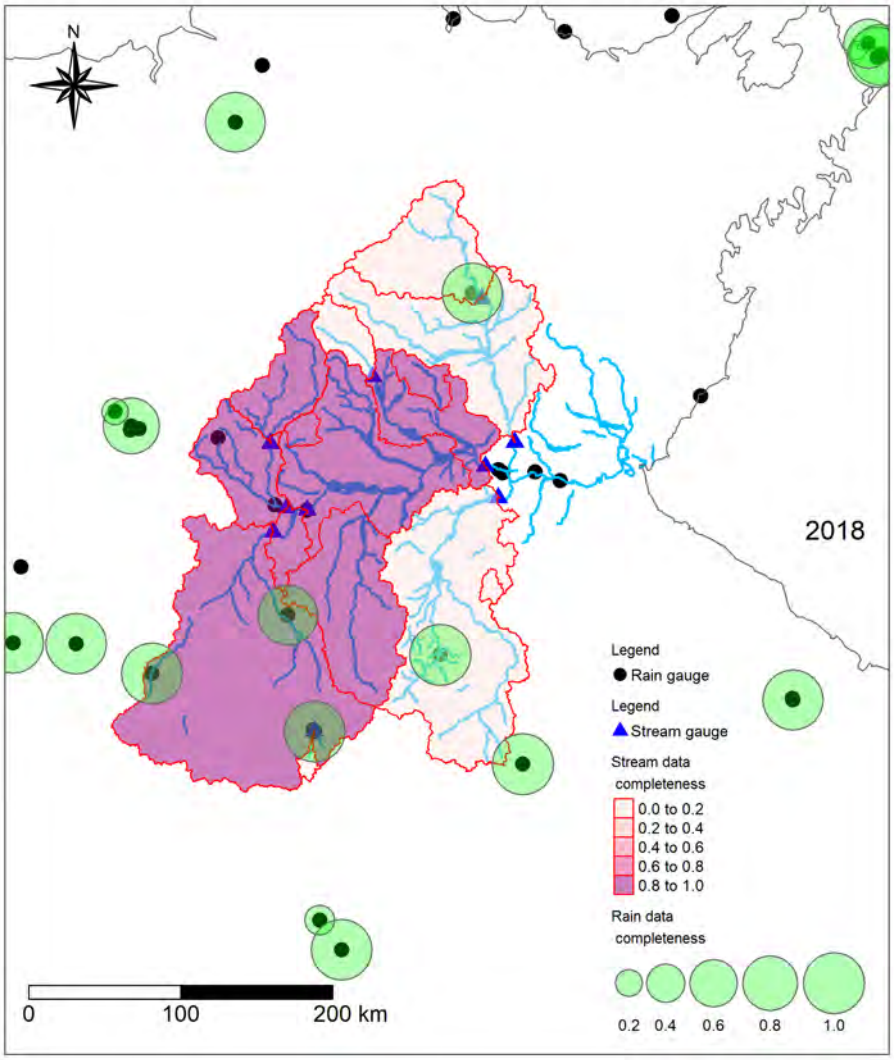
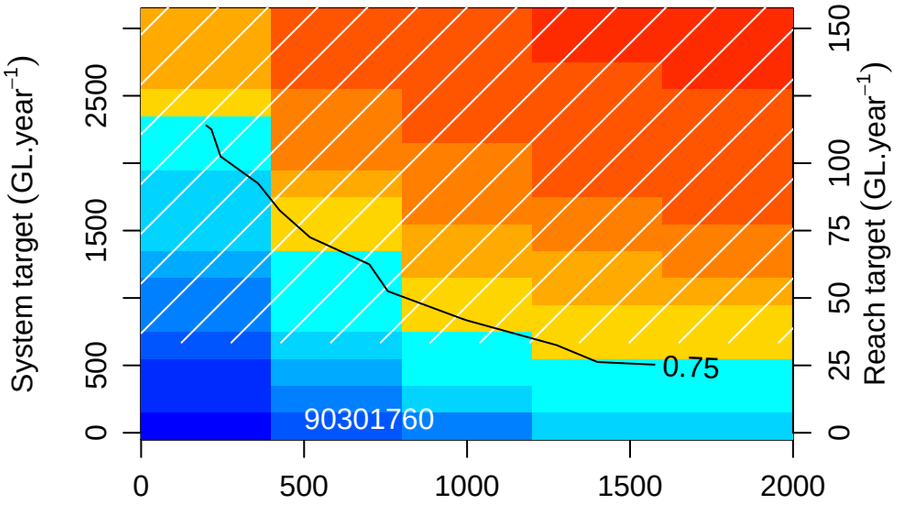
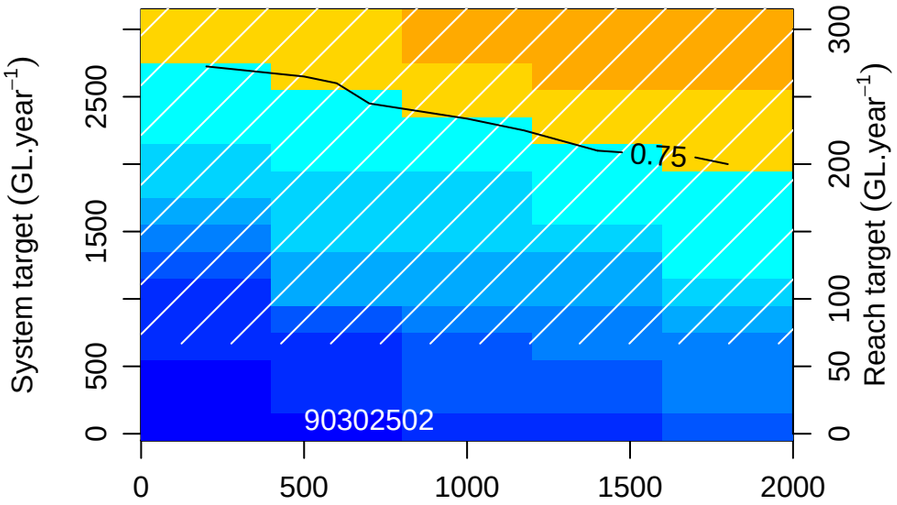


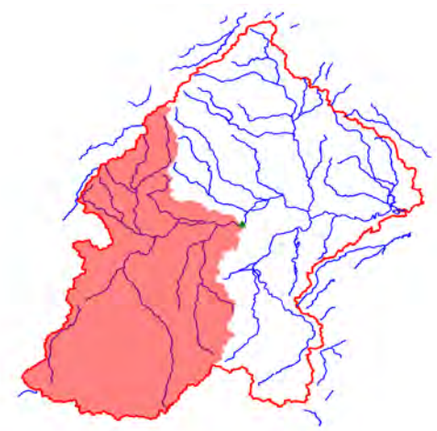
Figure 54: The distribution of rainfall and stream gauge data in the Roper River region in 2018. Size of the green circles indicates the completeness of rain gauge data at that site in the year while the colour ramp indicates the completeness of stream gauge data for contributing areas

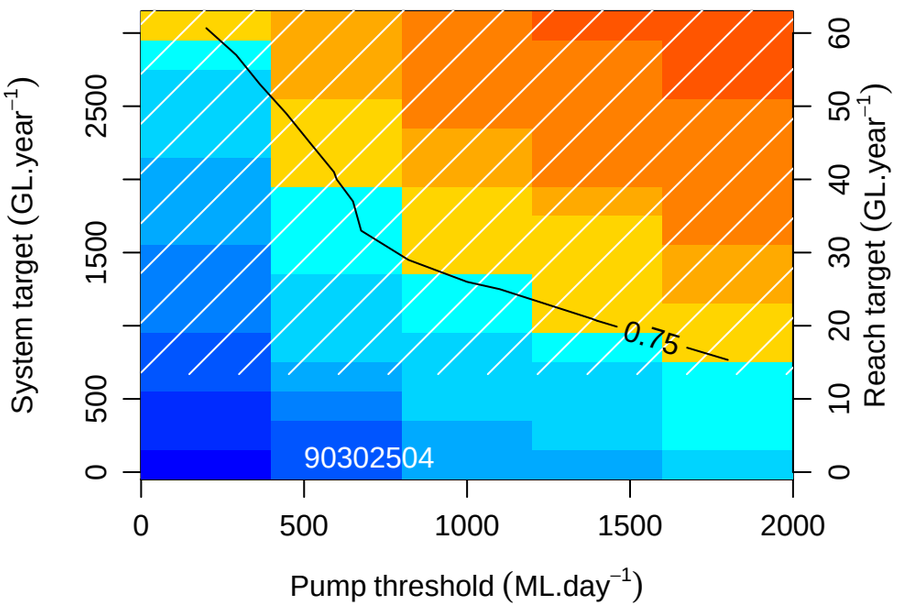
Supplementary material 2: pump rate for 5, 10, 15, 20, 30 and 40 day periods, Roper catchment

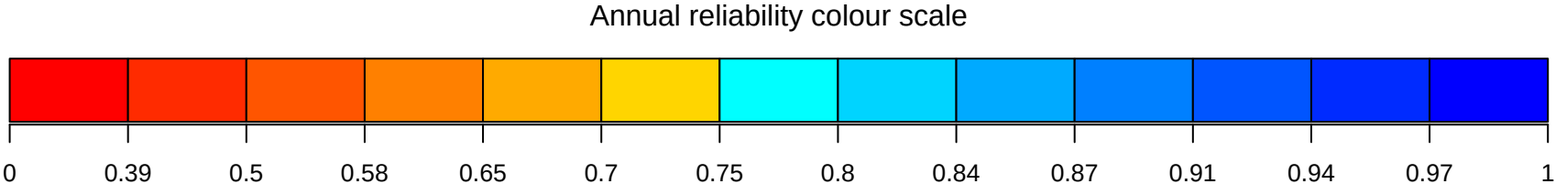
Pump rate : 5 days

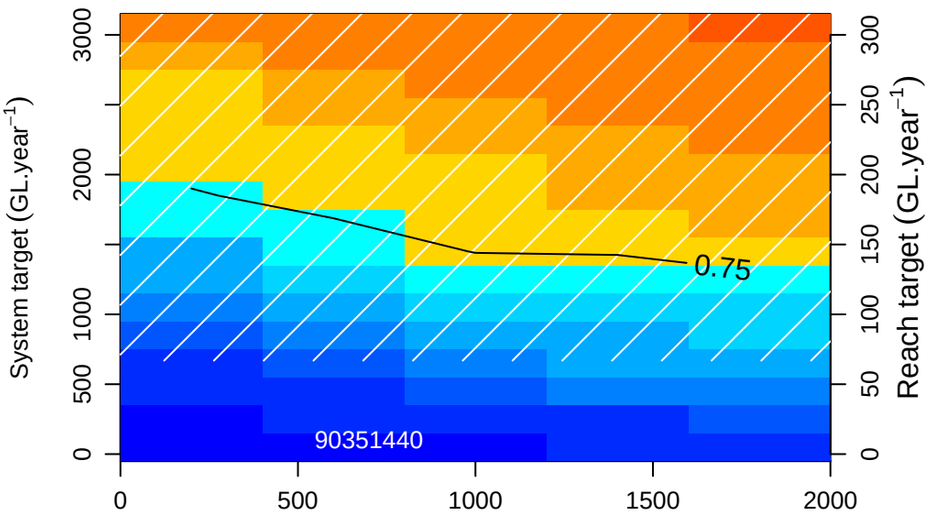


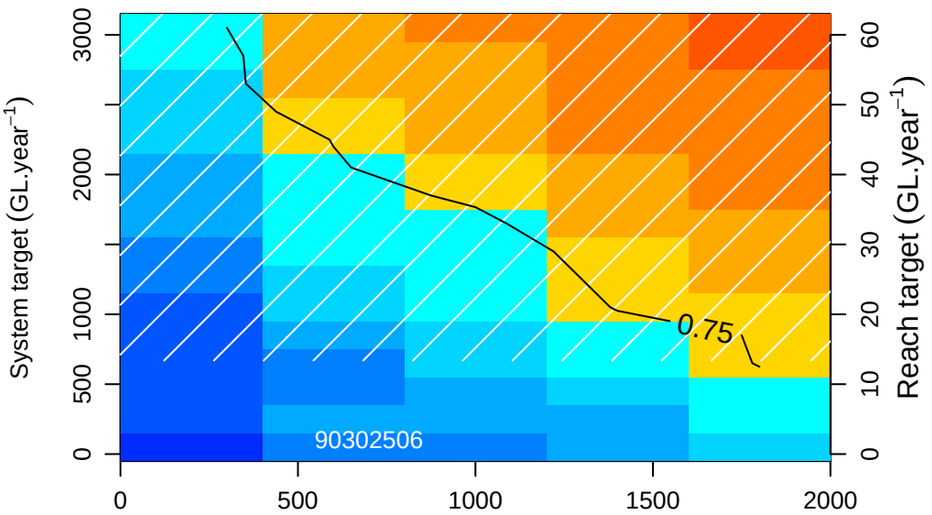


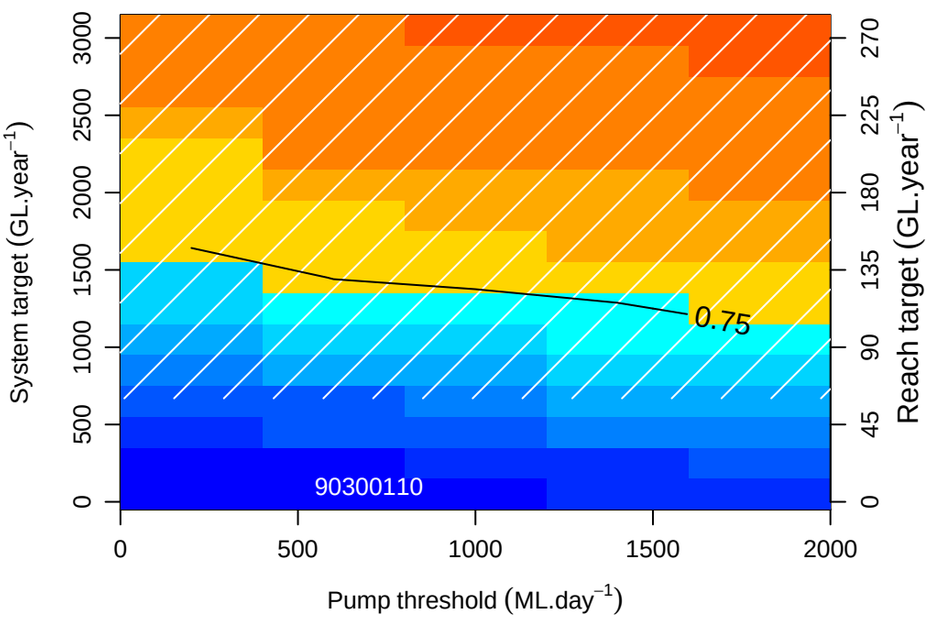


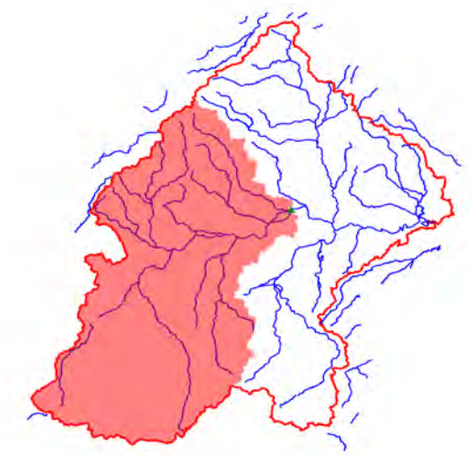




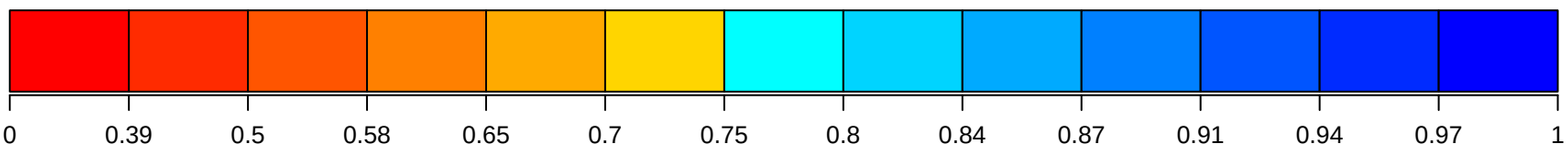


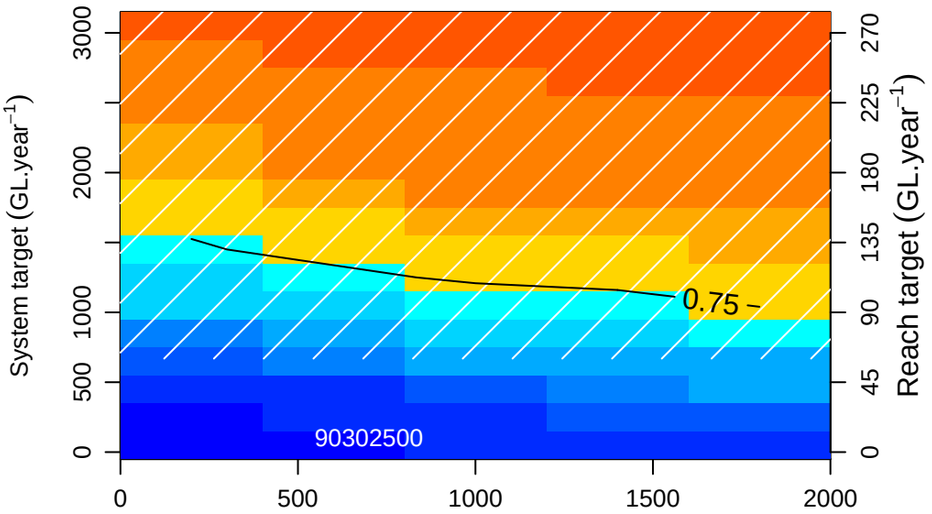


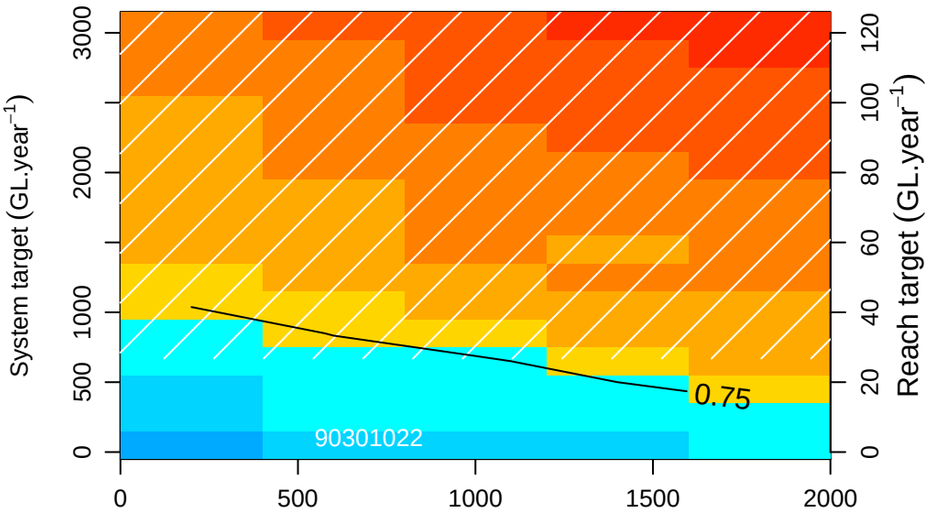


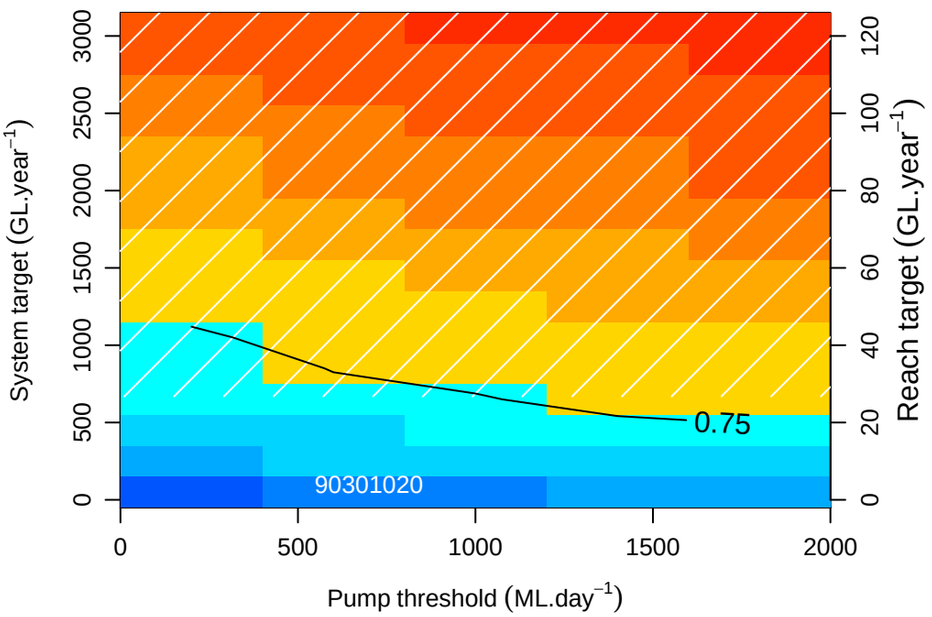


Annual reliability colour scale

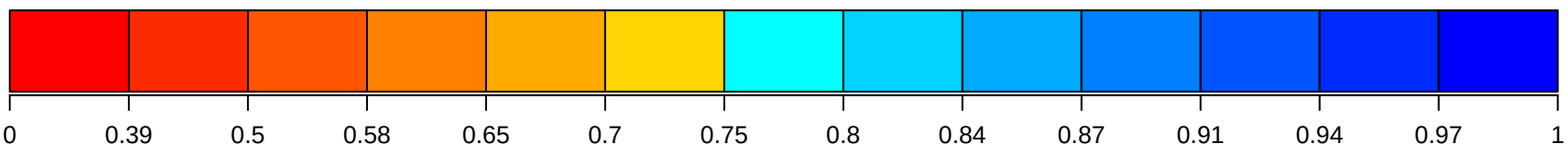


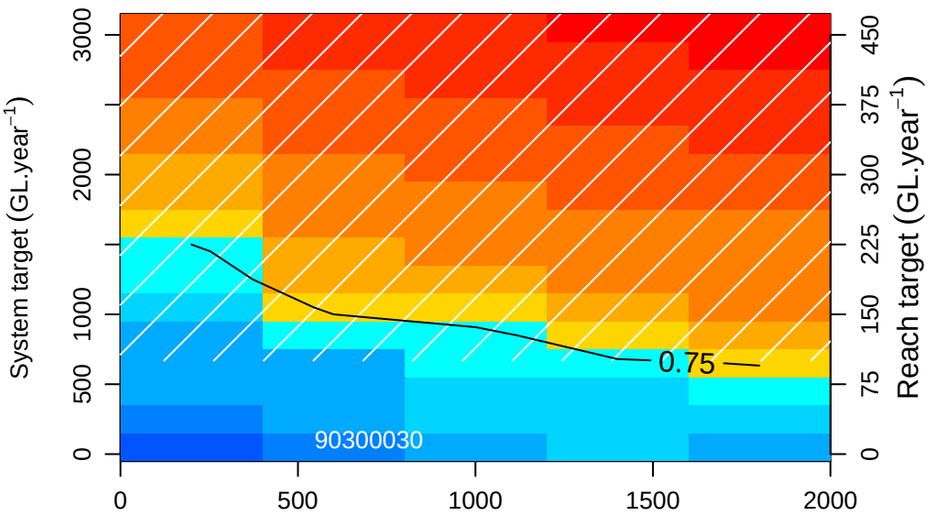


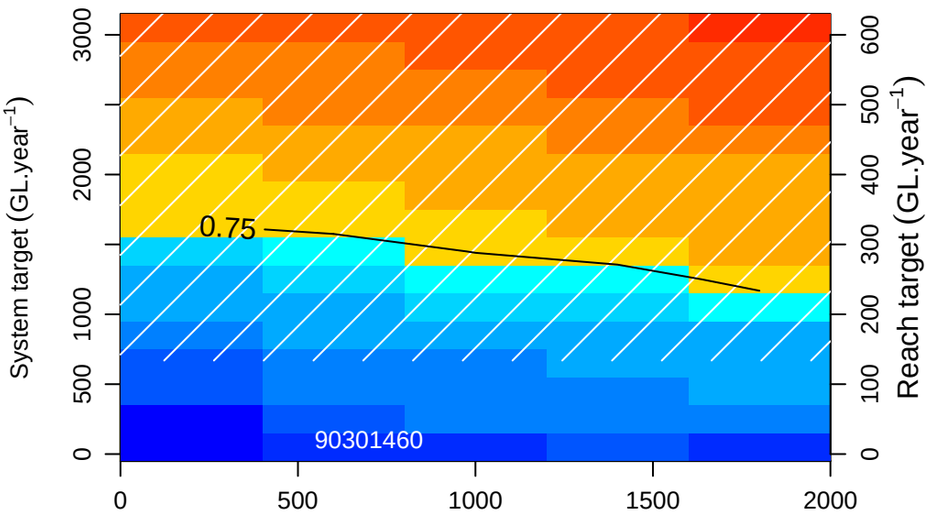


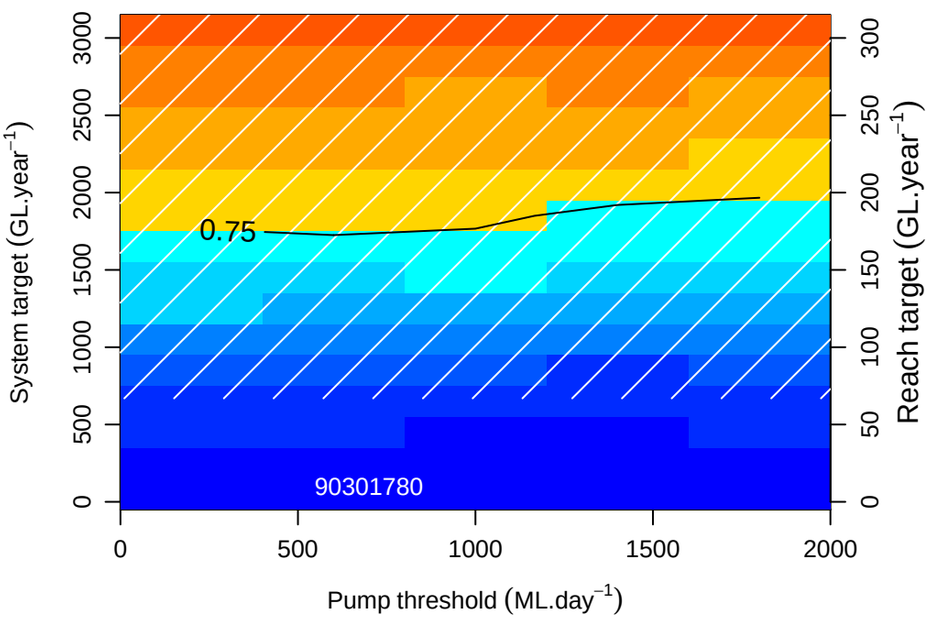


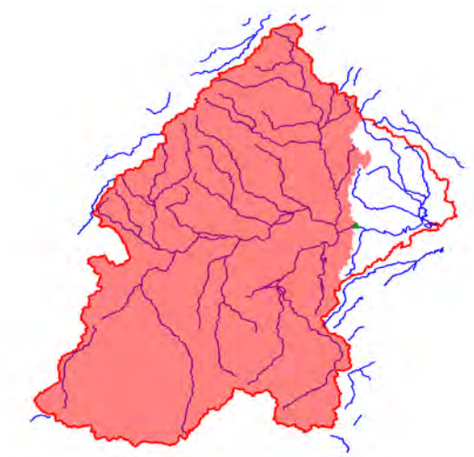
Annual reliability colour scale



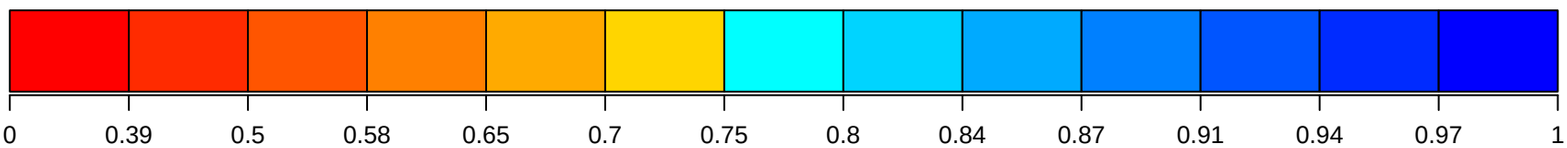




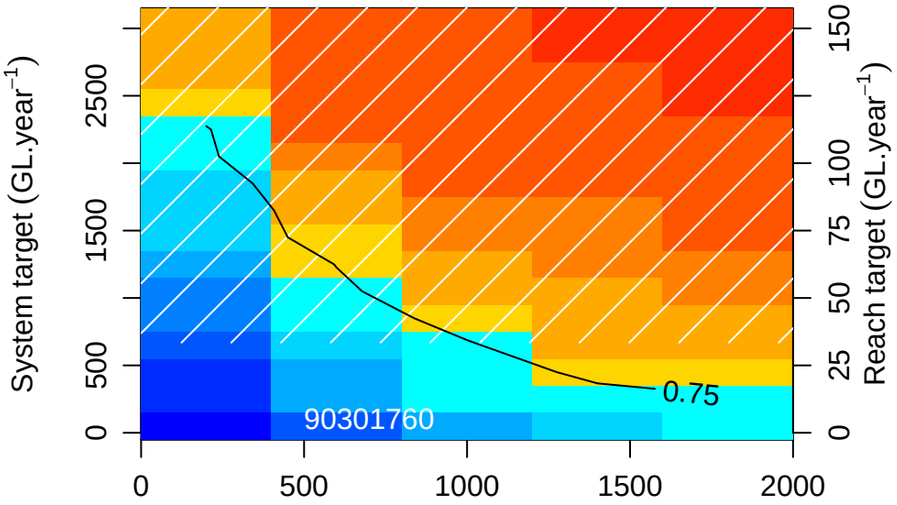


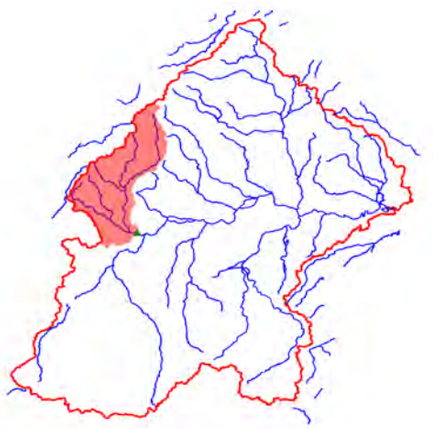


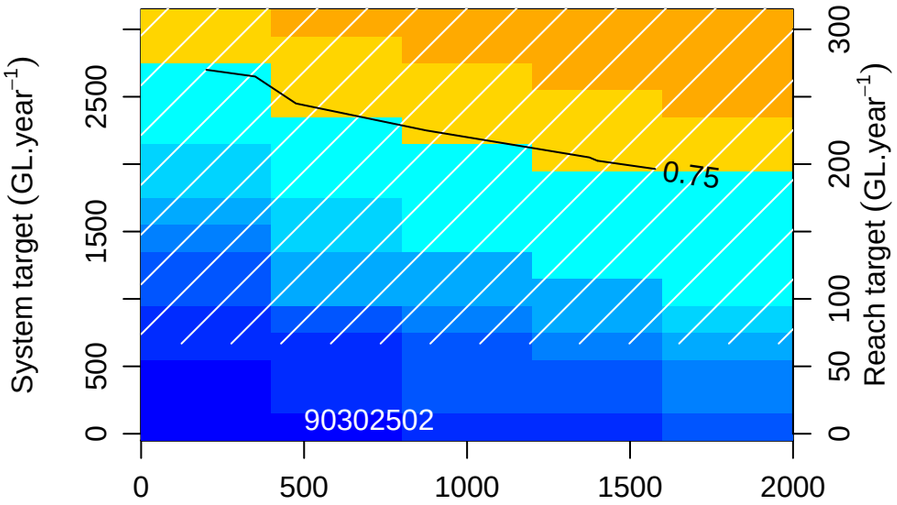
Annual reliability colour scale

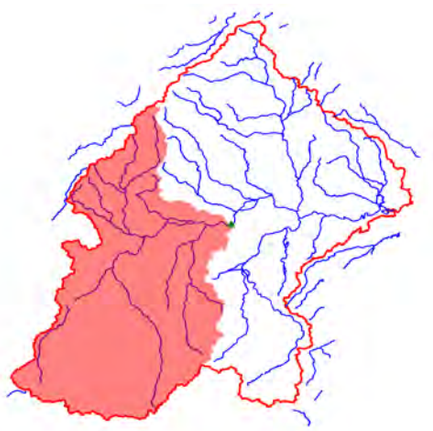


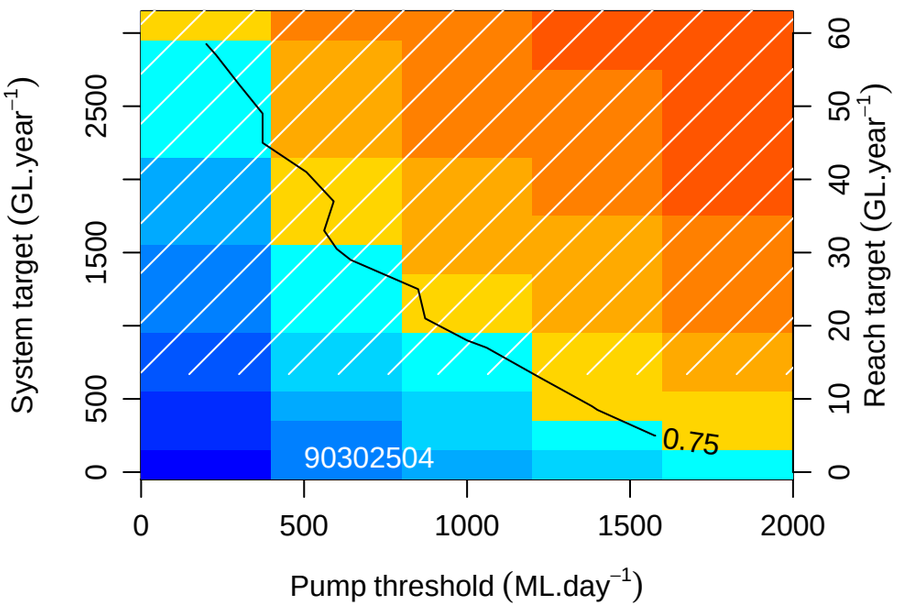
Pump rate : 10 days

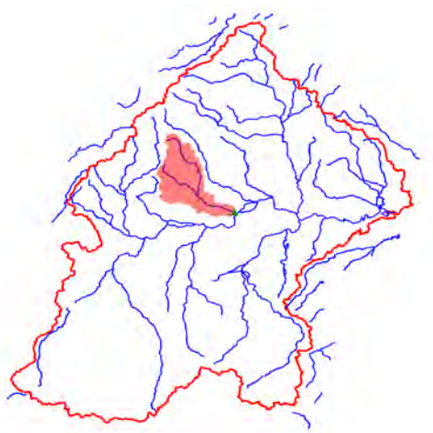


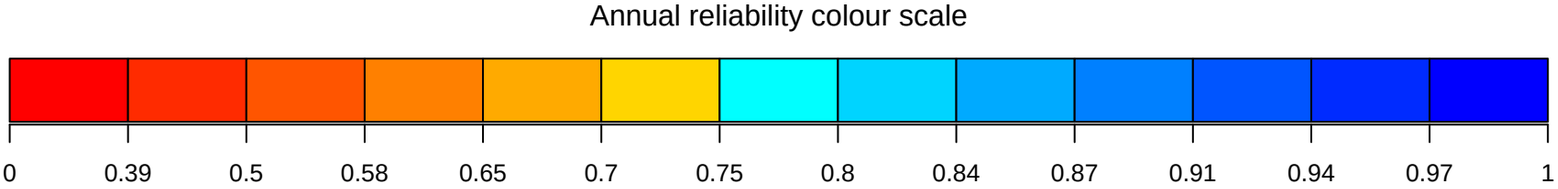


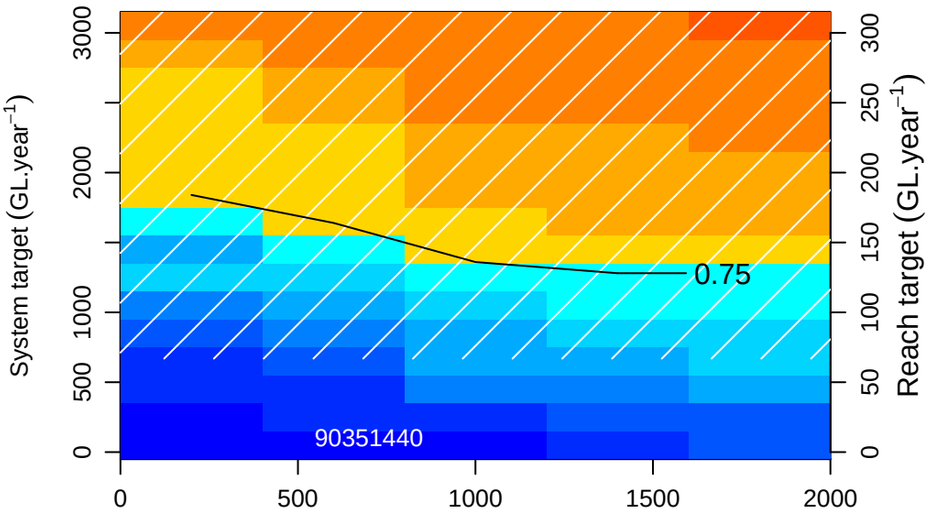


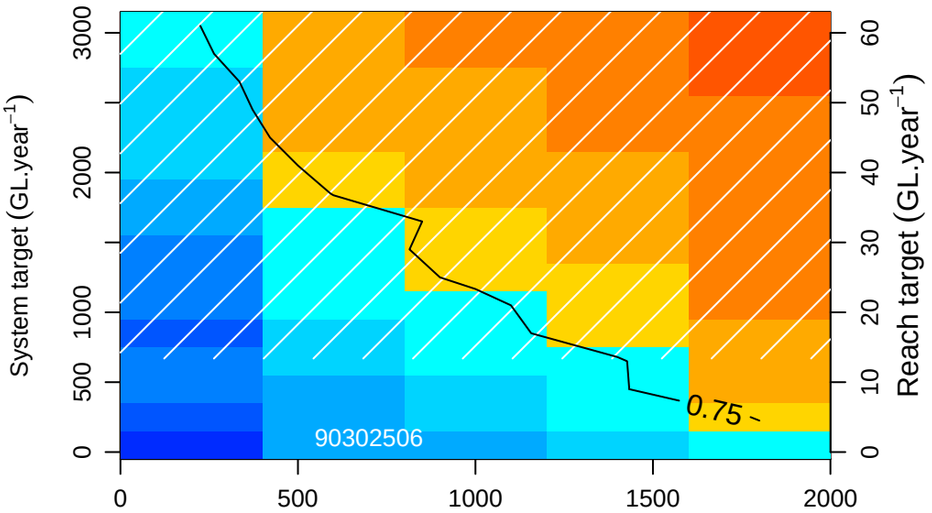


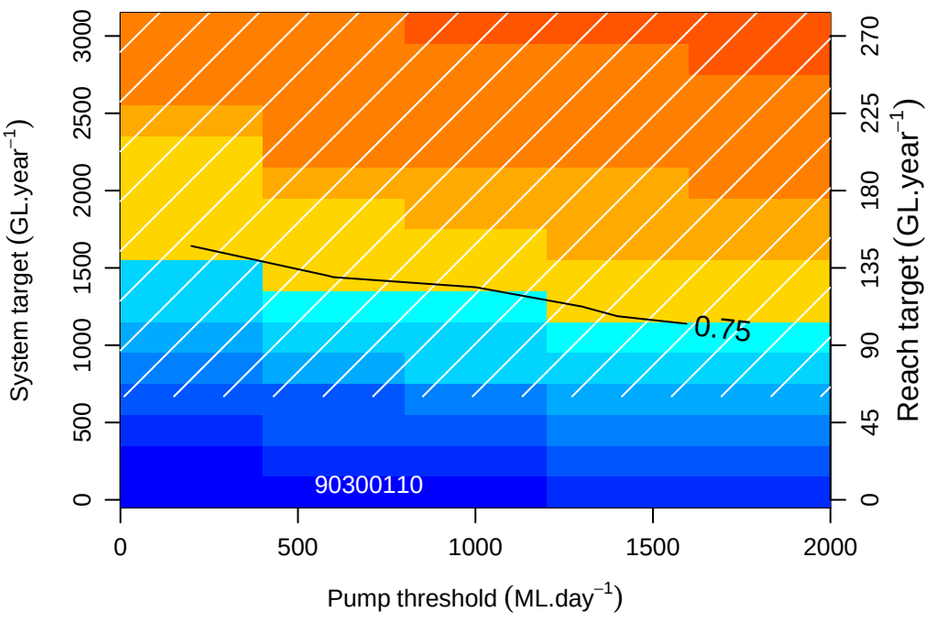


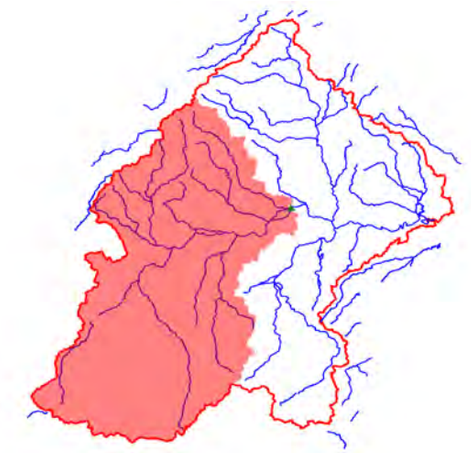




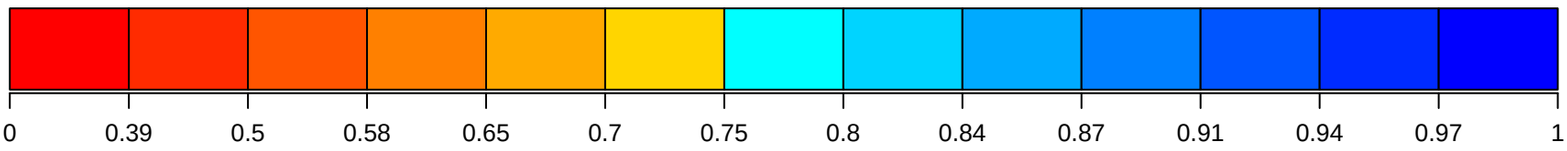


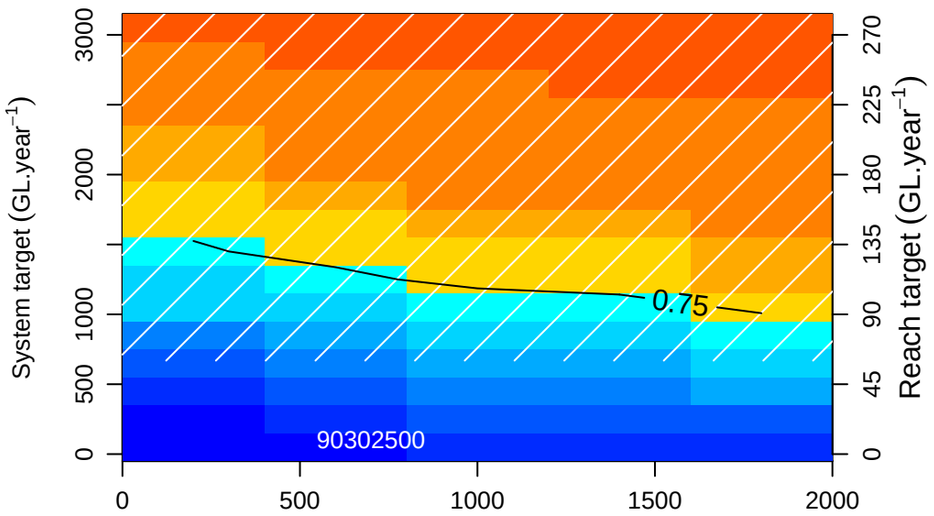


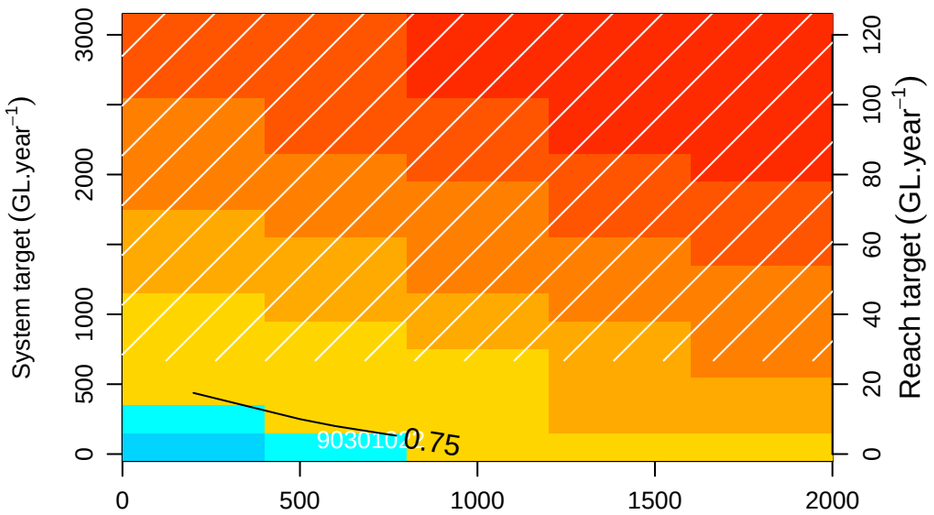


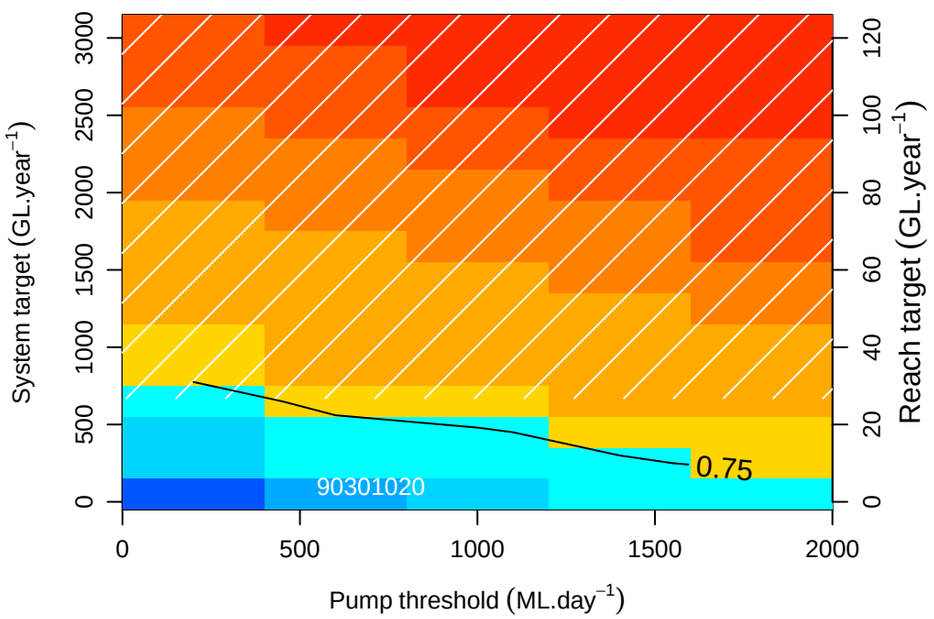


Annual reliability colour scale









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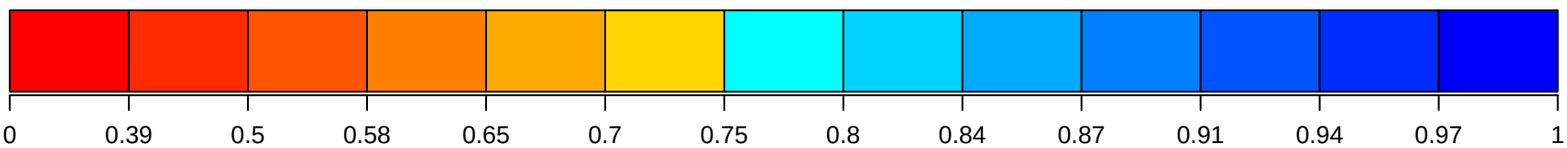
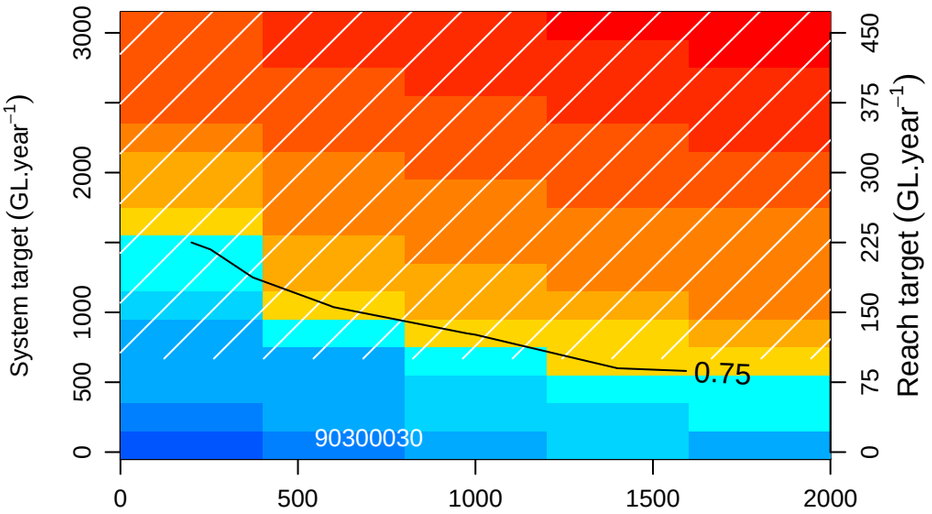
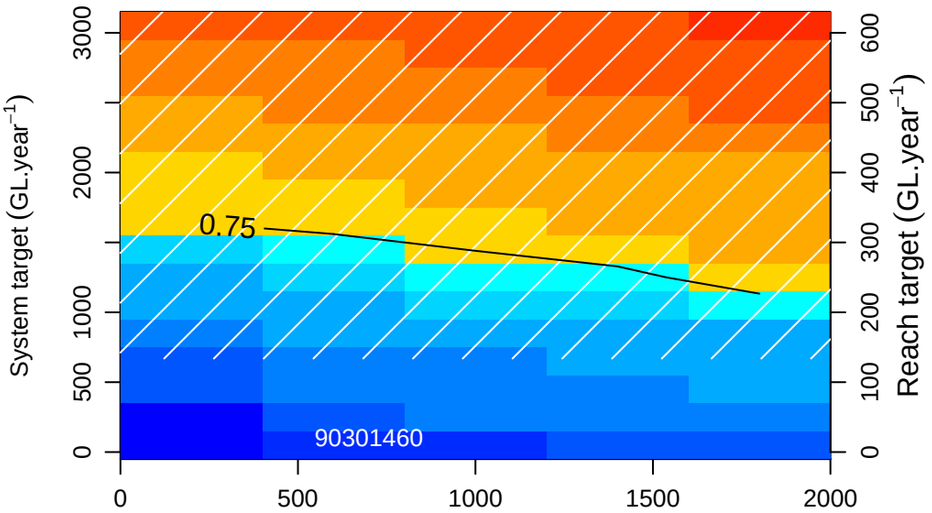
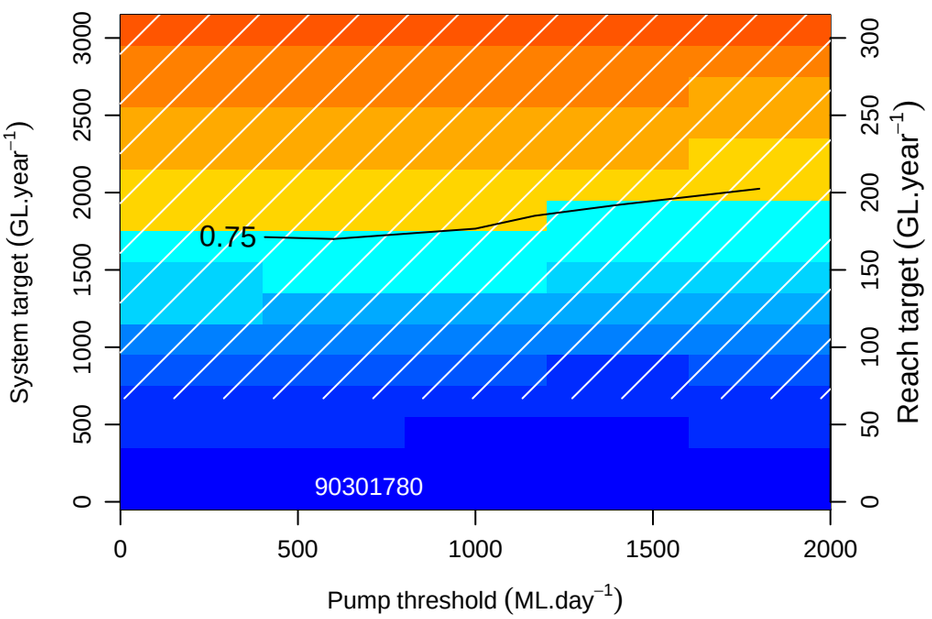
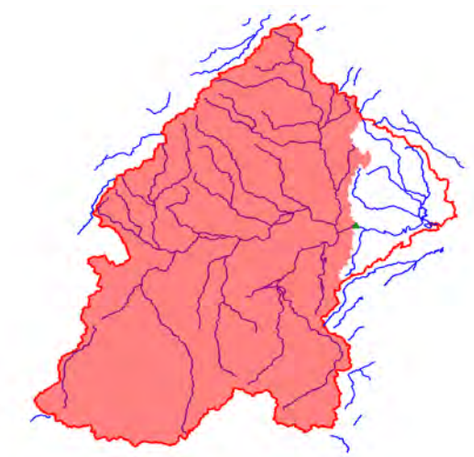


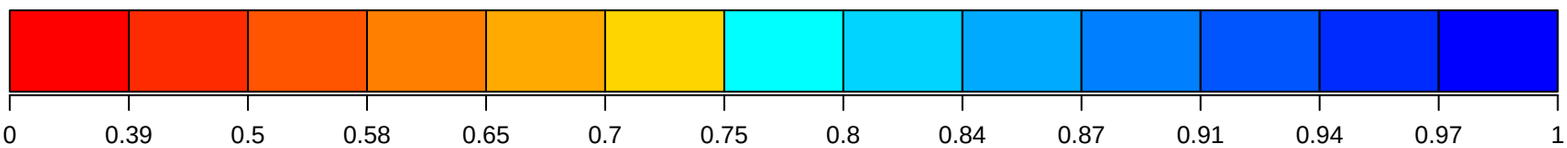




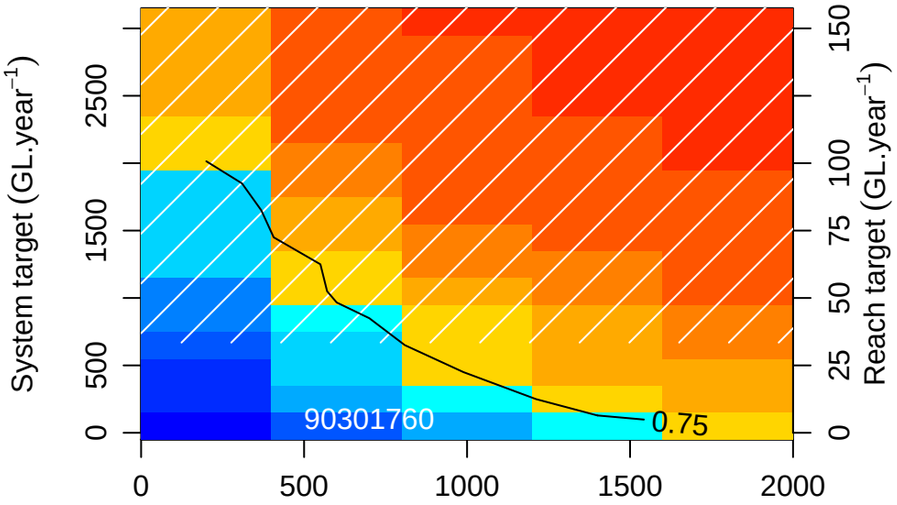


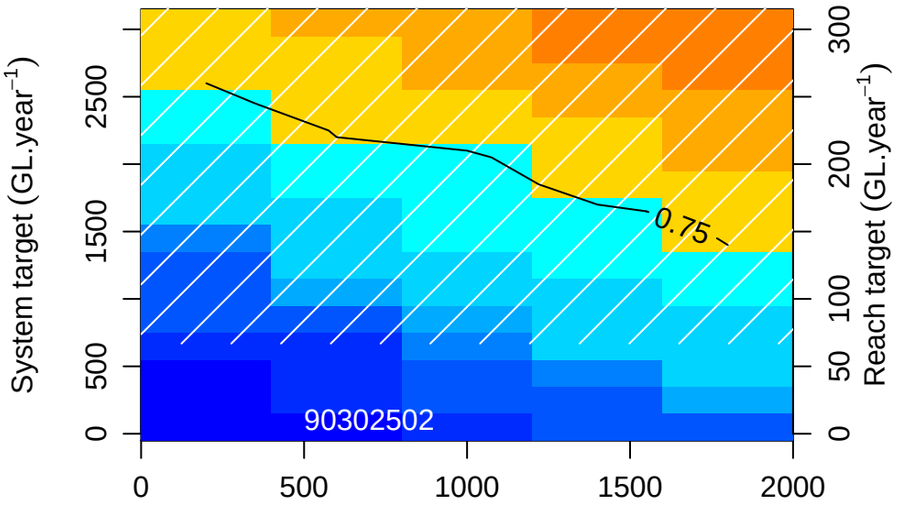


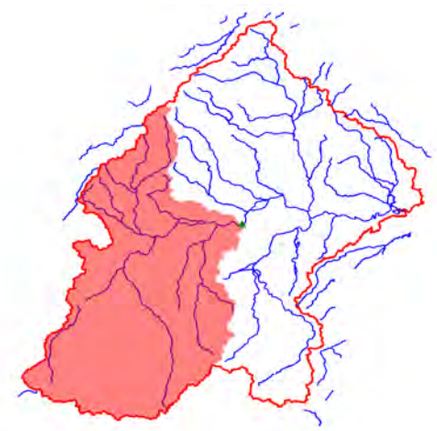
Annual reliability colour scale

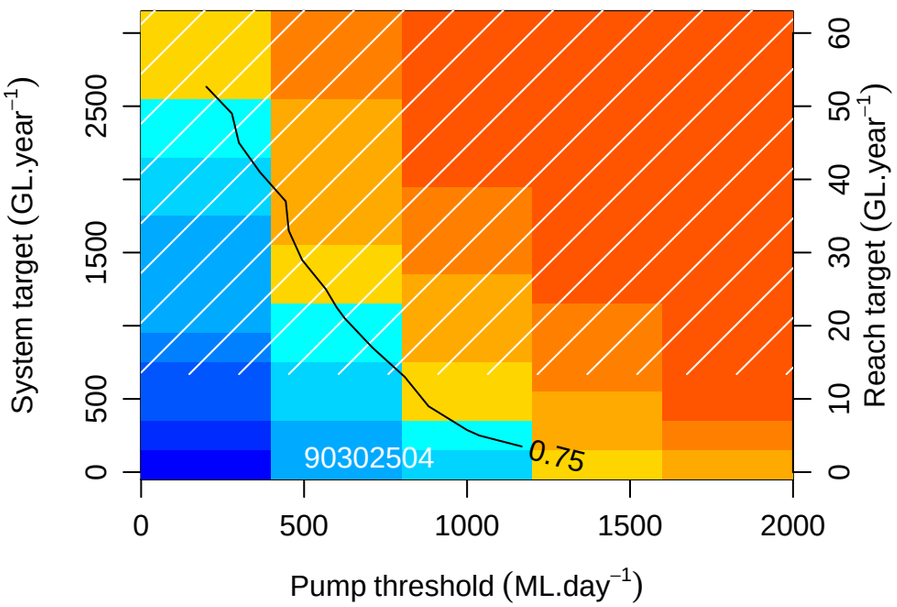


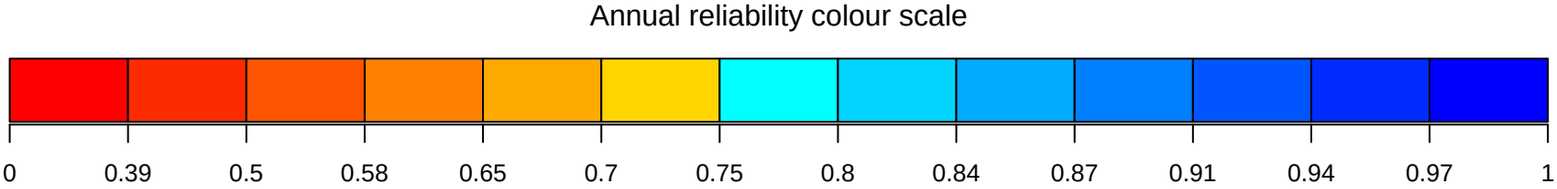
Pump rate : 15 days

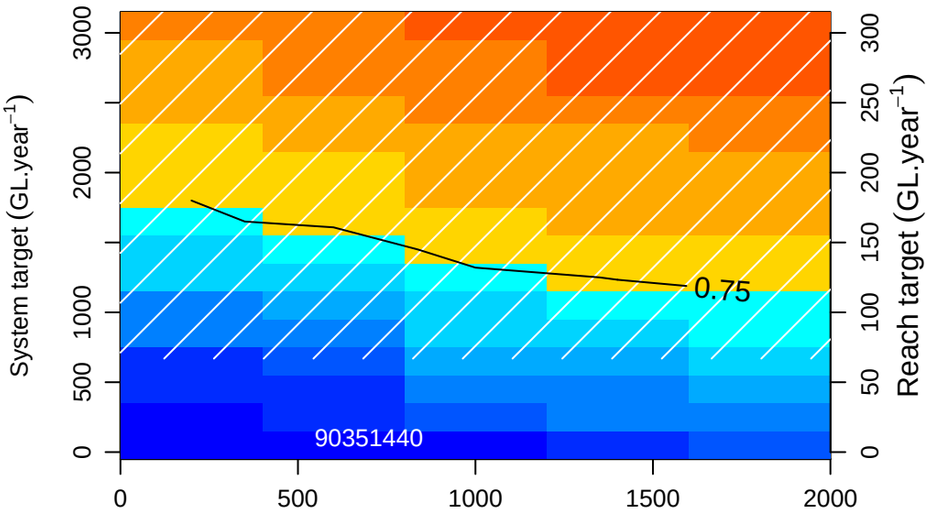


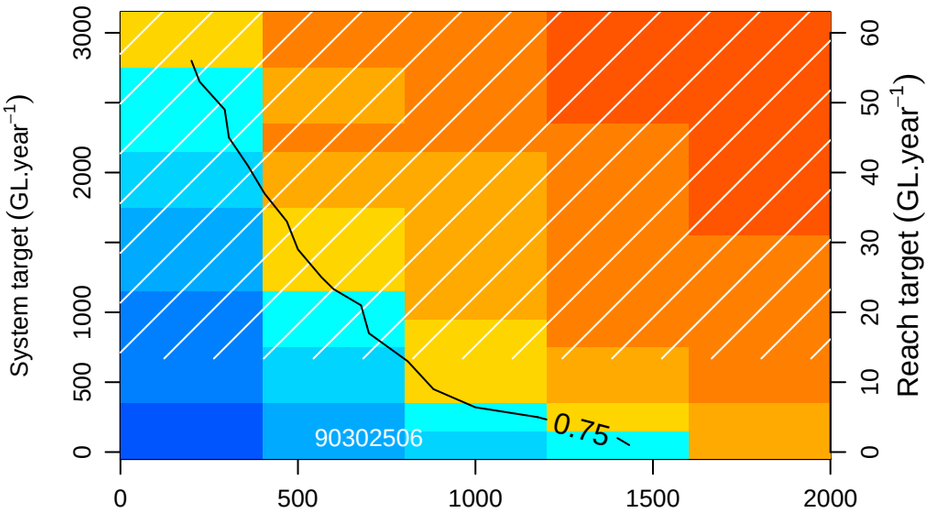


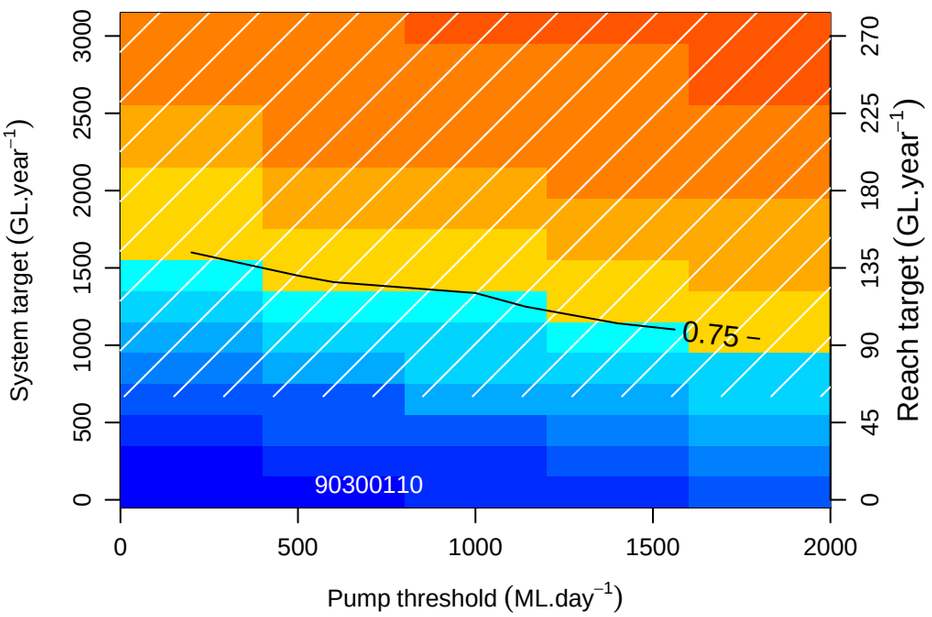


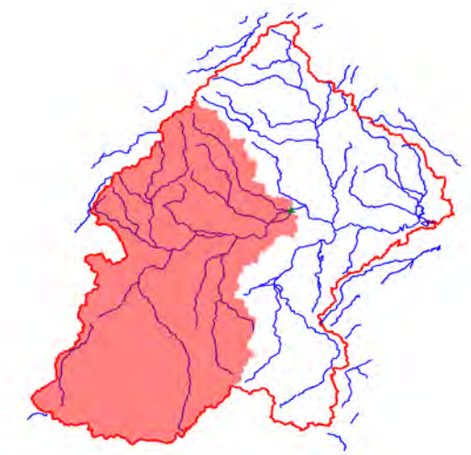


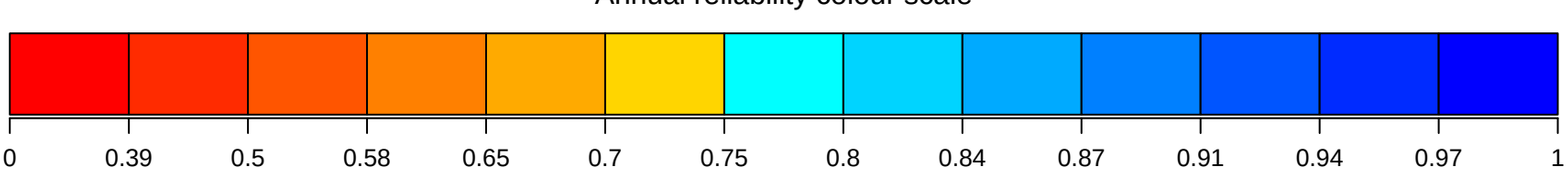


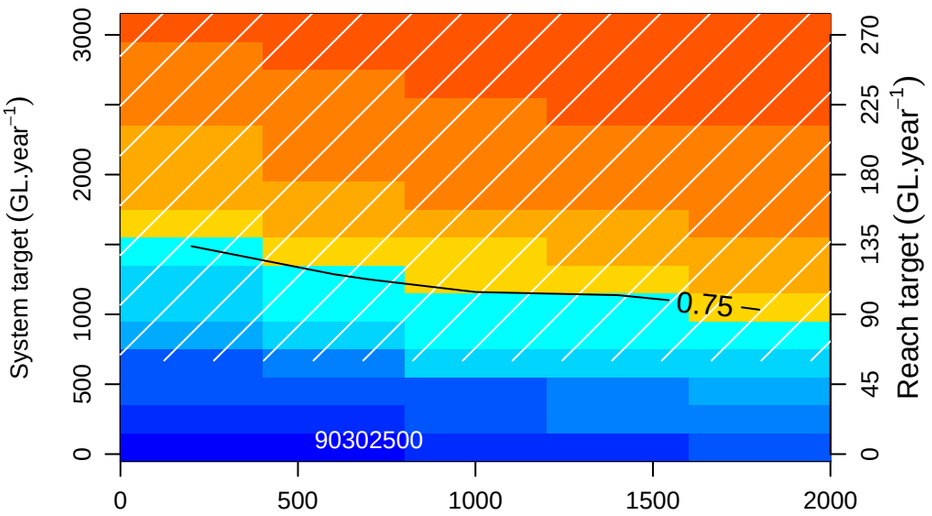

System target (GL.year^{-1})
Reach target (GL.year^{-1})
0.75
90351440

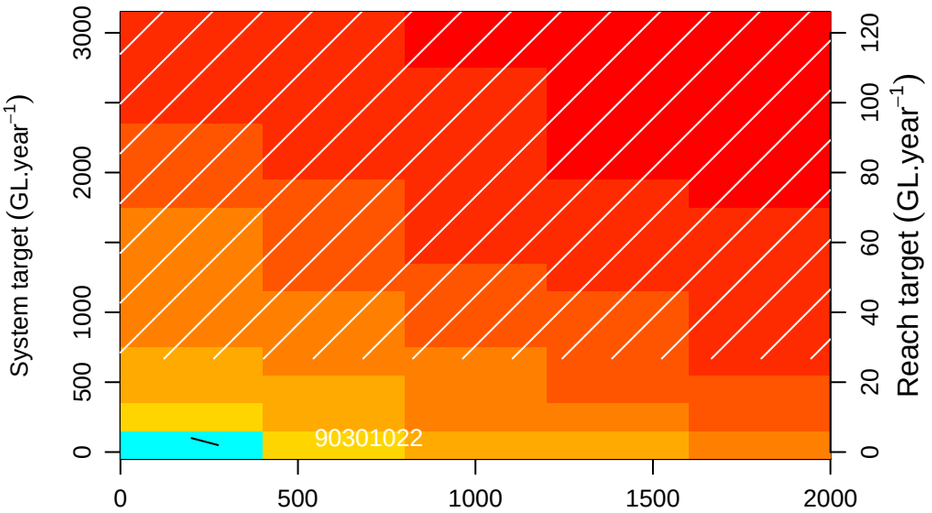

System target (GL.year^{-1})
Reach target (GL.year^{-1})
0.75
90302506

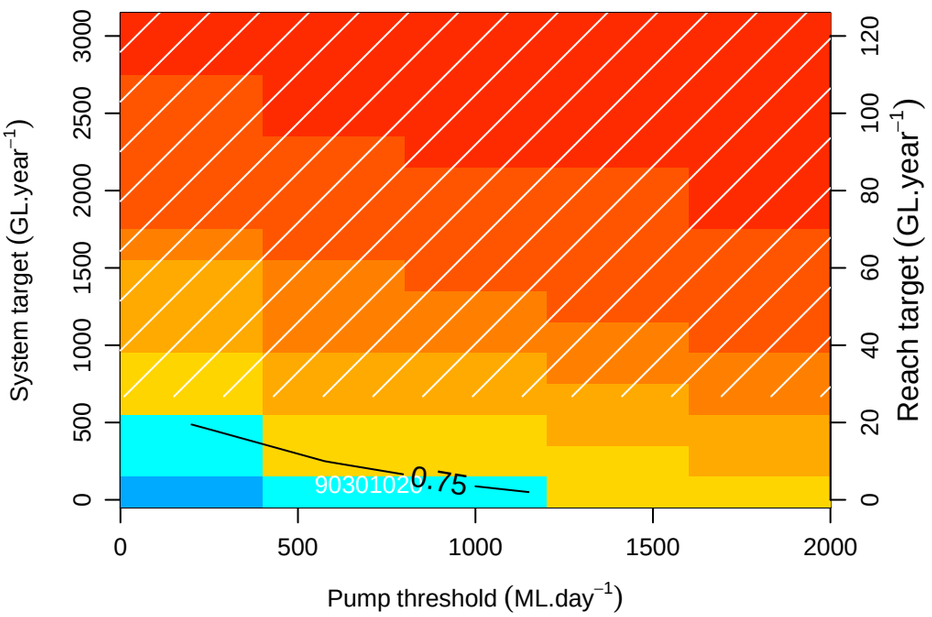

System target (GL.year^{-1})
Reach target (GL.year^{-1})
0.75
90300110
Pump threshold (ML.day^{-1})



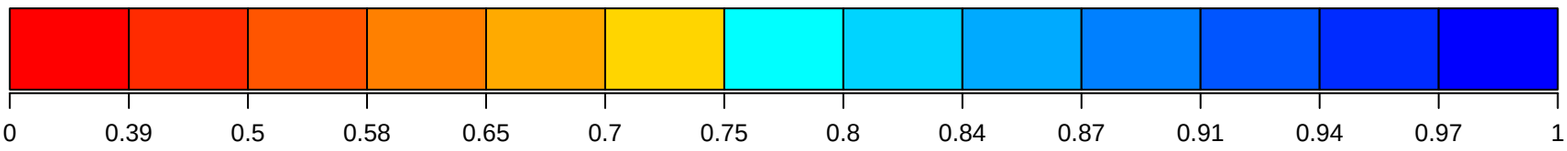

Annual reliability colour scale
0
0.39
0.5
0.58
0.65
0.7
0.75
0.8
0.84
0.87
0.91
0.94
0.97
1

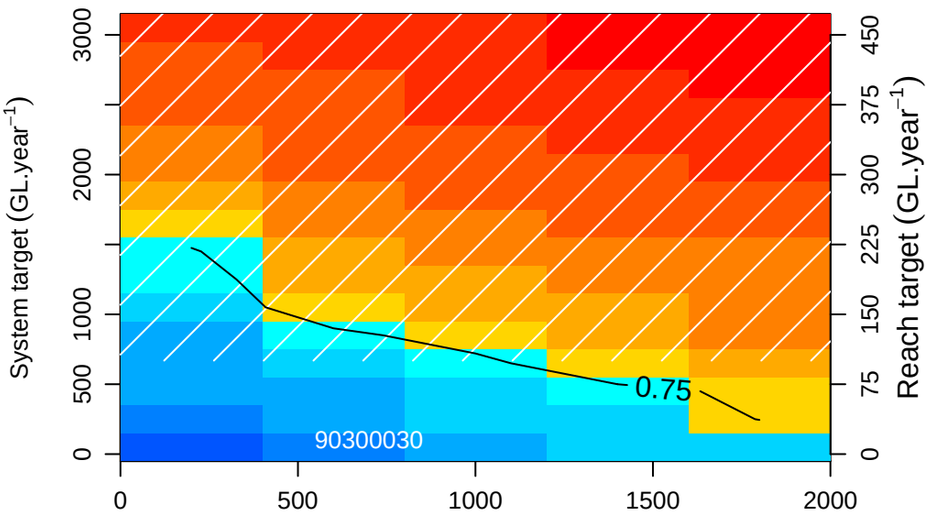


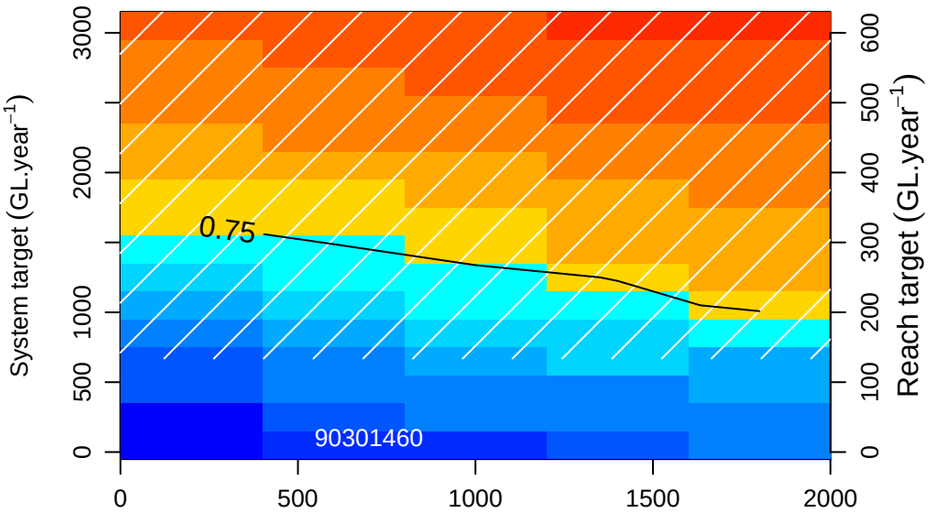


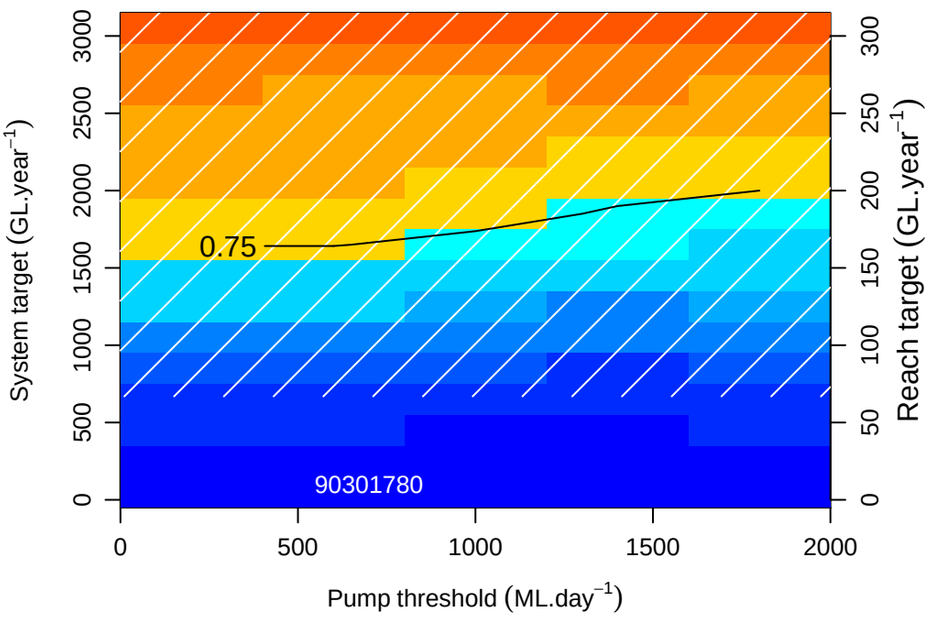


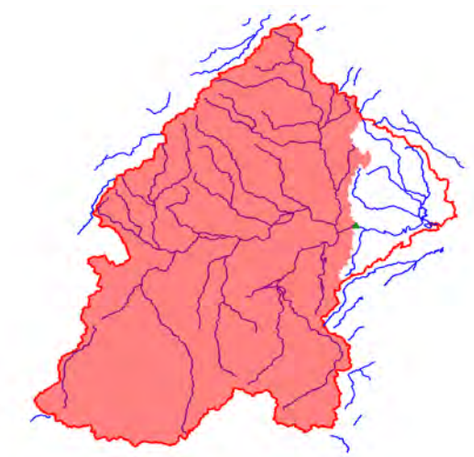
Annual reliability colour scale

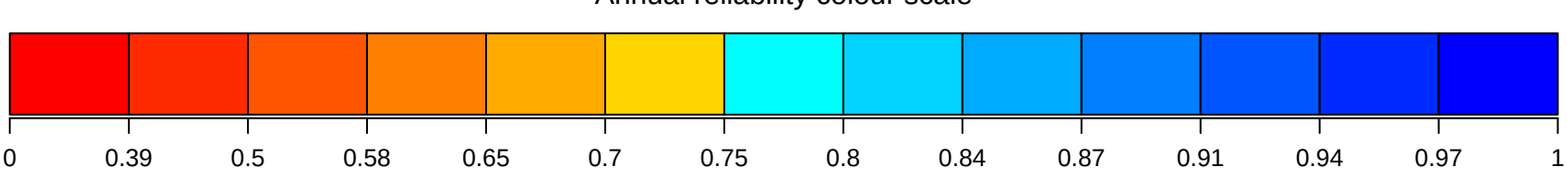



System target (GL.year^{-1})
Reach target (GL.year^{-1})
0.75
90300030

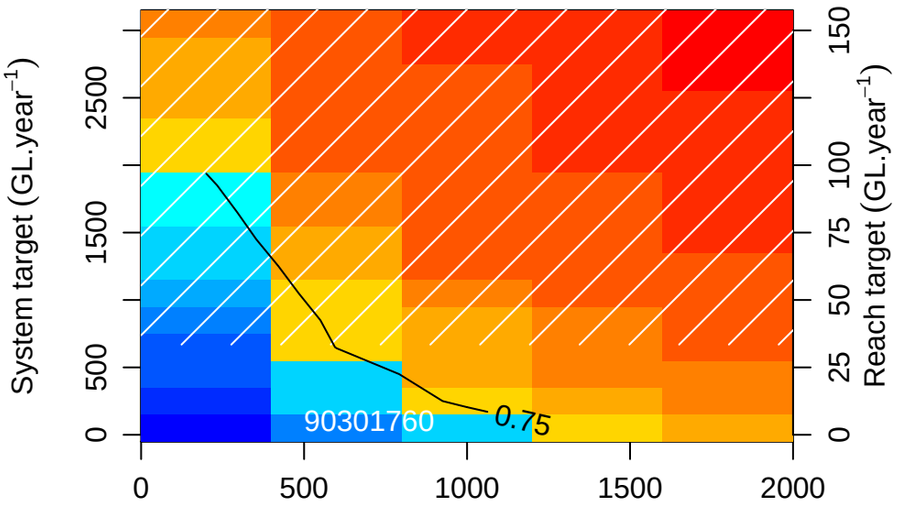

System target (GL.year^{-1})
Reach target (GL.year^{-1})
0.75
90301460

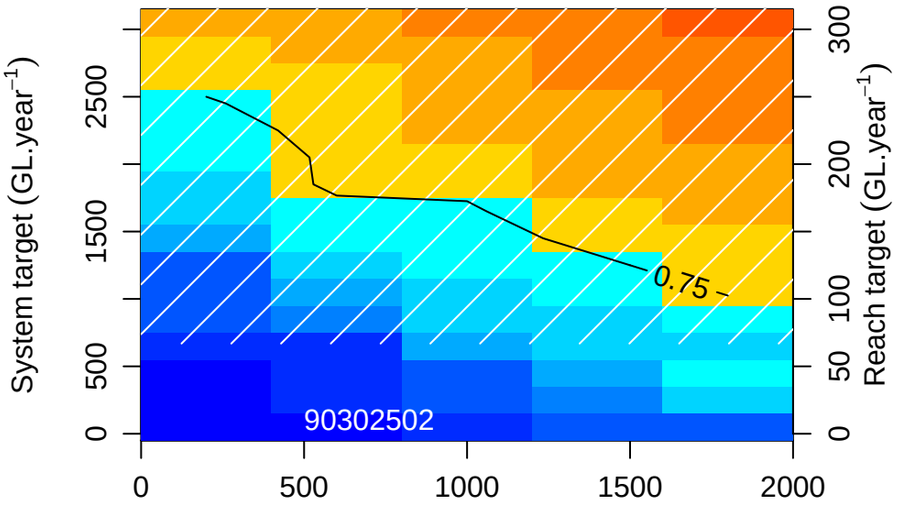

System target (GL.year^{-1})
Reach target (GL.year^{-1})
0.75
90301780
Pump threshold (ML.day^{-1})

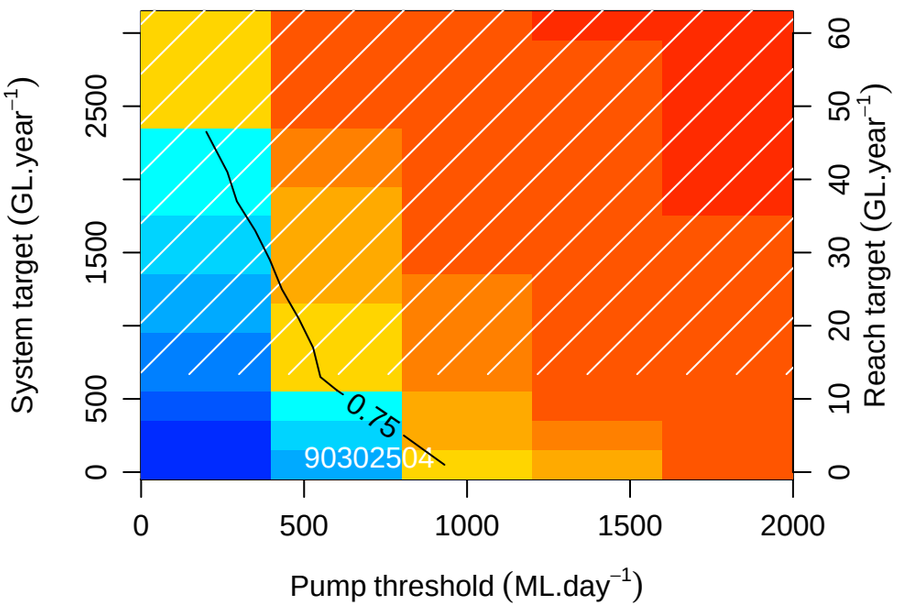


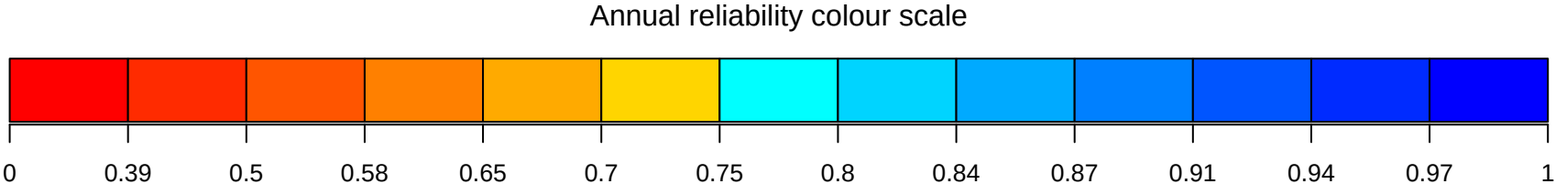

Annual reliability colour scale
0
0.39
0.5
0.58
0.65
0.7
0.75
0.8
0.84
0.87
0.91
0.94
0.97
1

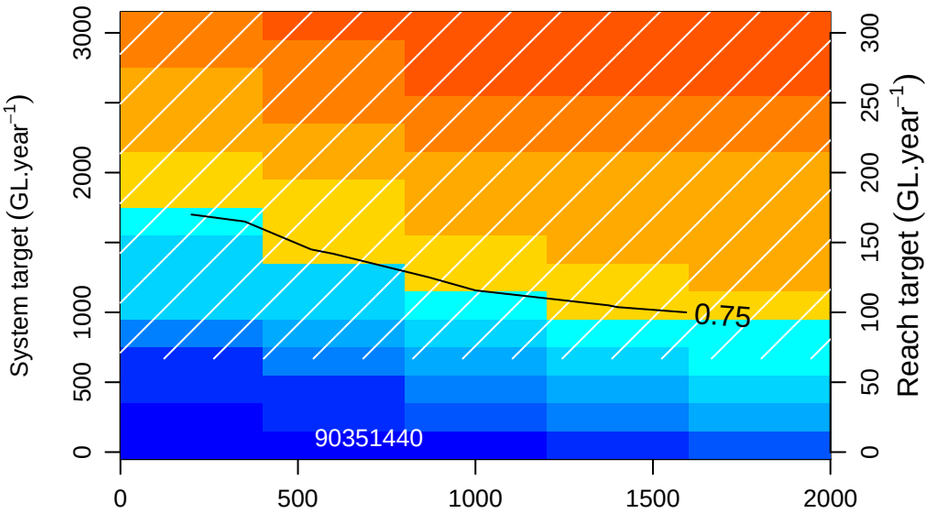
Pump rate : 20 days

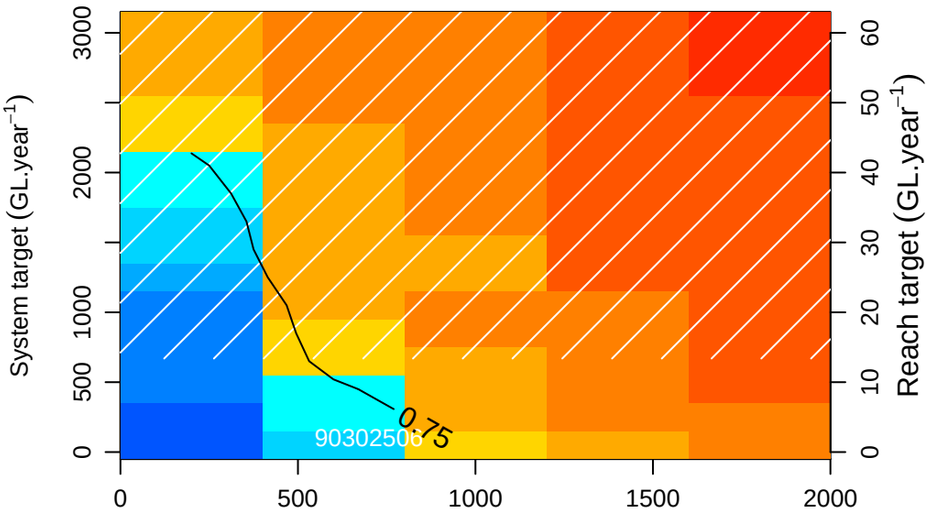


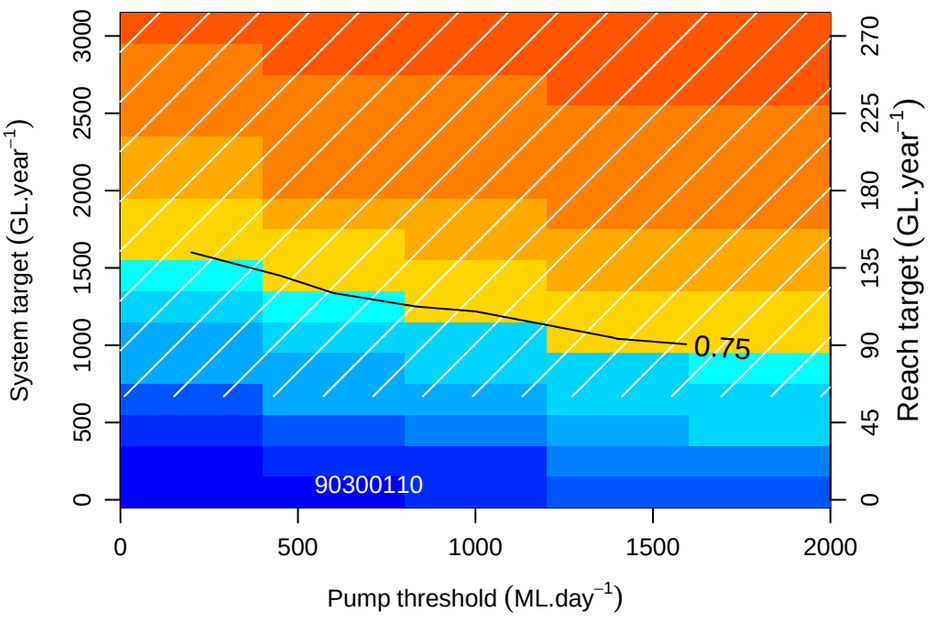


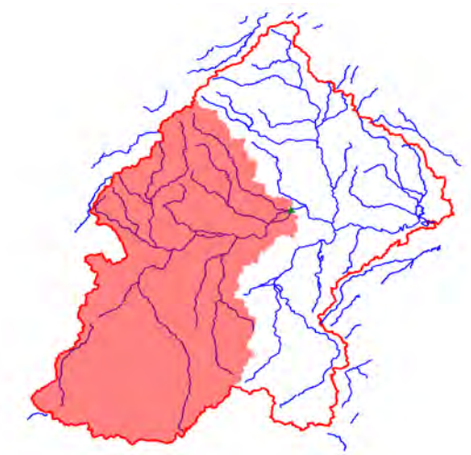


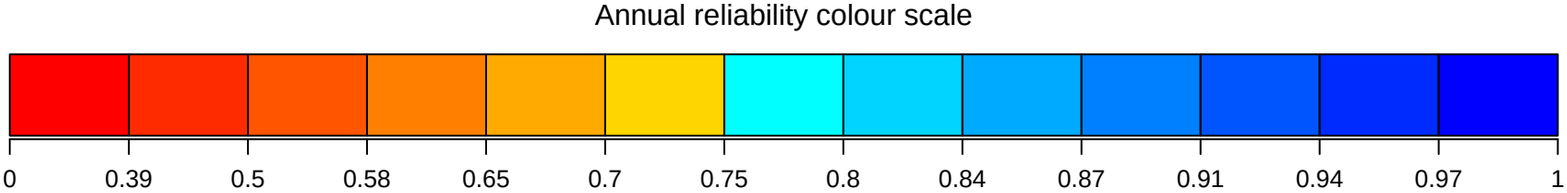


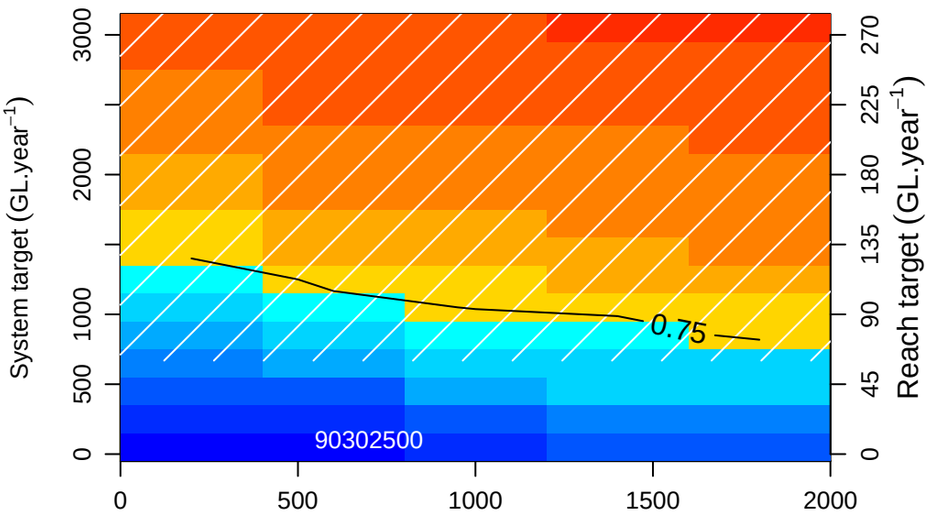

System target (GL.year^{-1})
Reach target (GL.year^{-1})
0
500
1000
1500
2000
3000
0
50
100
150
200
250
300
0.75
90351440

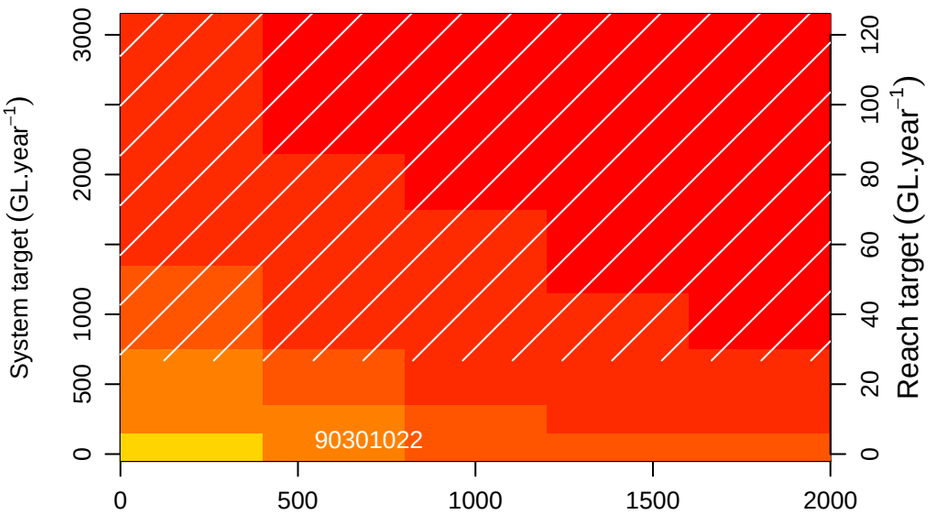

System target (GL.year^{-1})
Reach target (GL.year^{-1})
0
500
1000
1500
2000
3000
0
10
20
30
40
50
60
0.75
90302500

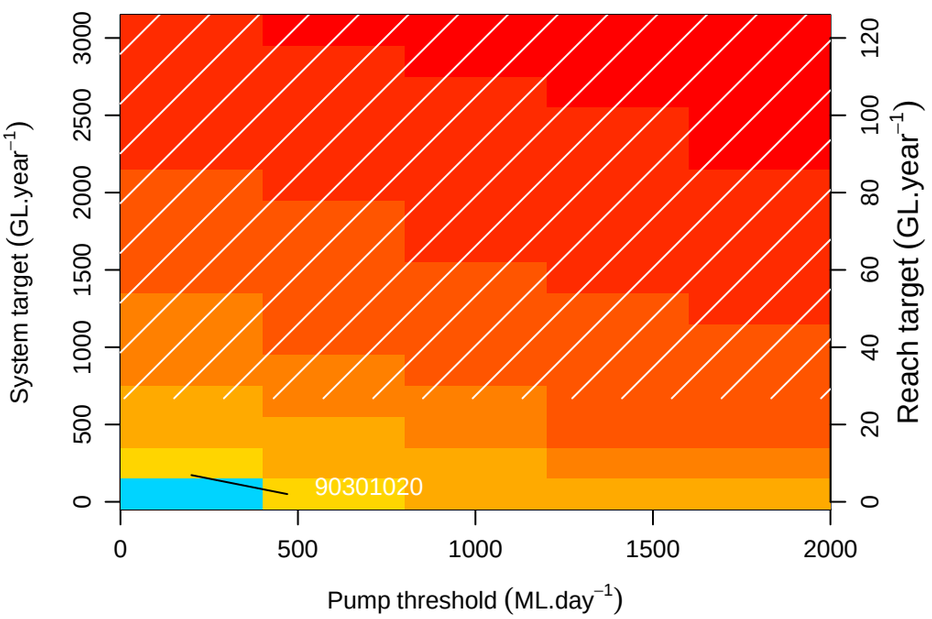

System target (GL.year^{-1})
Reach target (GL.year^{-1})
0
500
1000
1500
2000
2500
3000
0
45
90
135
180
225
270
0.75
90300110
Pump threshold (ML.day^{-1})



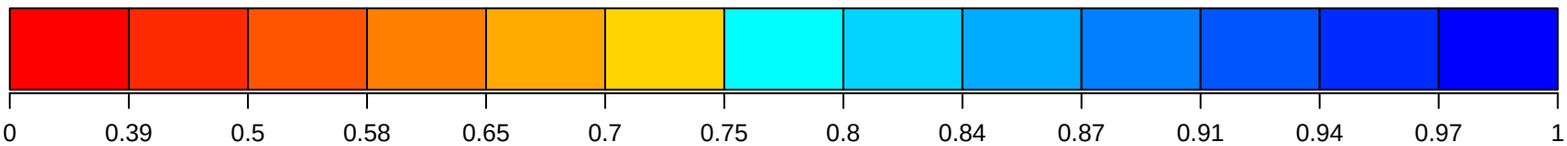

Annual reliability colour scale
0
0.39
0.5
0.58
0.65
0.7
0.75
0.8
0.84
0.87
0.91
0.94
0.97
1

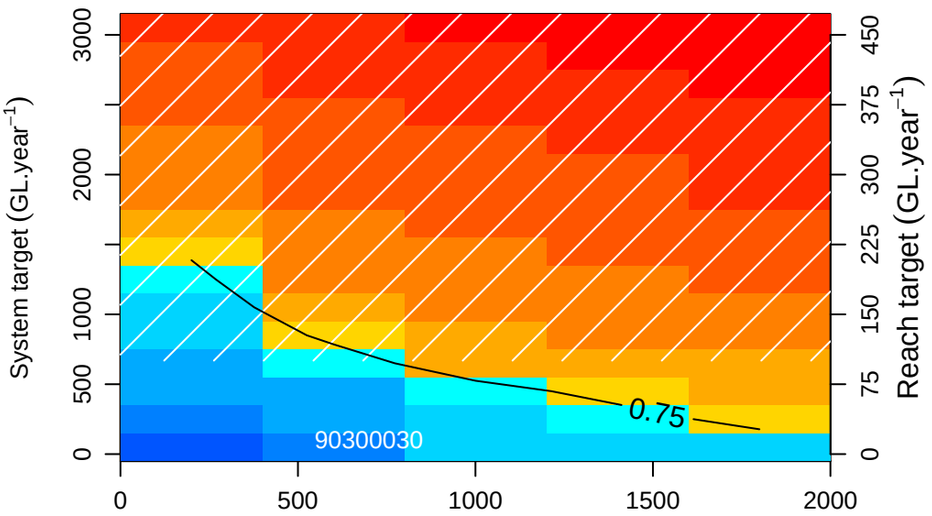


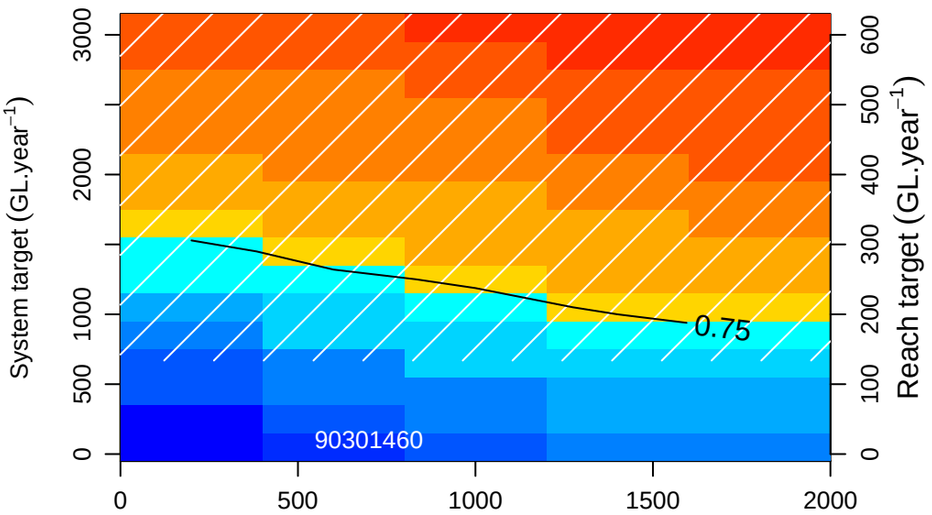


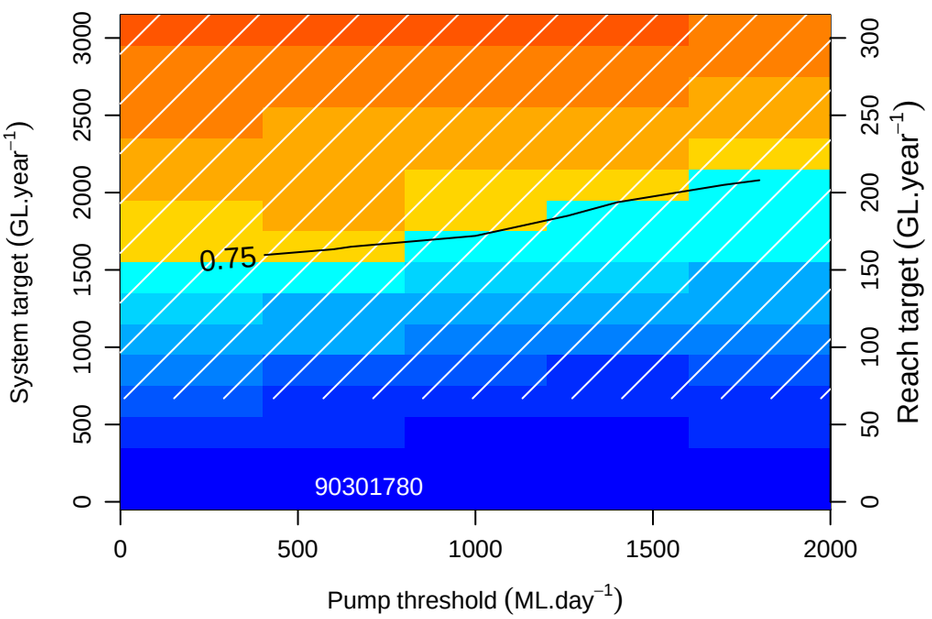


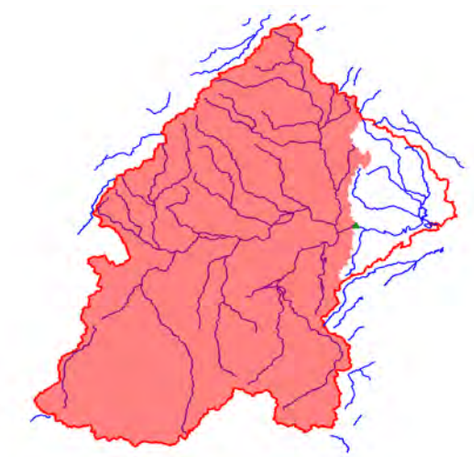
Annual reliability colour scale

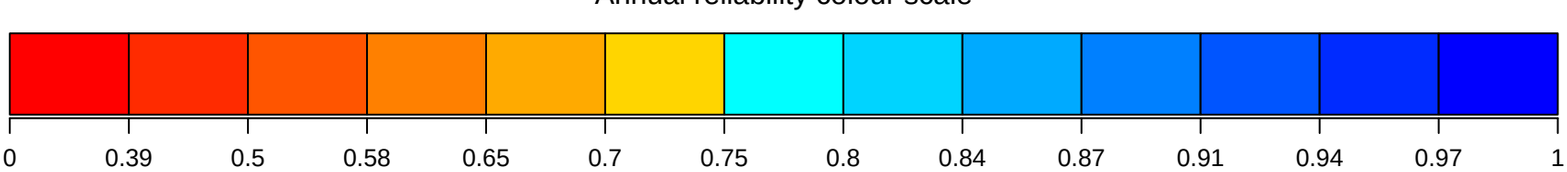



System target (GL.year^{-1})
Reach target (GL.year^{-1})
0.75
90300030

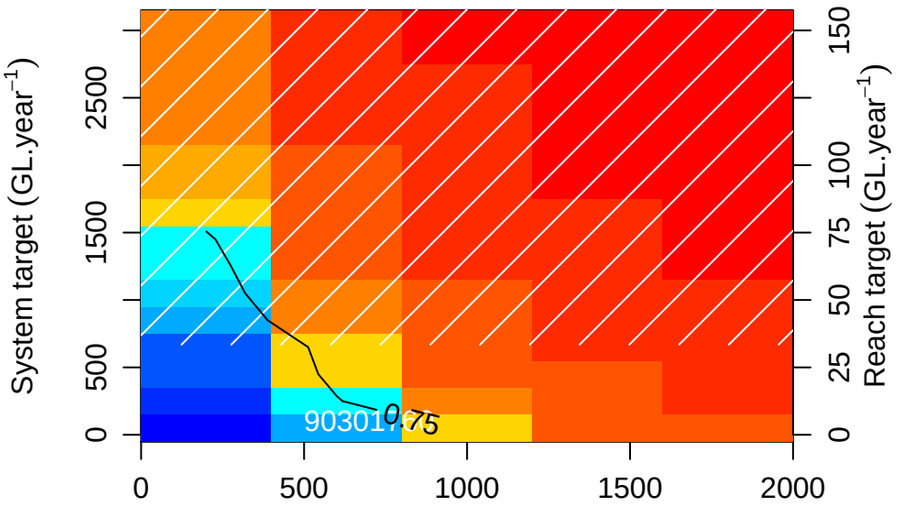

System target (GL.year^{-1})
Reach target (GL.year^{-1})
0.75
90301460

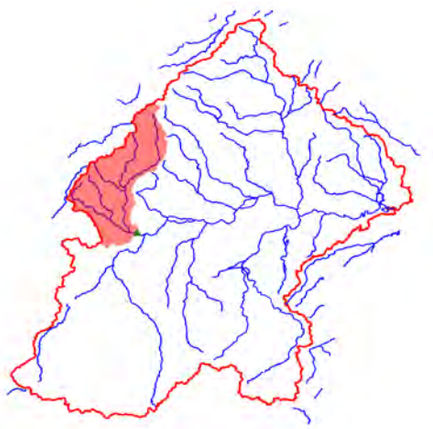

System target (GL.year^{-1})
Reach target (GL.year^{-1})
0.75
90301780
Pump threshold (ML.day^{-1})

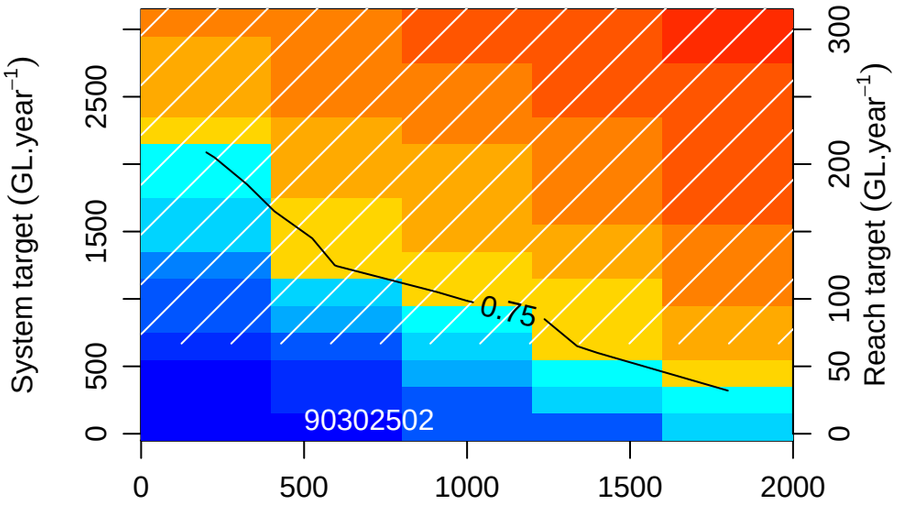


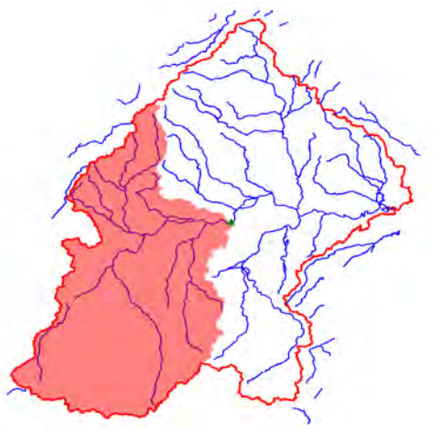

Annual reliability colour scale
0
0.39
0.5
0.58
0.65
0.7
0.75
0.8
0.84
0.87
0.91
0.94
0.97
1

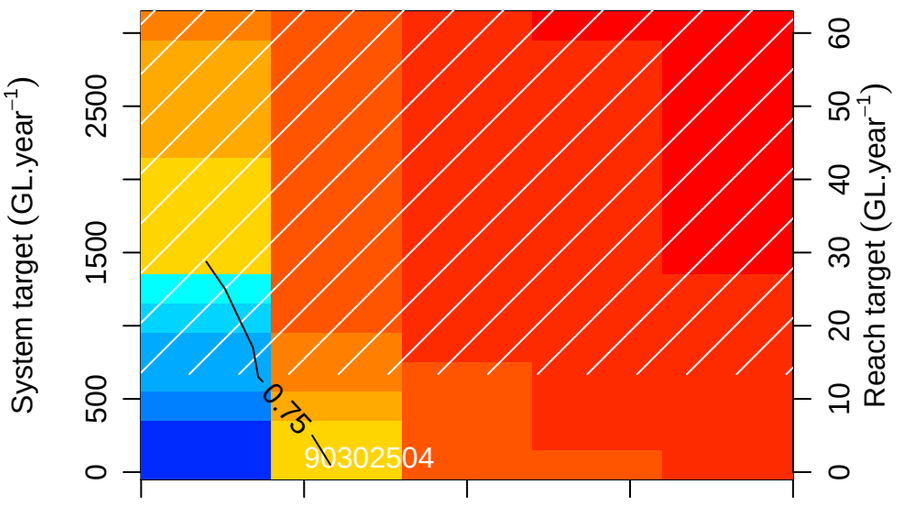
Pump rate : 30 days

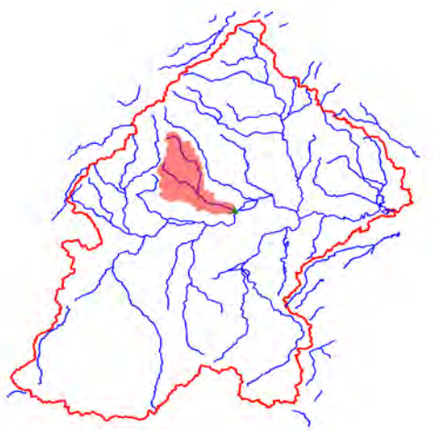


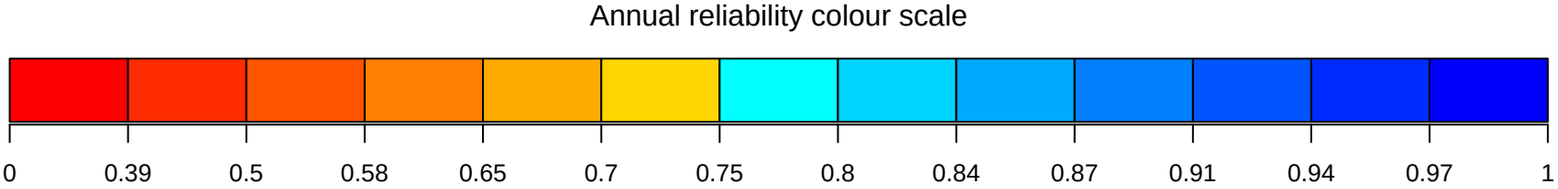


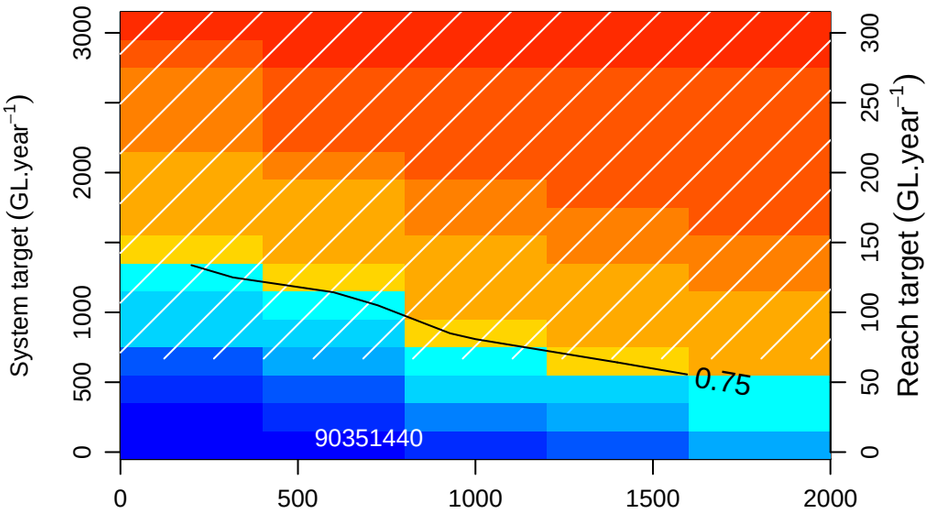


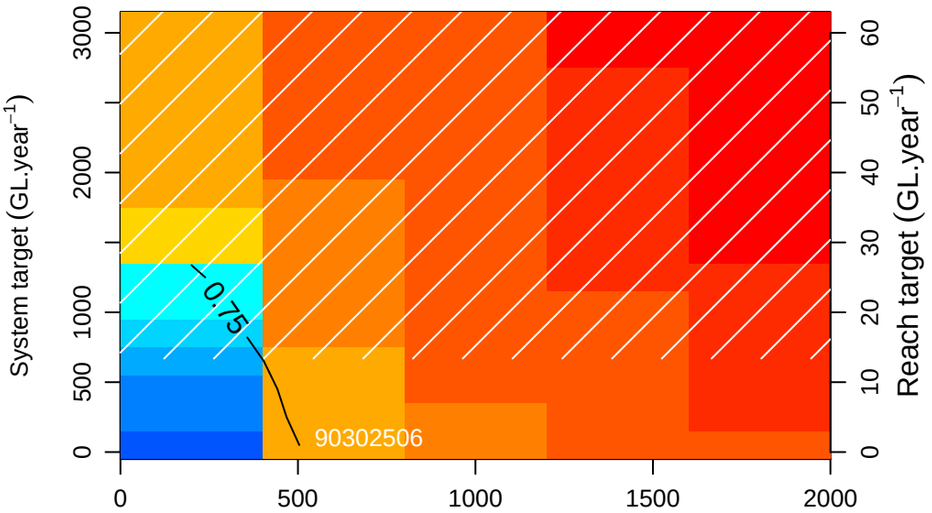


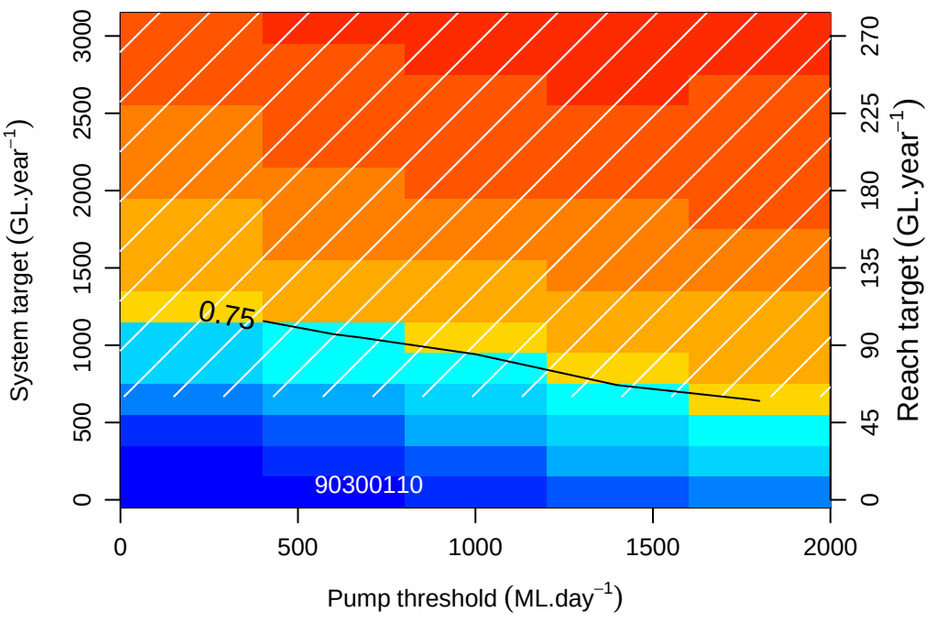


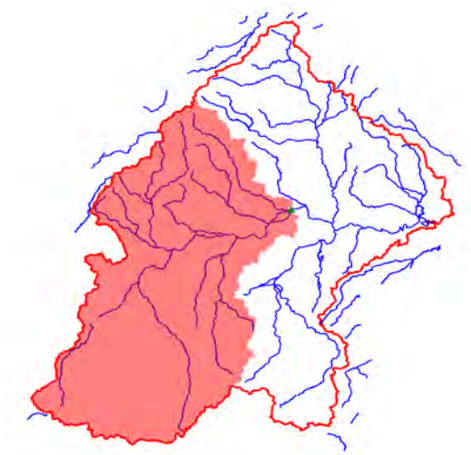


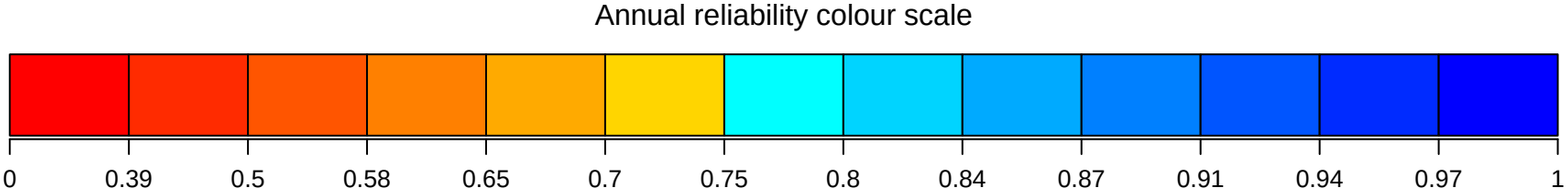


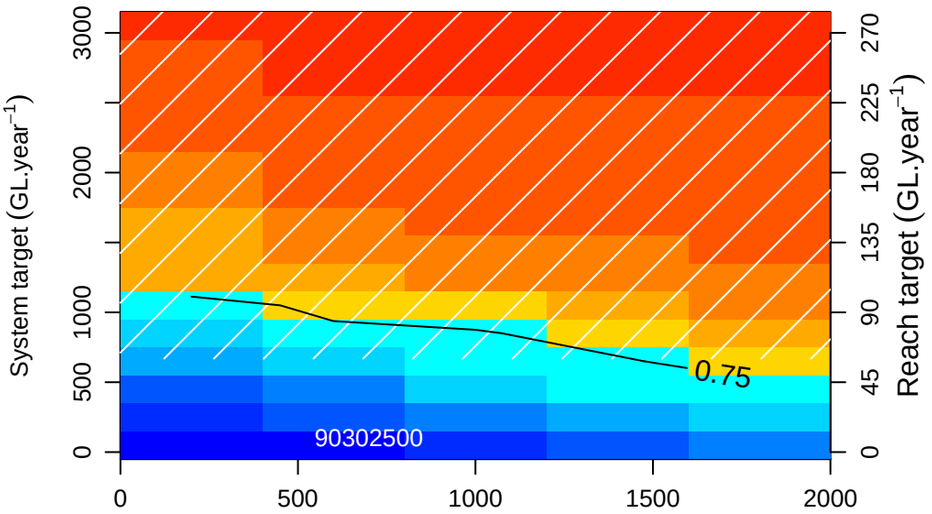

System target (GL.year^{-1})
Reach target (GL.year^{-1})
0
500
1000
1500
2000
3000
0
50
100
150
200
250
300
0.75
90351440

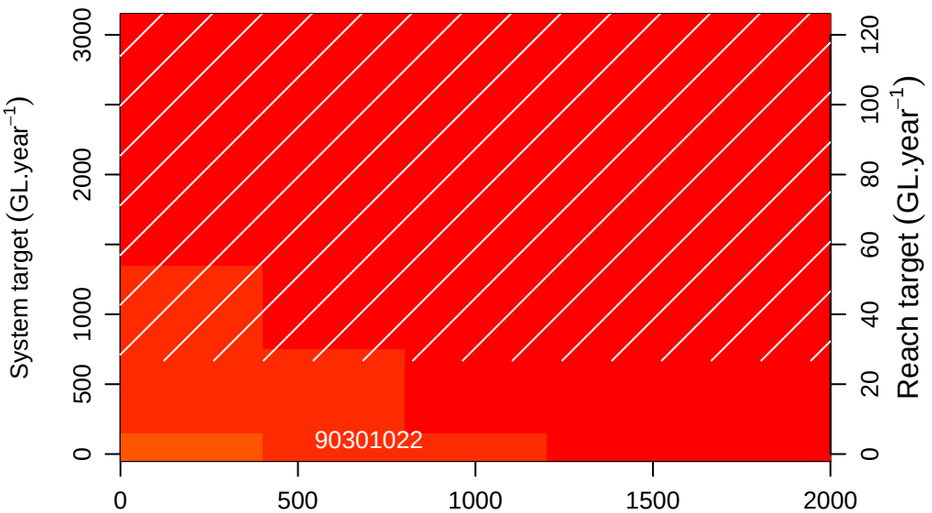

System target (GL.year^{-1})
Reach target (GL.year^{-1})
0
500
1000
1500
2000
3000
0
10
20
30
40
50
60
0.75
90302506

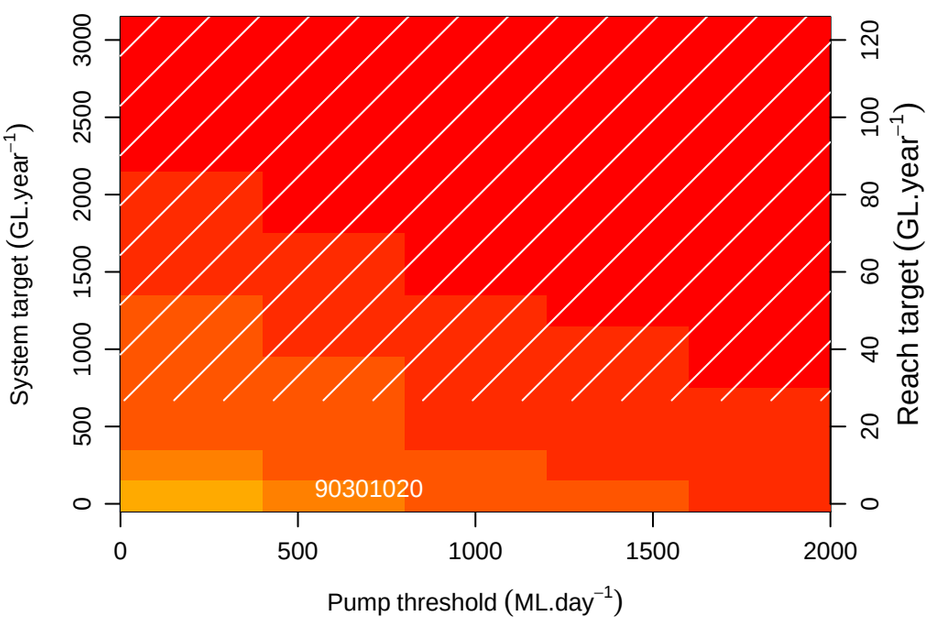

System target (GL.year^{-1})
Reach target (GL.year^{-1})
0
500
1000
1500
2000
2500
3000
0
45
90
135
180
225
270
0.75
90300110
Pump threshold (ML.day^{-1})

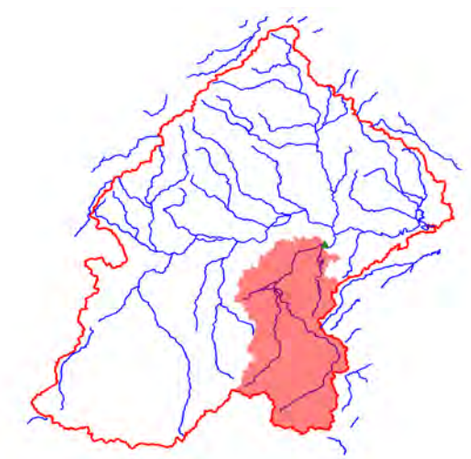



Annual reliability colour scale
0
0.39
0.5
0.58
0.65
0.7
0.75
0.8
0.84
0.87
0.91
0.94
0.97
1

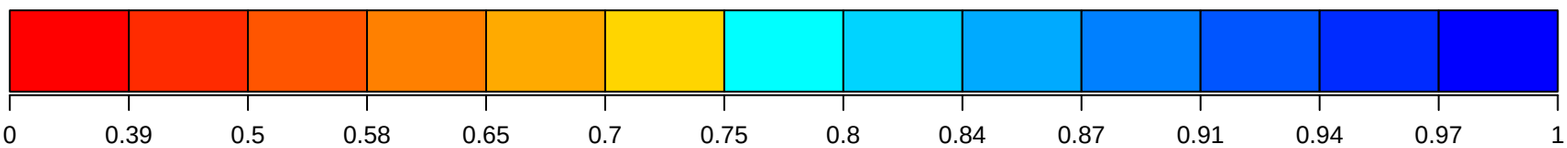


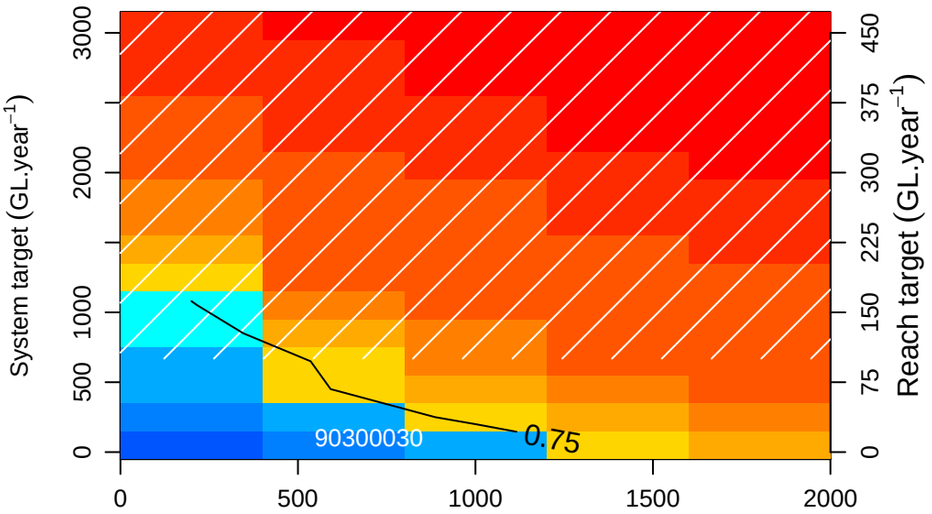


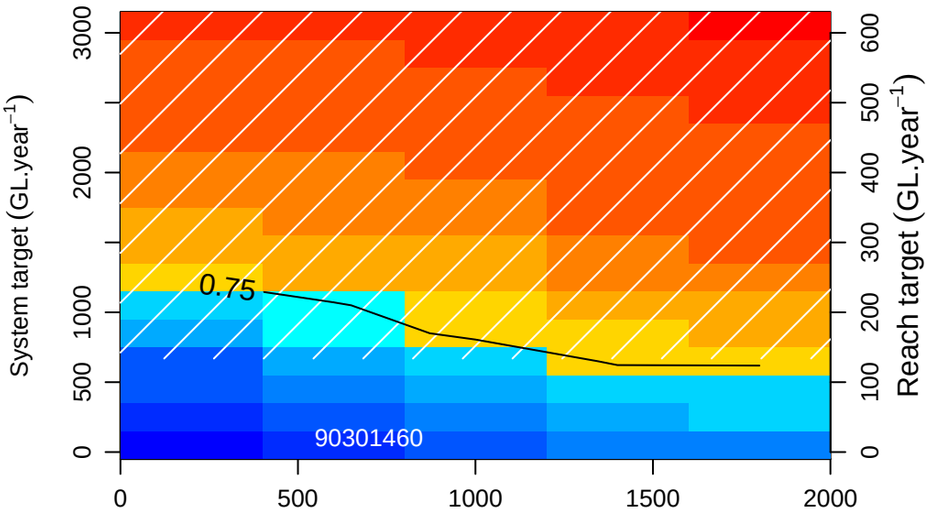


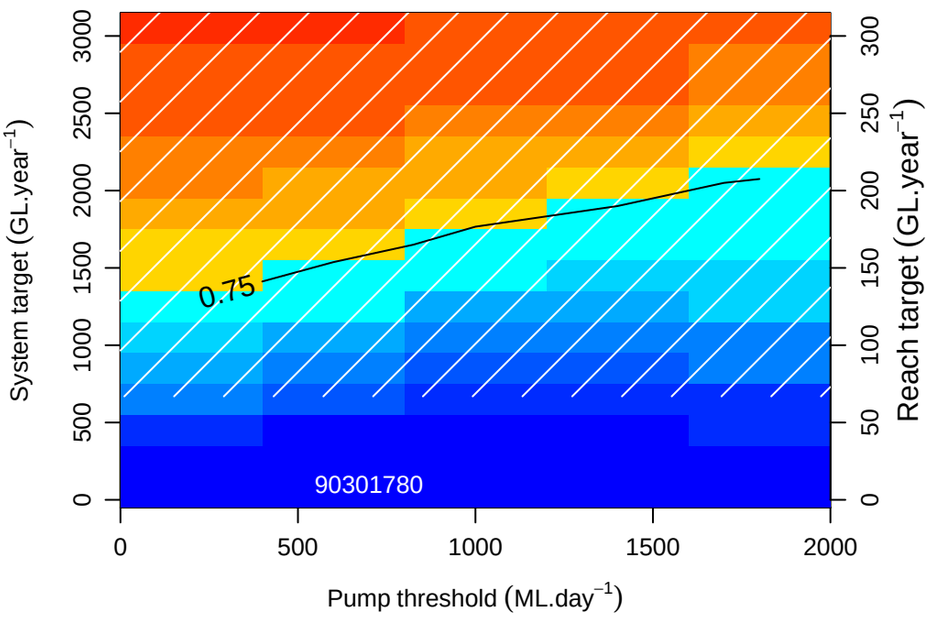


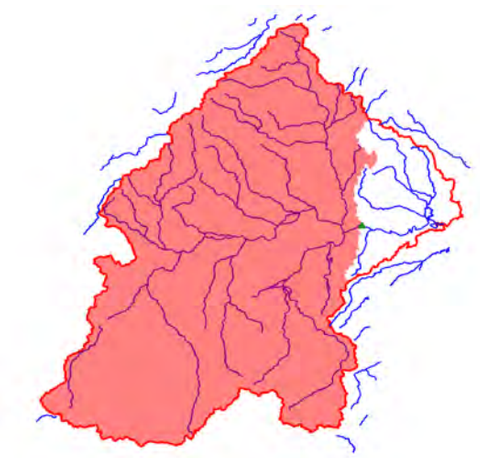
Annual reliability colour scale



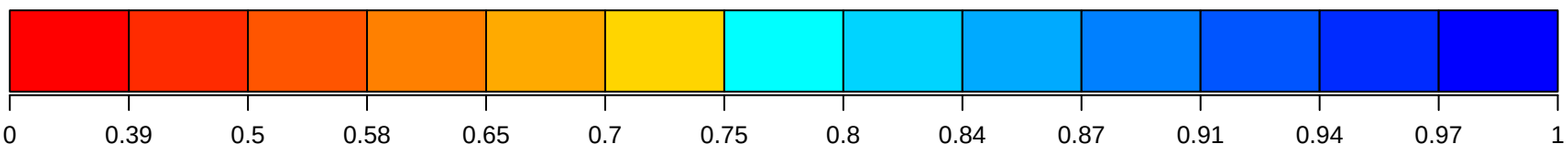




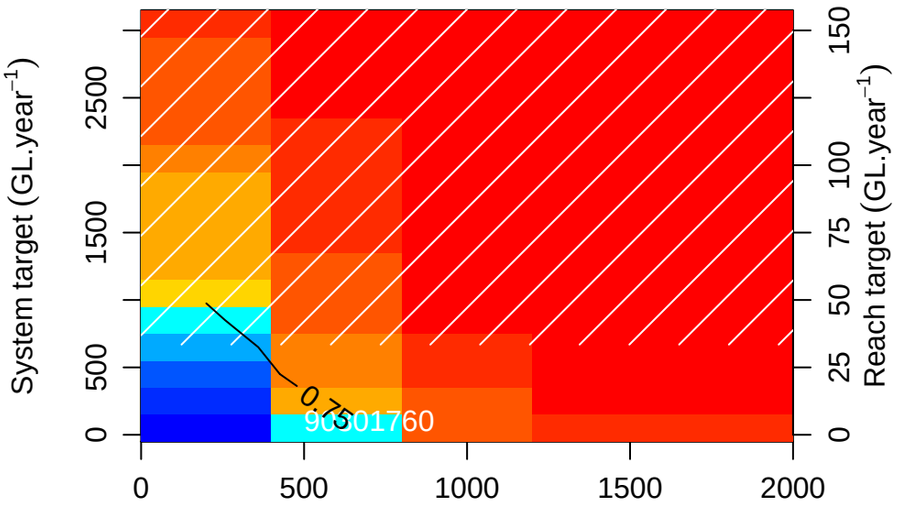


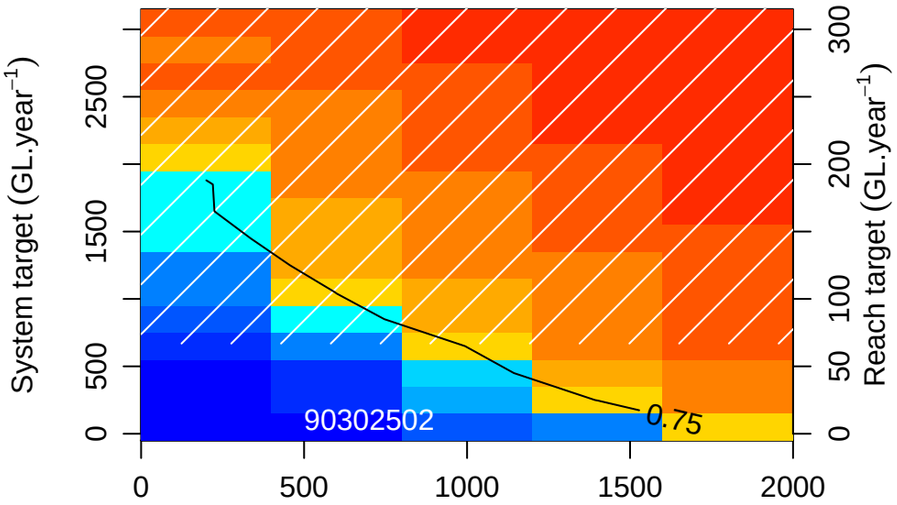


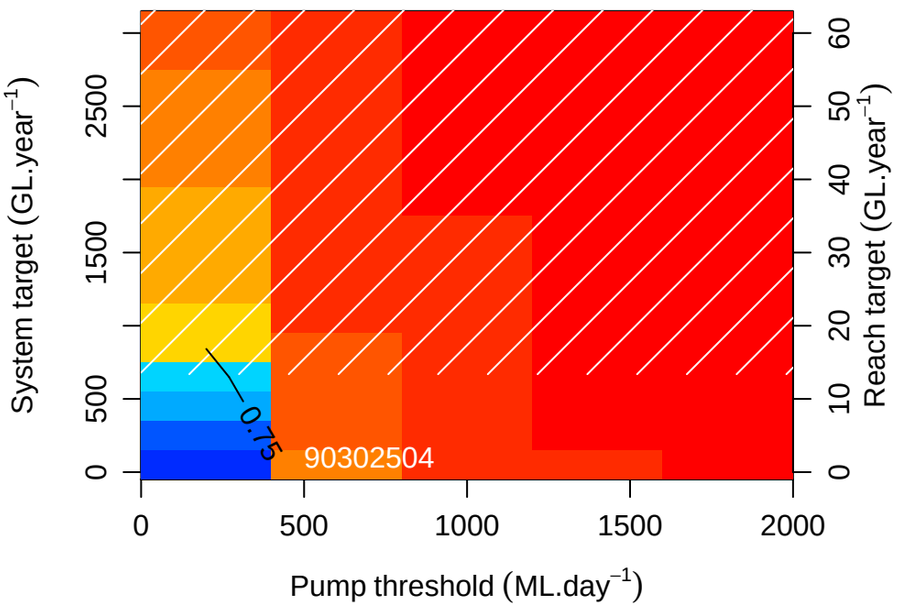
Annual reliability colour scale

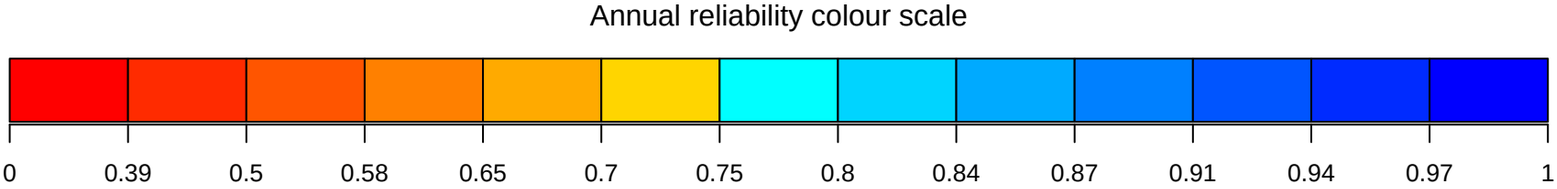


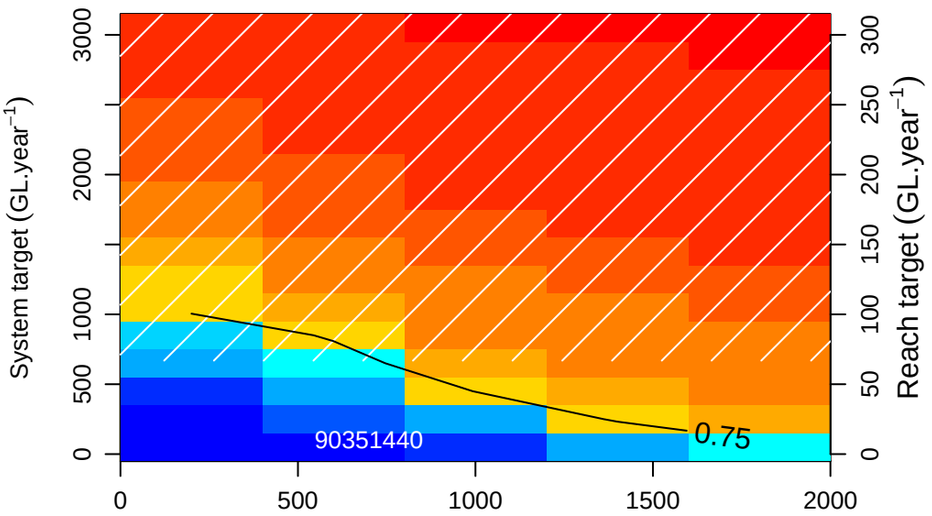
Pump rate : 40 days

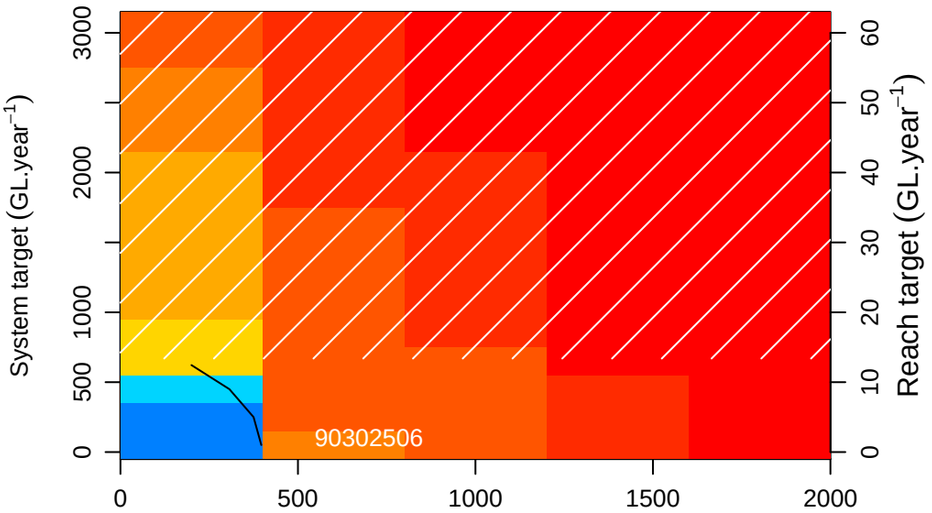


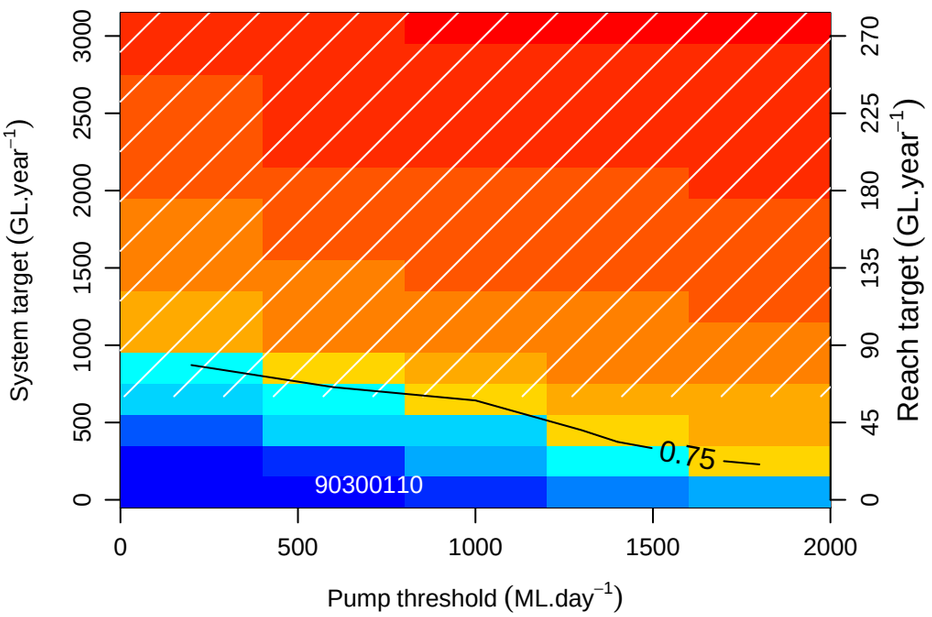


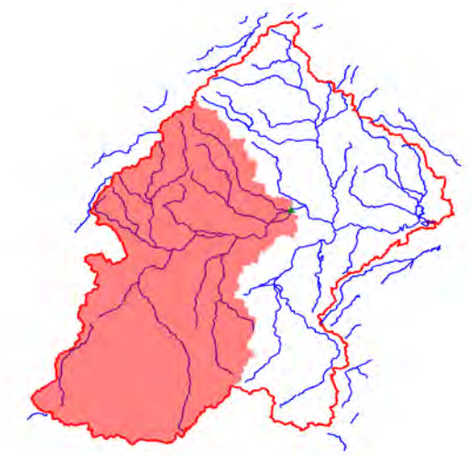




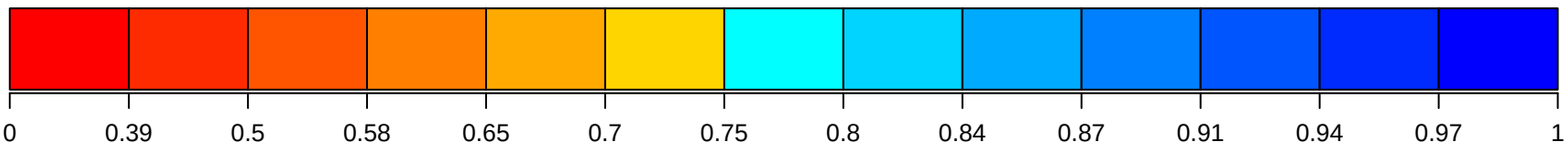


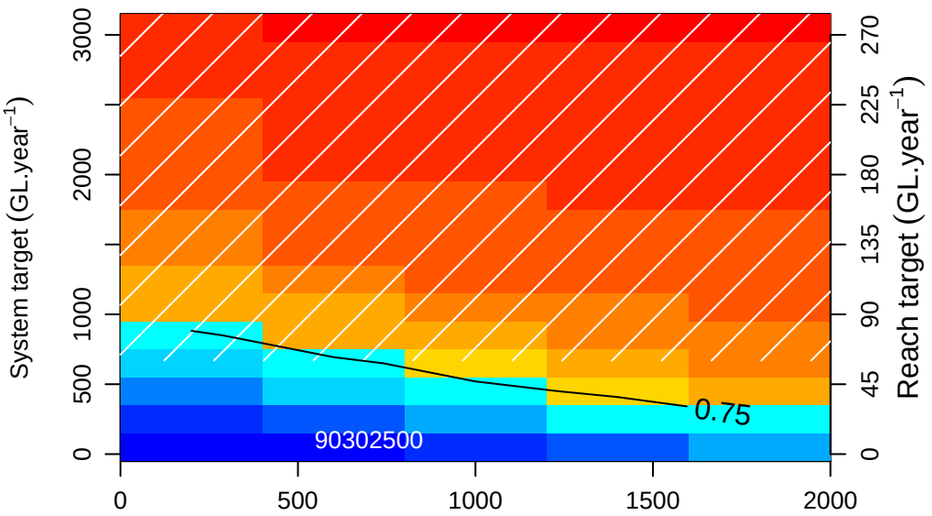


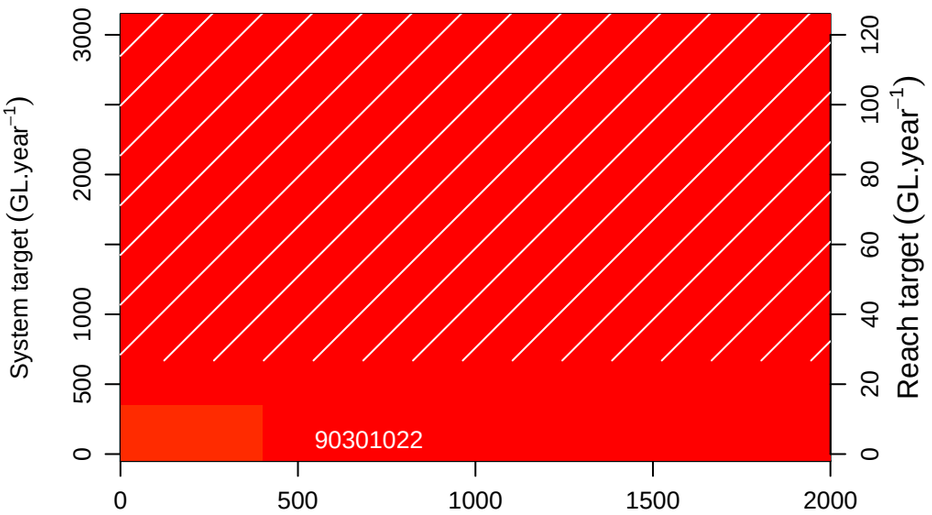


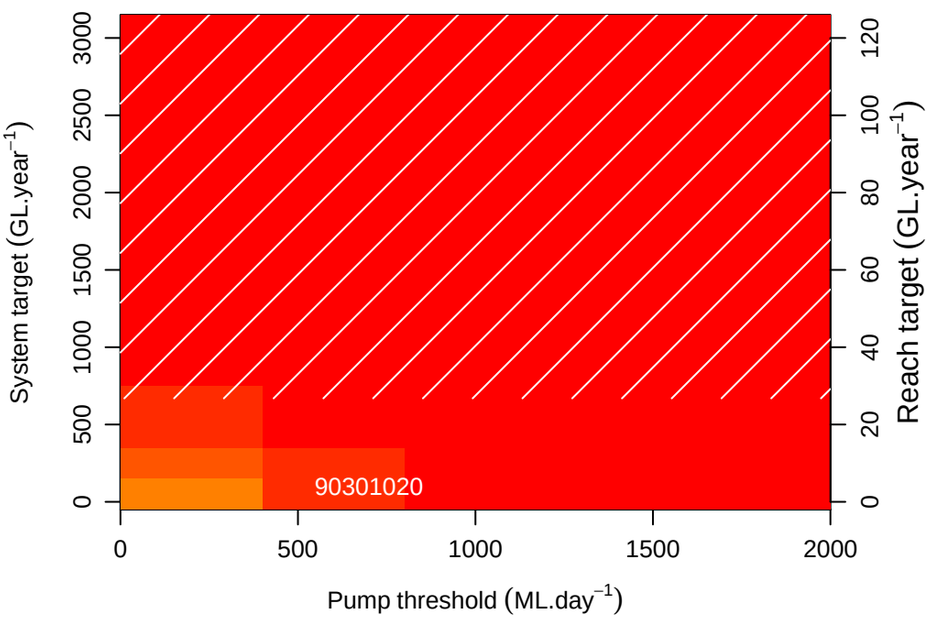


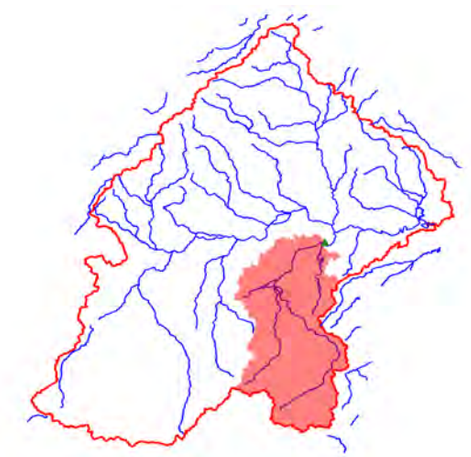
Annual reliability colour scale

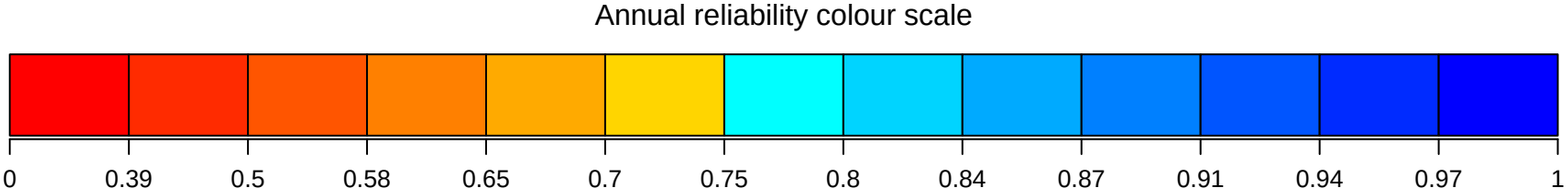


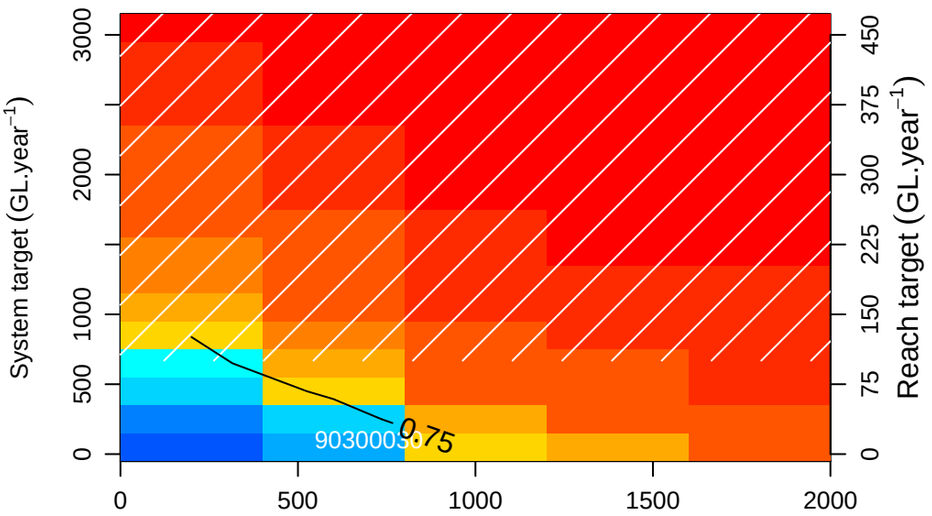

System target (GL.year^{-1})
Reach target (GL.year^{-1})
0
500
1000
2000
3000
0
45
90
135
180
225
270
0.75
90302500

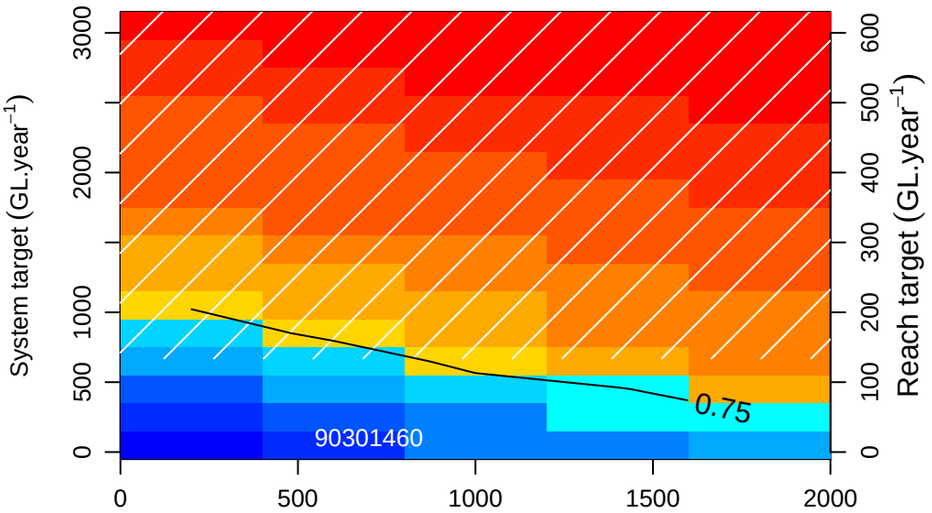

System target (GL.year^{-1})
Reach target (GL.year^{-1})
0
500
1000
2000
3000
0
20
40
60
80
100
120
90301022

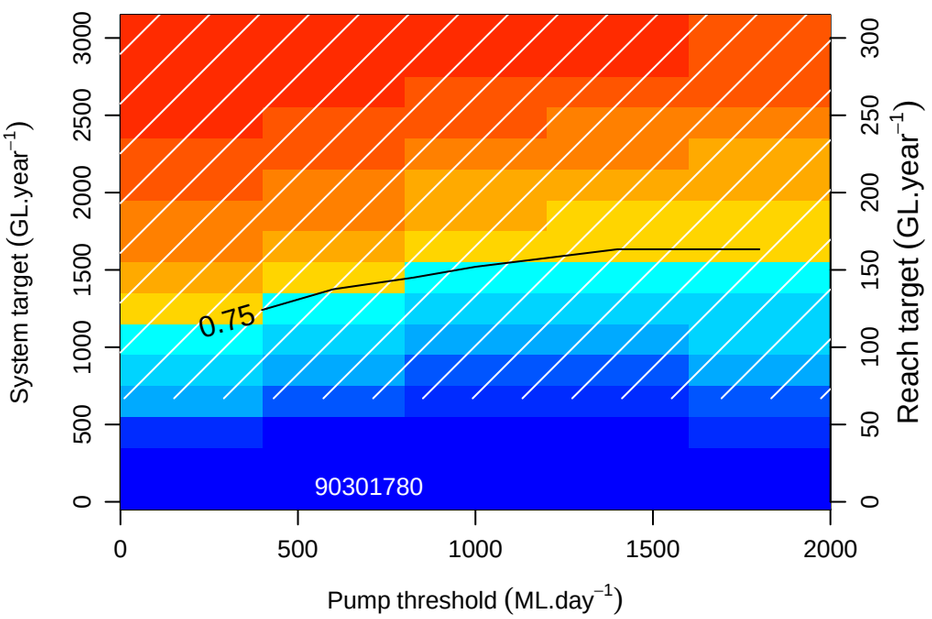

System target (GL.year^{-1})
Reach target (GL.year^{-1})
0
500
1000
1500
2000
2500
3000
0
20
40
60
80
100
120
90301020
Pump threshold (ML.day^{-1})

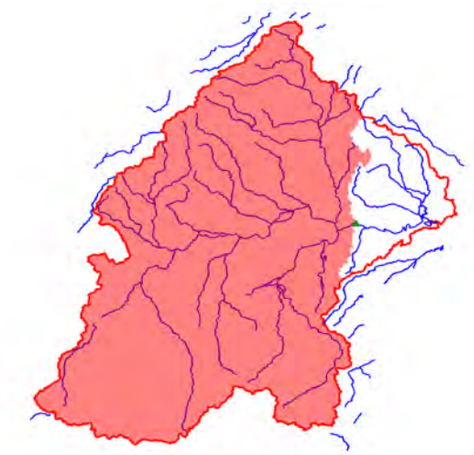


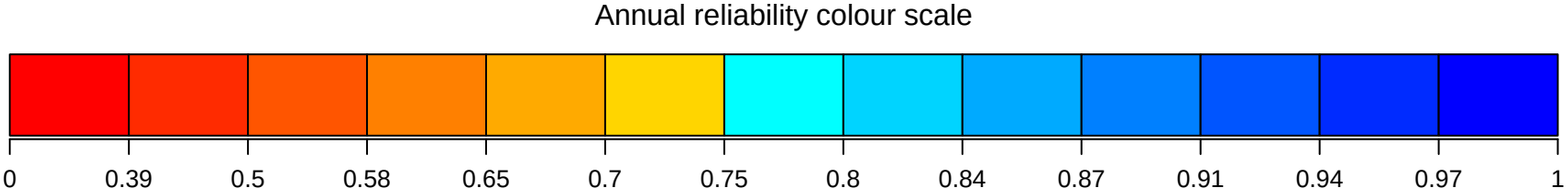

Annual reliability colour scale
0
0.39
0.5
0.58
0.65
0.7
0.75
0.8
0.84
0.87
0.91
0.94
0.97
1


System target (GL.year^{-1})
Reach target (GL.year^{-1})
0
500
1000
2000
3000
75
150
225
300
375
450
0.75
90300036


System target (GL.year^{-1})
Reach target (GL.year^{-1})
0
500
1000
2000
3000
100
200
300
400
500
600
0.75
90301460


System target (GL.year^{-1})
Reach target (GL.year^{-1})
0
500
1000
1500
2000
2500
3000
50
100
150
200
250
300
0.75
90301780
Pump threshold (ML.day^{-1})




Annual reliability colour scale
0
0.39
0.5
0.58
0.65
0.7
0.75
0.8
0.84
0.87
0.91
0.94
0.97
1

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