



Department of Water
Government of Western Australia

Past hydrologic research and future direction

John Ruprecht
A/Director, Water Resource Management



Research catchments

- Studies in 27 experimental catchments in the south–west of Western Australia examined the impacts of land use practices such as
 - clearing for agricultural development,
 - forest harvesting and regeneration,
 - forest thinning,
 - bauxite mining and
 - reforestation on water yield.
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Research Catchments

- **Clearing for agriculture**

- Salmon
- Wights
- Don
- Ernies
- Lemon

- **Forest thinning**

- Lewis
- Hansens
- Higgens
- Jones
- Yarragil 4X
- Yarragil 4L

- **Reforestation**

- Padbury Road
- Maringee Farm
- Batalling Creek
- Stenes Arboretum

- **Forest harvesting**

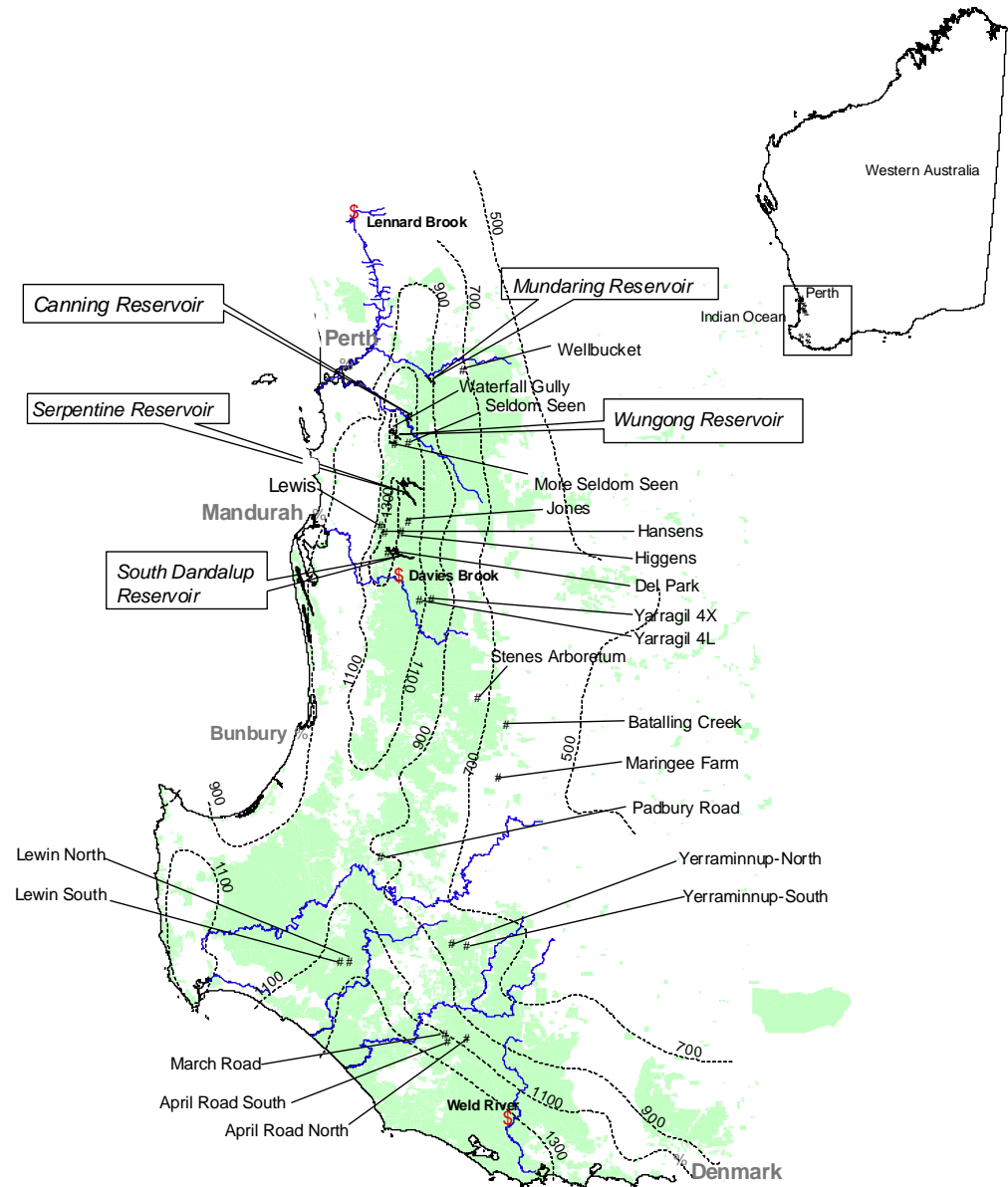
- Lewin South
- Lewin North
- March Road
- April Road North
- April Road South
- Yerraminnup South
- Yerraminnup North
- Wellbucket

- **Bauxite mining**

- Del Park
- Seldom Seen
- More Seldom Seen
- Waterfall Gully

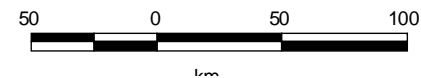


Research Catchments - location



Legend

- # Experimental catchment
- \$ Gauging station
- % Town
- River
- Rainfall isohyet (mm)
- Native vegetation



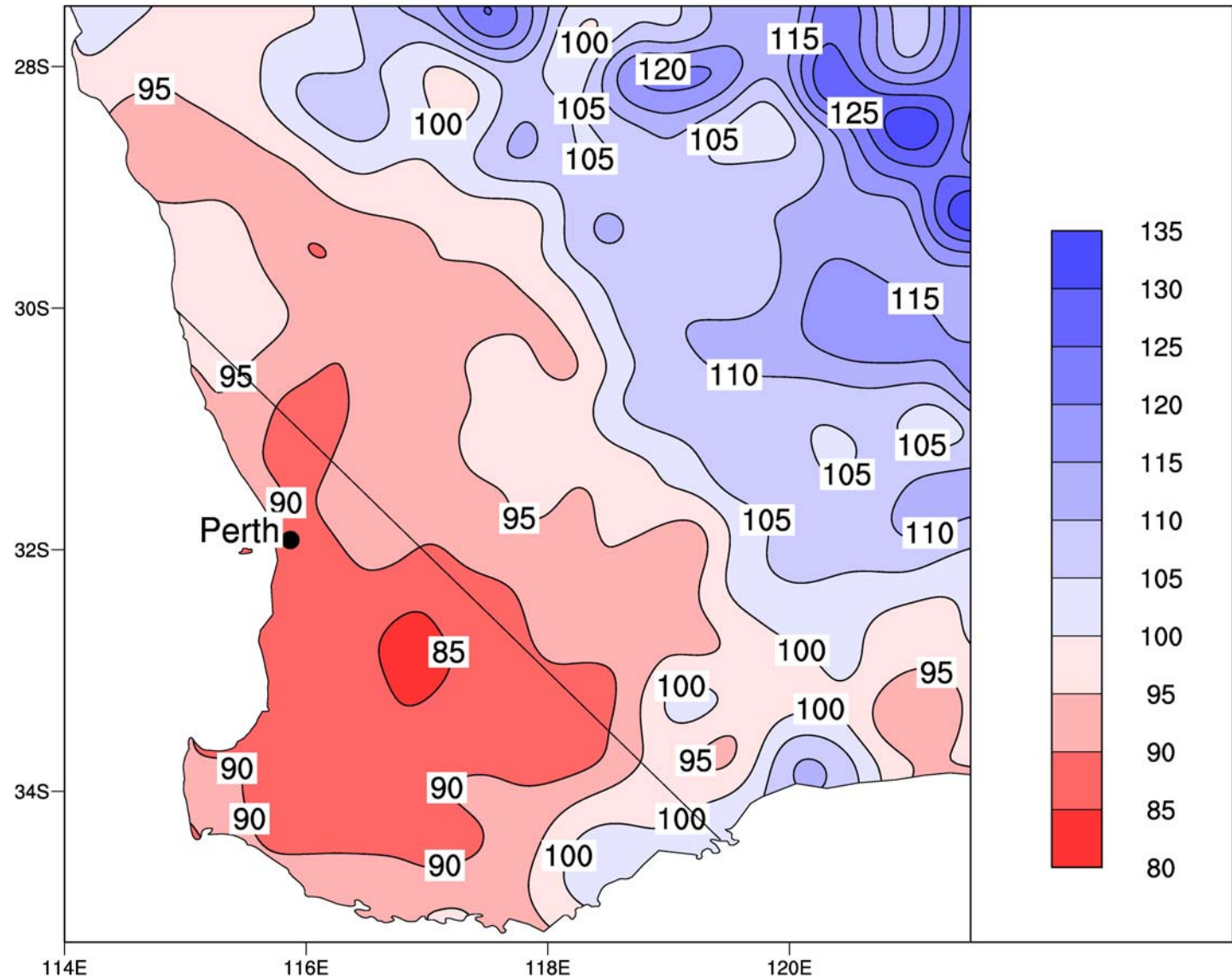


Key influences on water resources of Perth water supply catchments

- **Climate**
 - **Land use change**
 - clearing
 - timber harvesting
 - forest thinning
 - bauxite mining
 - reforestation
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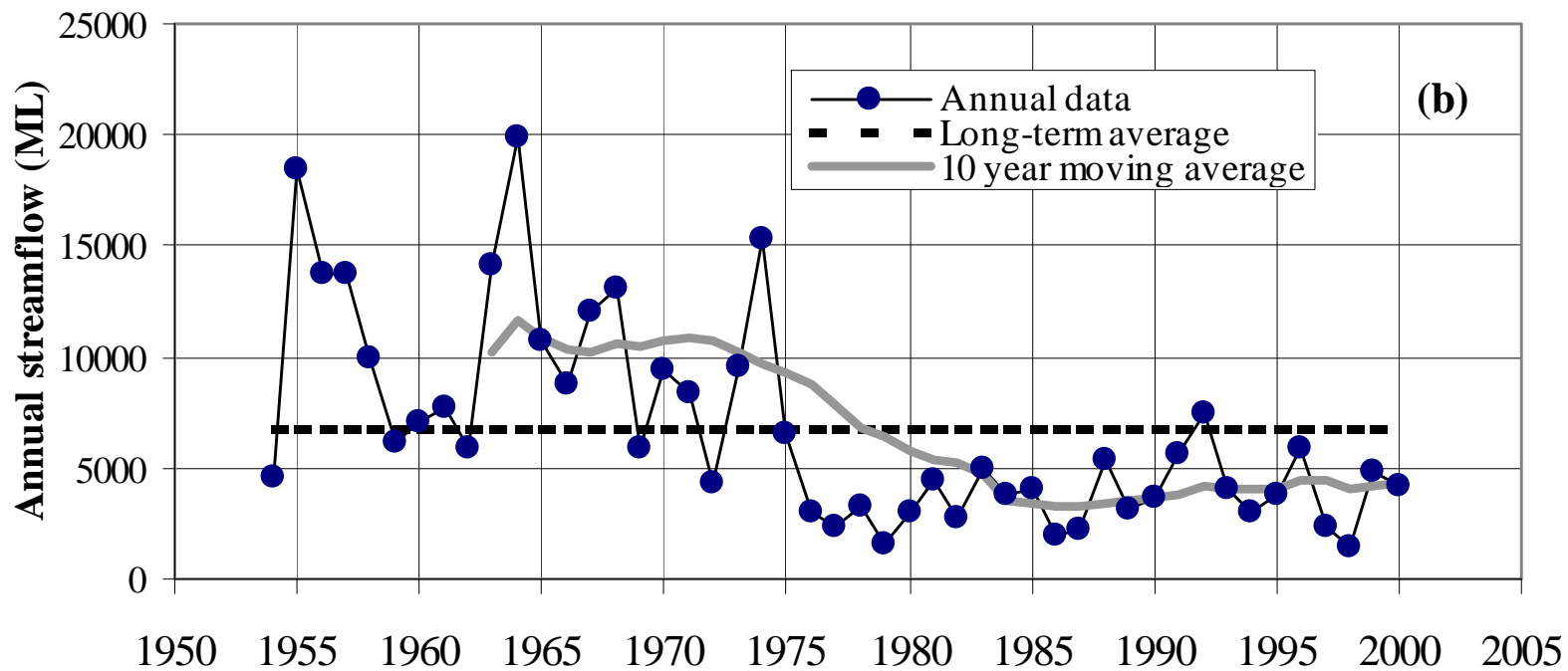


Climate





Climate



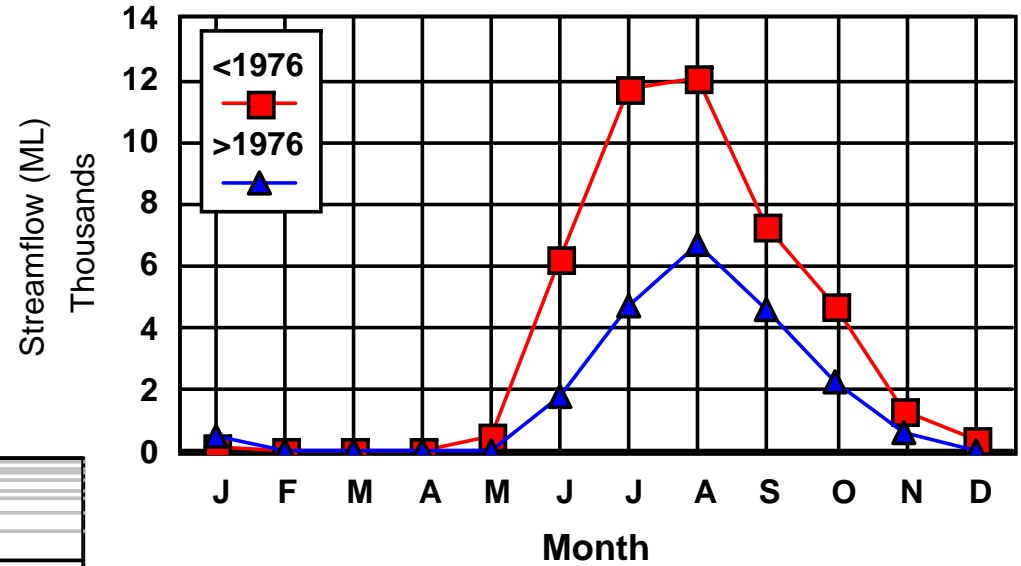
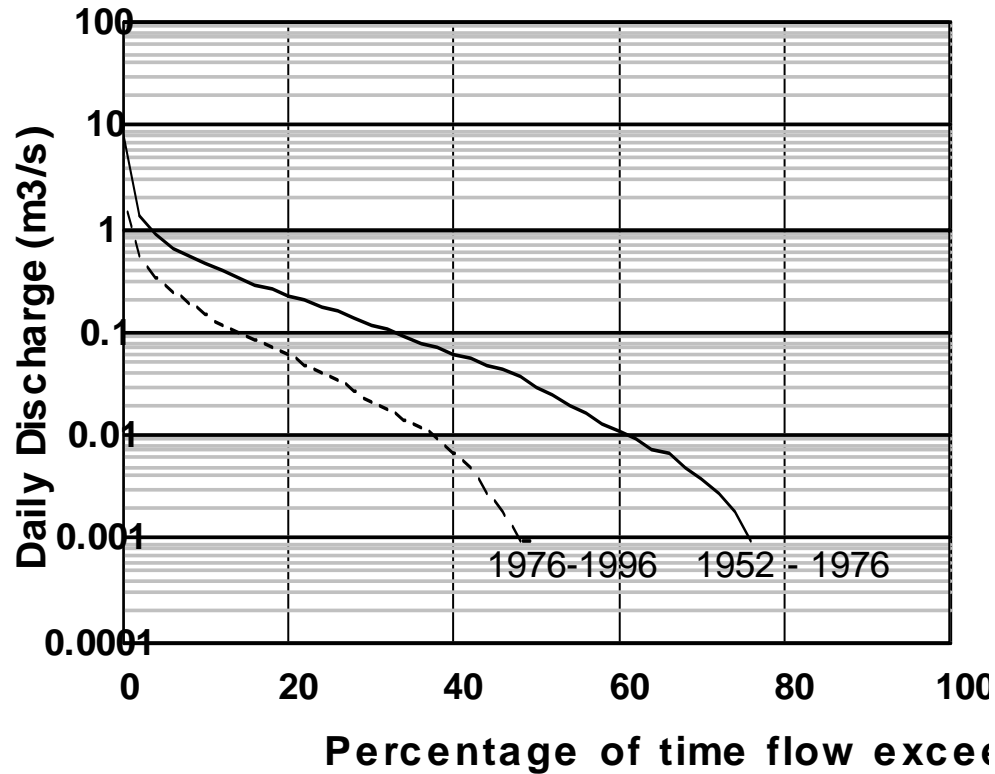
Davies Brook

Bari and Ruprecht, 2003



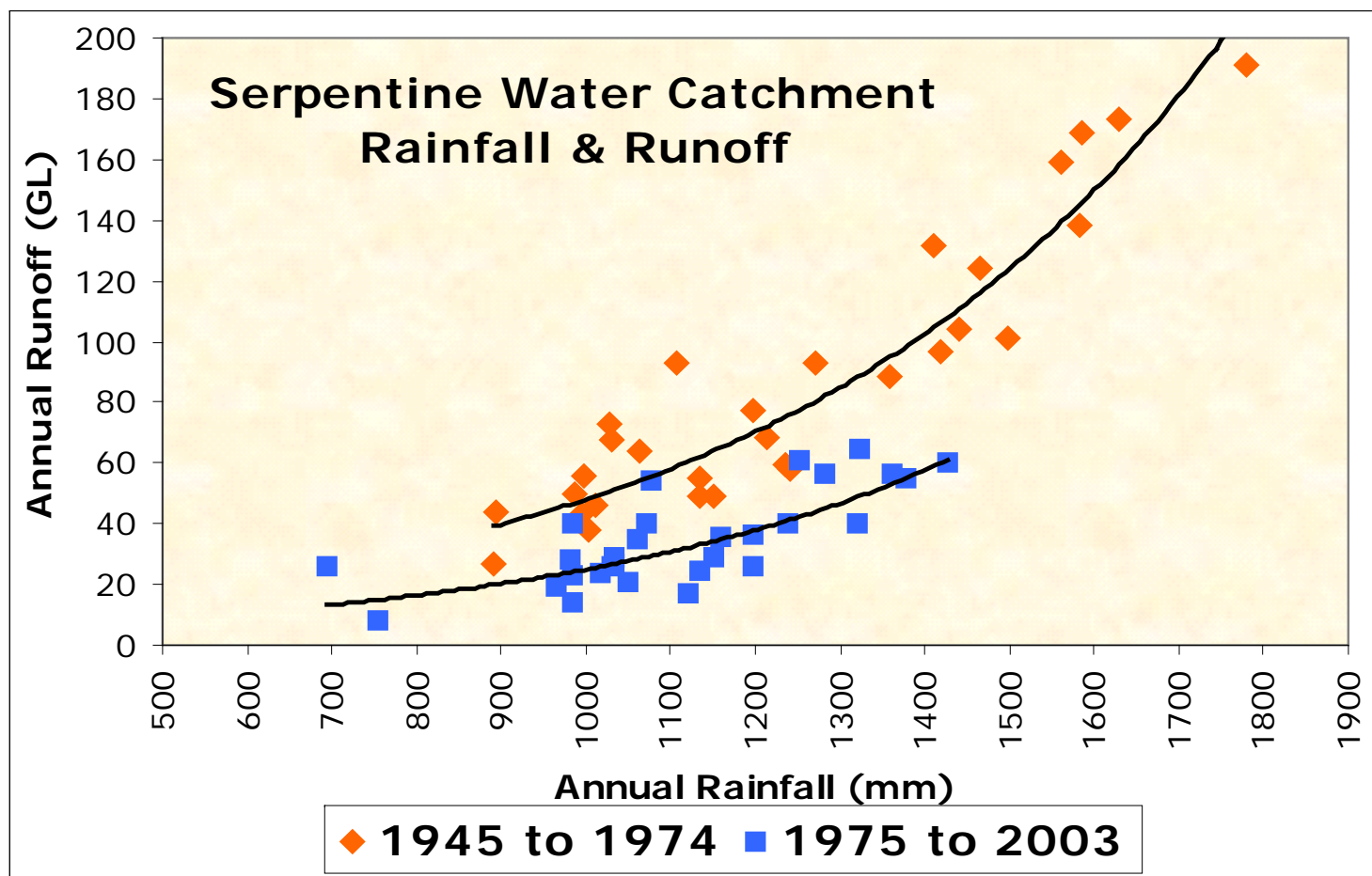
Climate - seasonal changes

Harris River 612 017/036



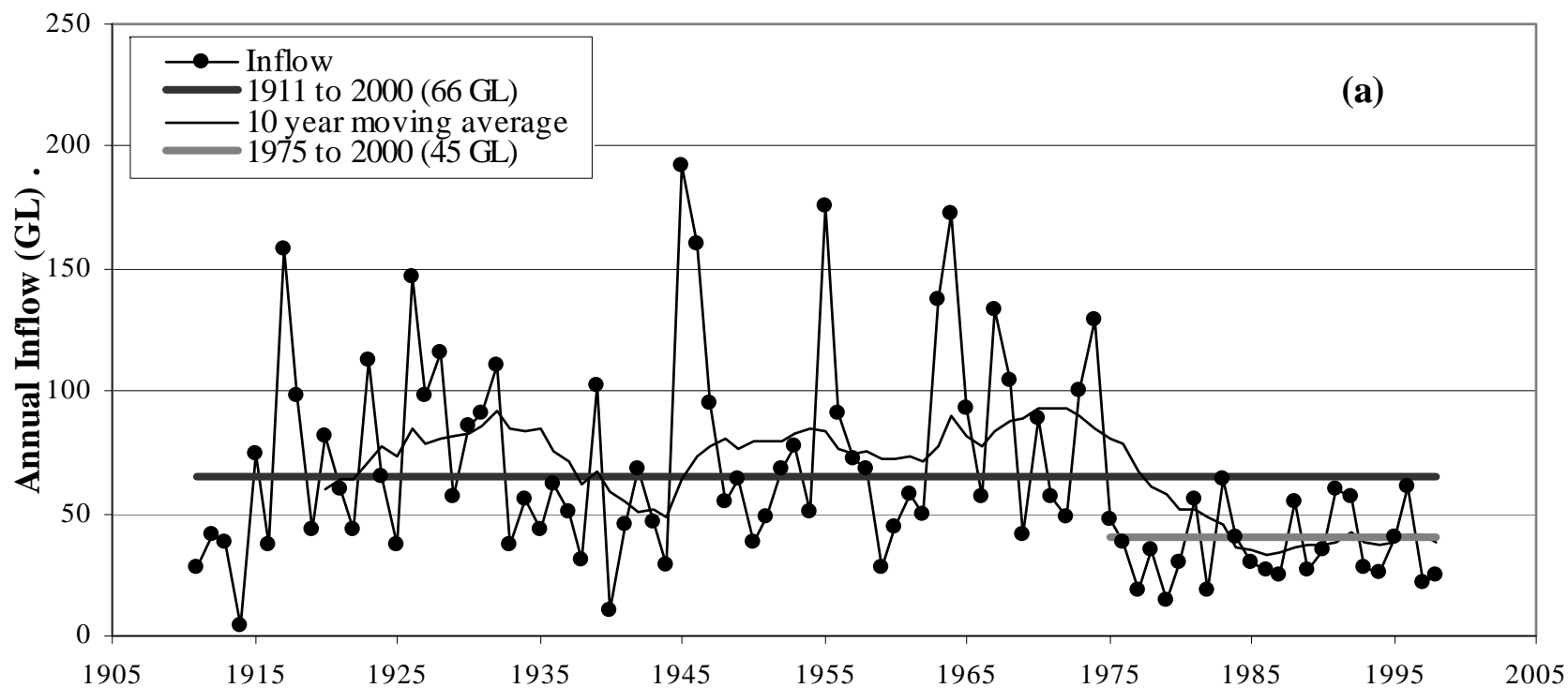


Climate - rainfall relationships





Climate

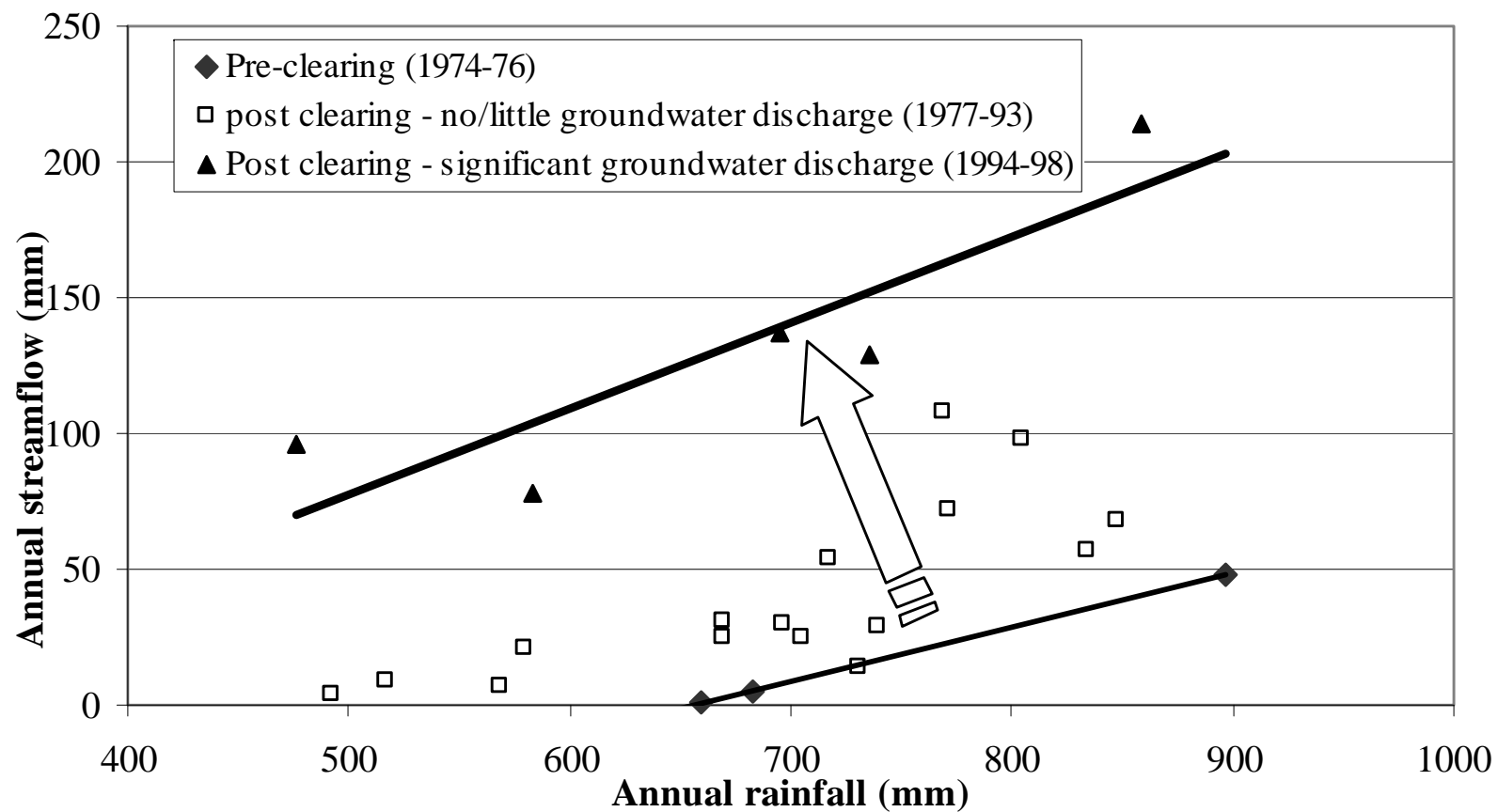


Serpentine River -
inflow

Bari and Ruprecht, 2003

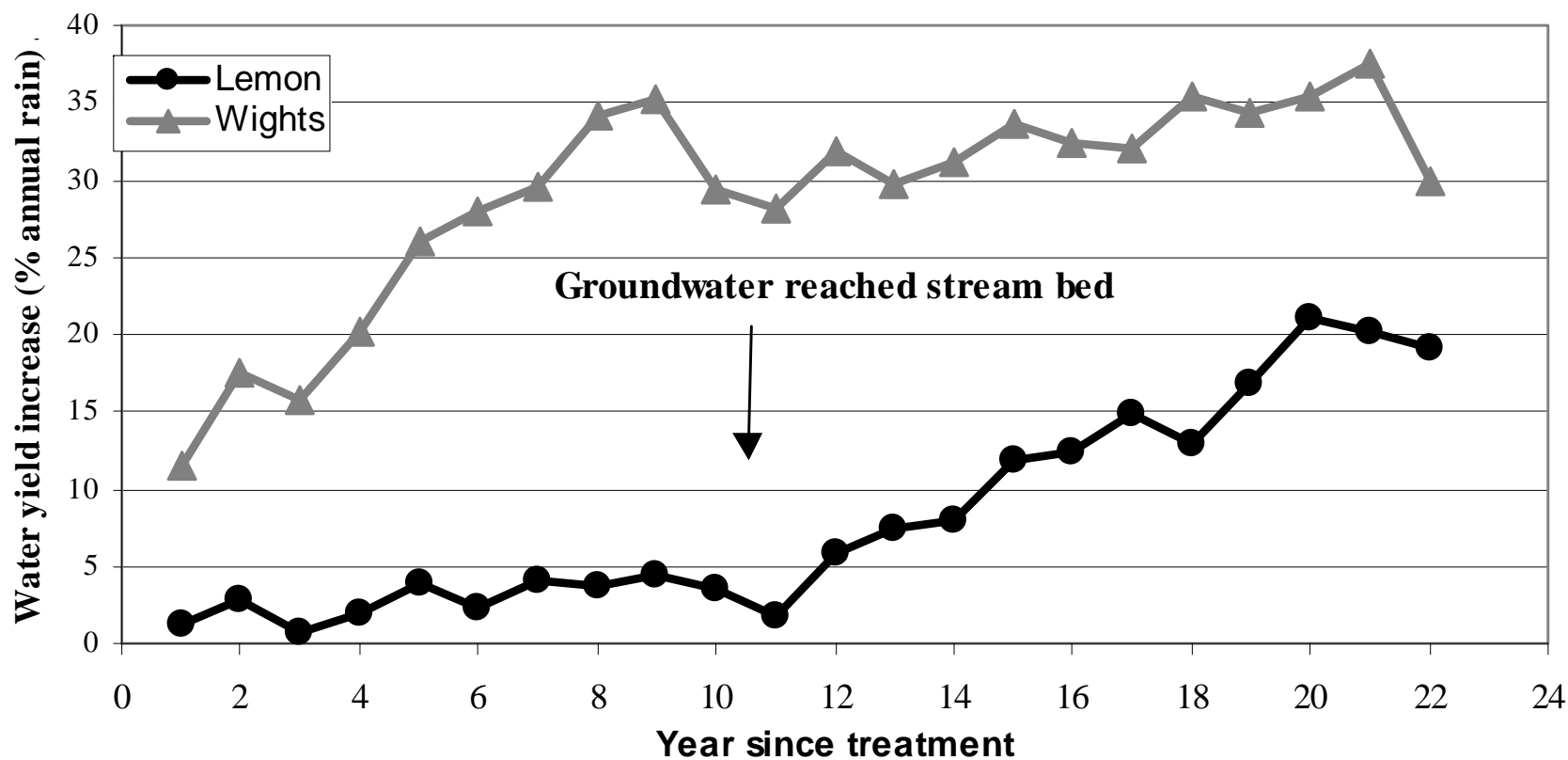


Land use - clearing



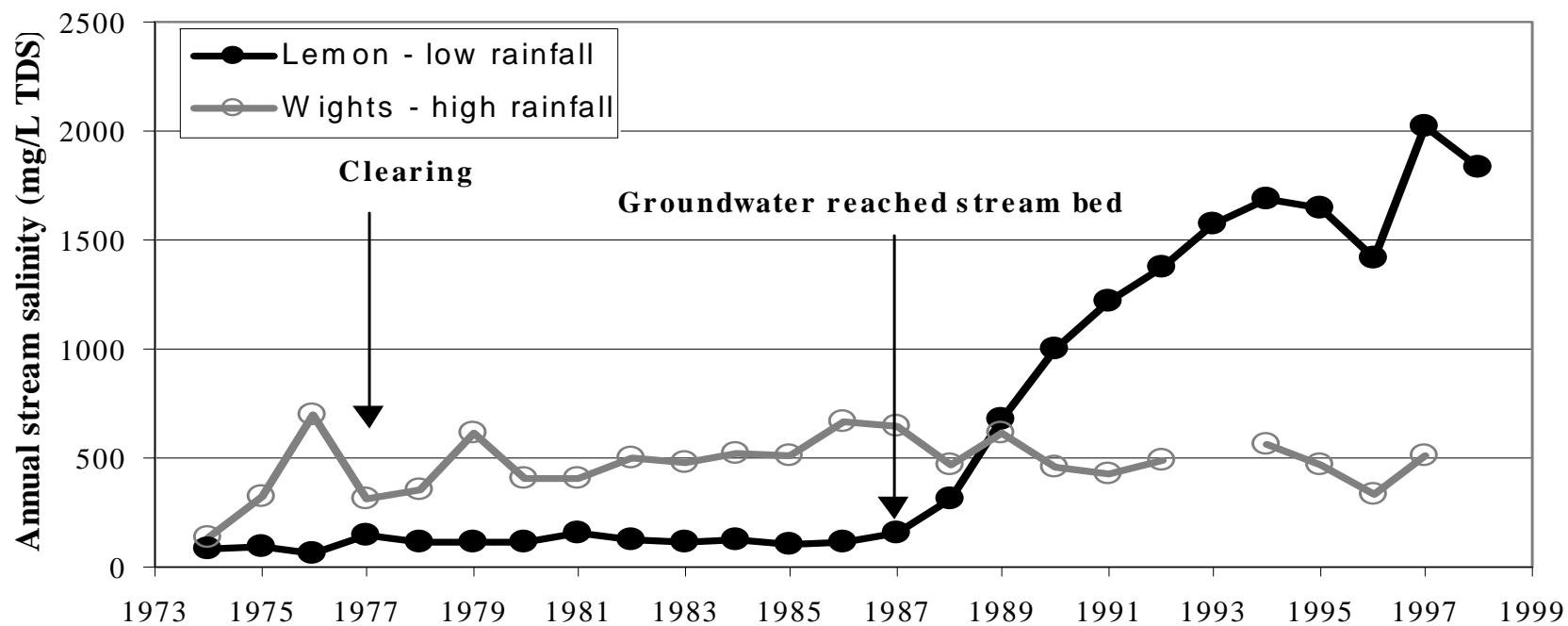


Land use - clearing



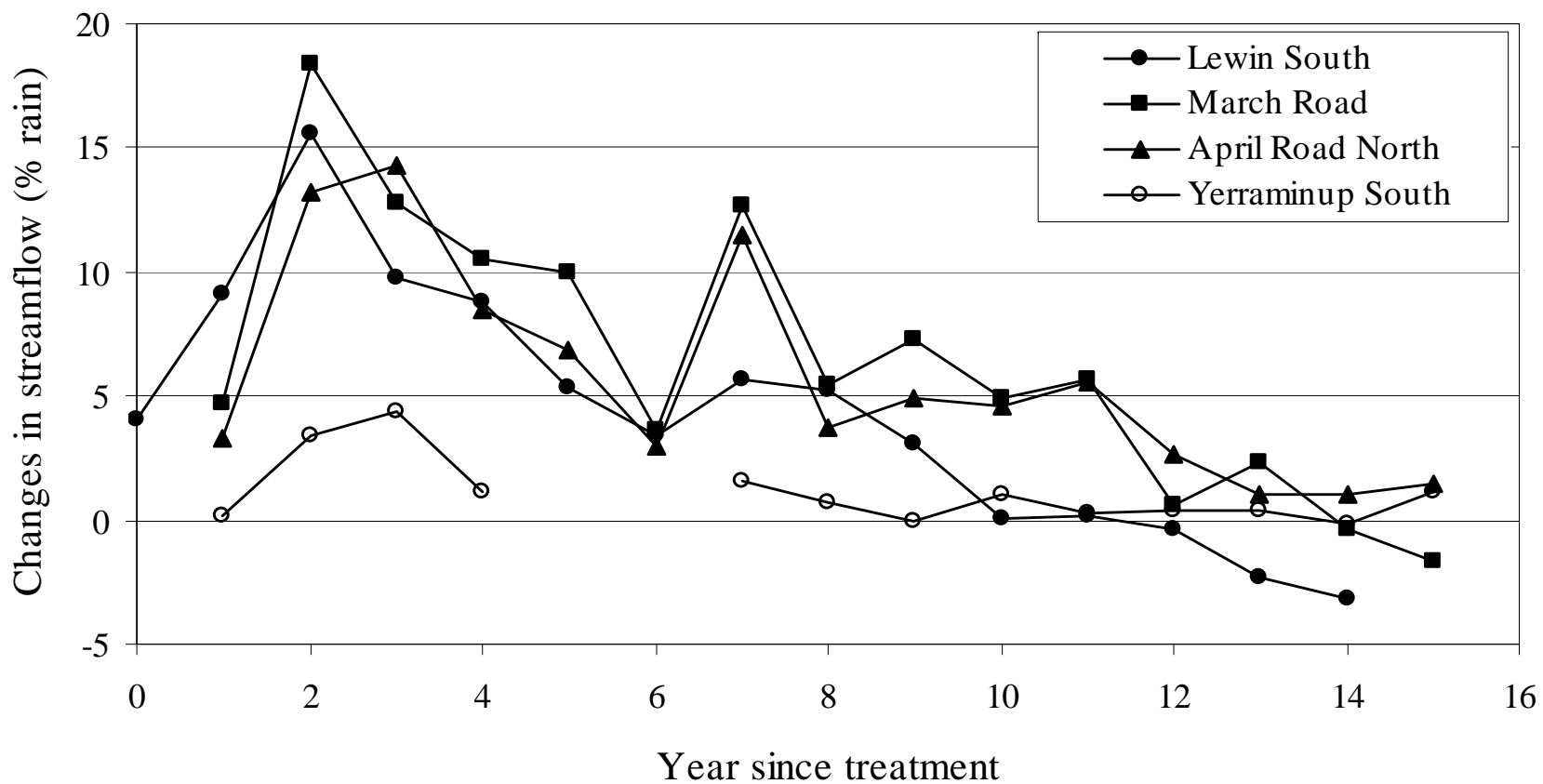


Land use - clearing



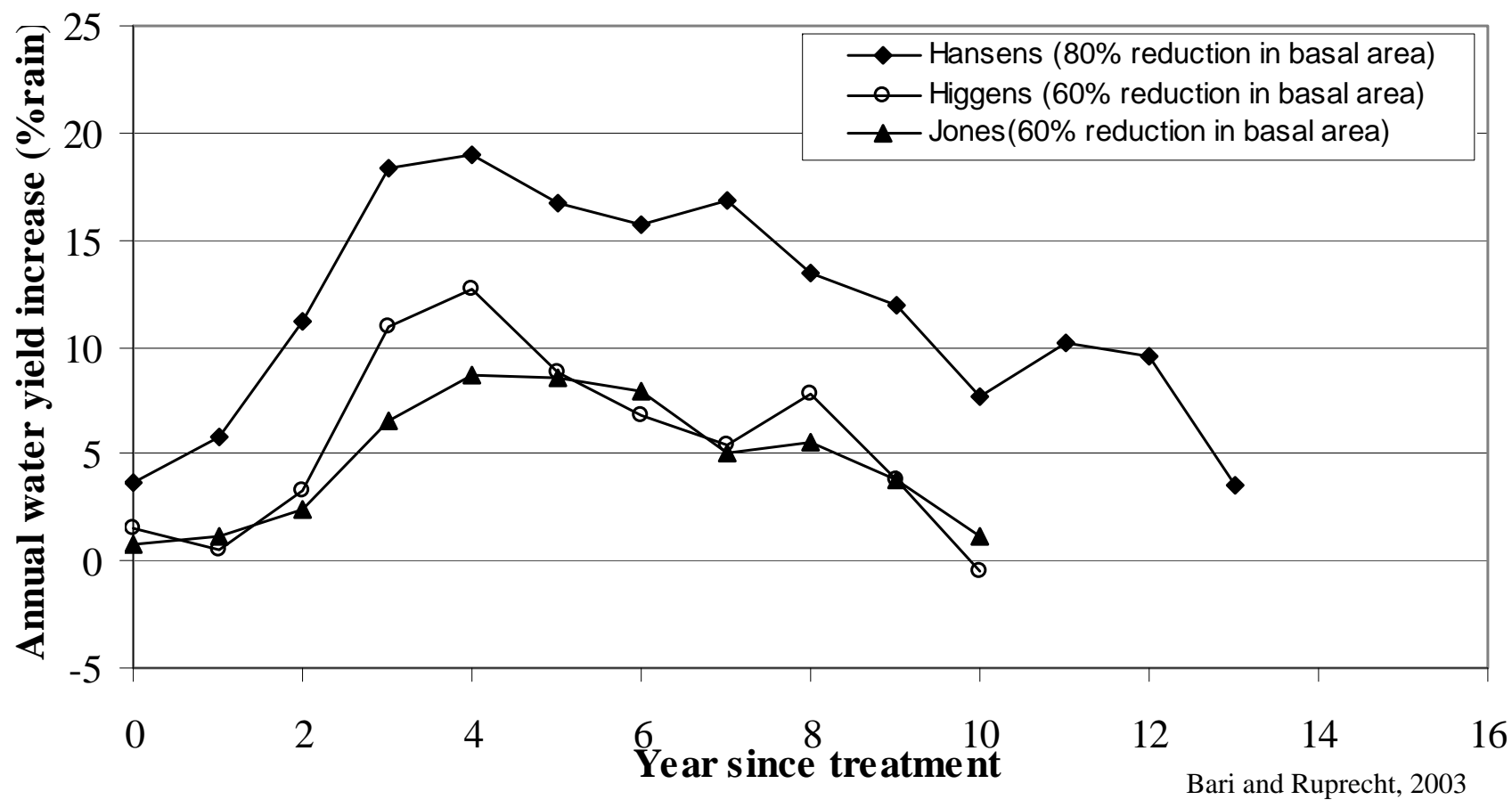


Land use - timber harvesting



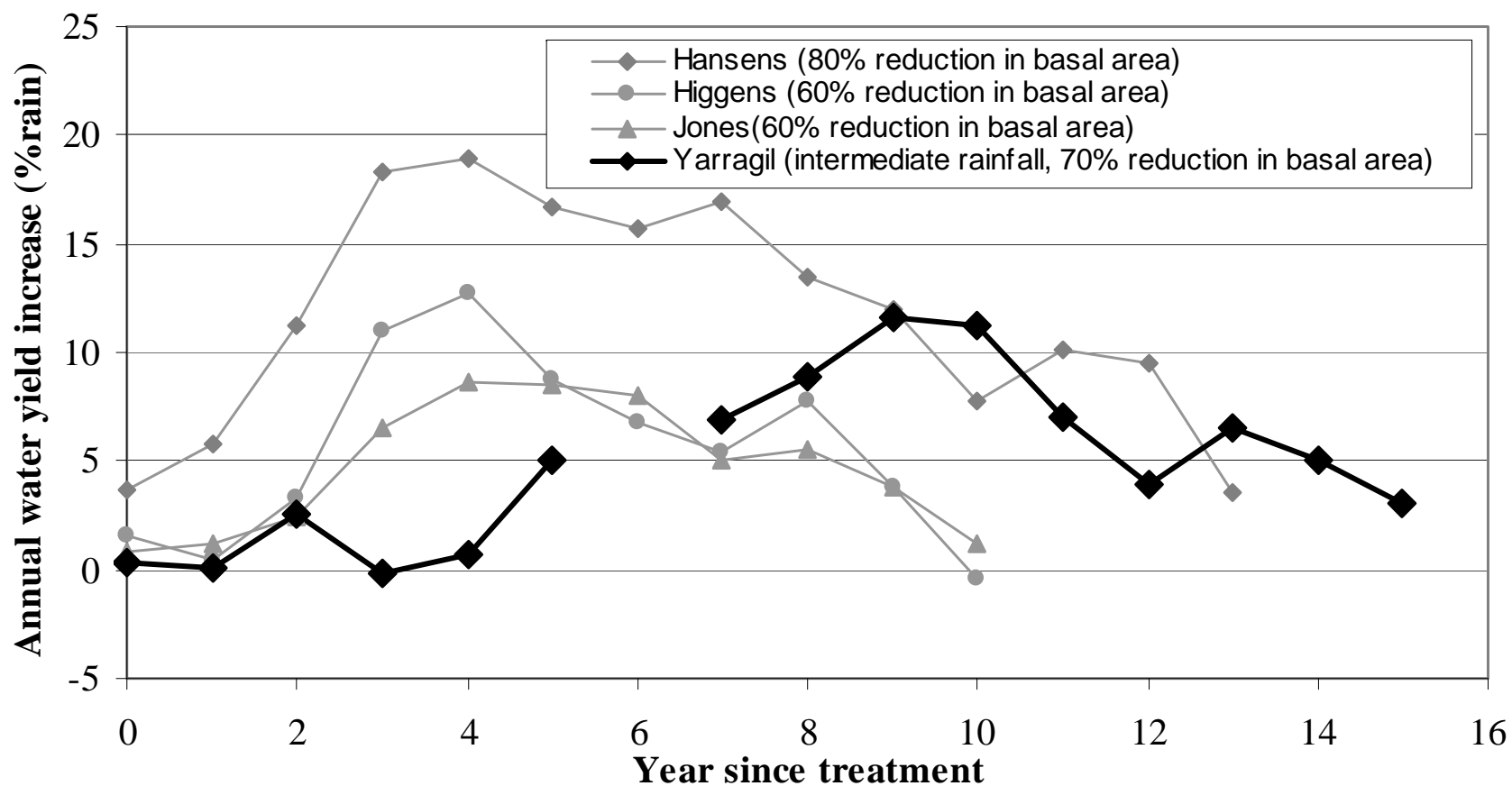


Land use - forest thinning





Land use - forest thinning



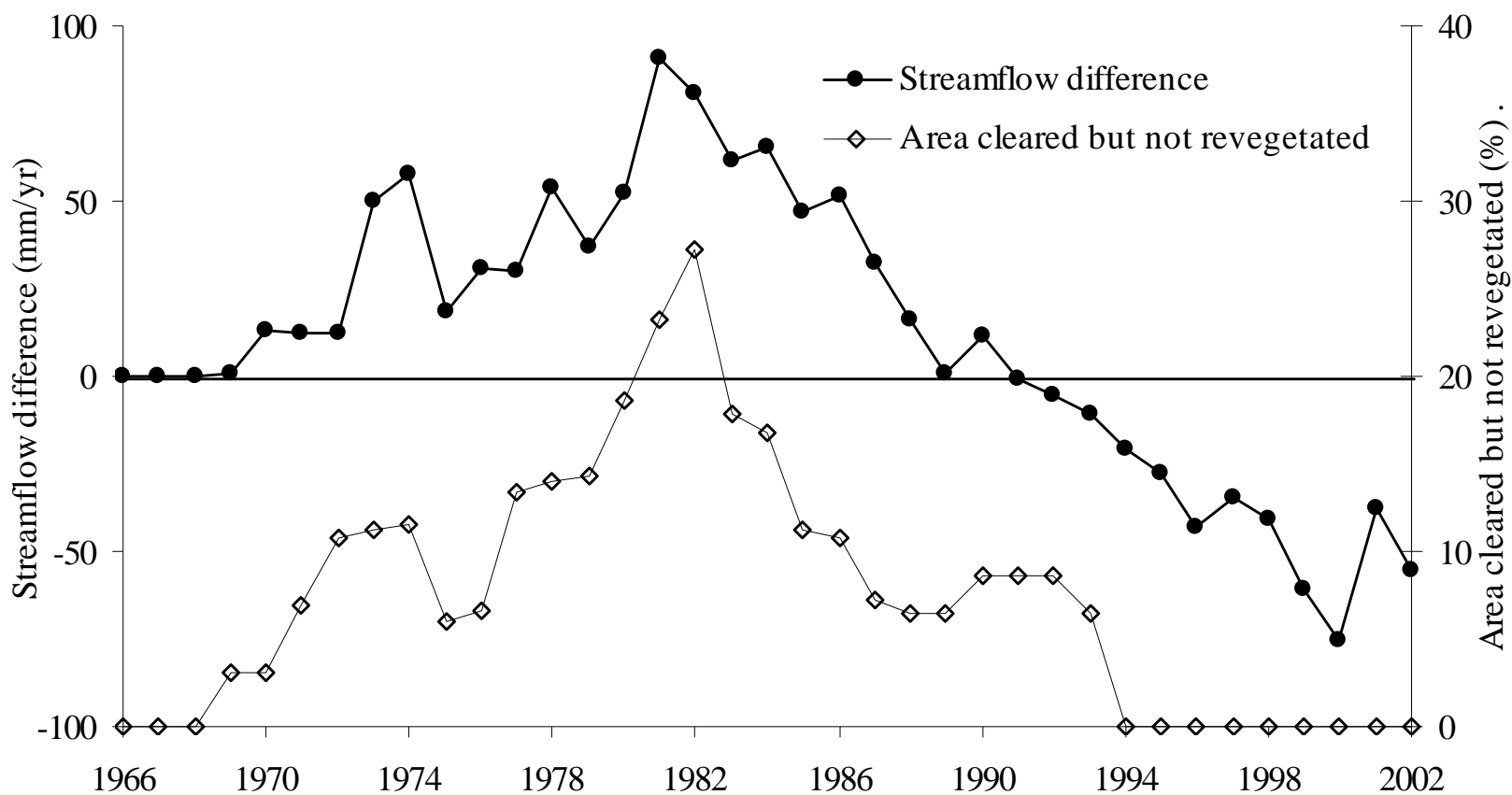


Land use - forest thinning

<i>Catchment</i>	<i>Treatment (reduction in basal area)</i> (%)	<i>Maximum increase in water yield</i>		<i>Increase in water yield after 10 years</i>	
		(% rain)	(mm)	(% rain)	(mm)
Hansens	80	19	260	7.5	90
Higgins	60	12	156	0	0
Jones	60	9	103	0	0
Yarragil 4L*	60**	12	131	11	97

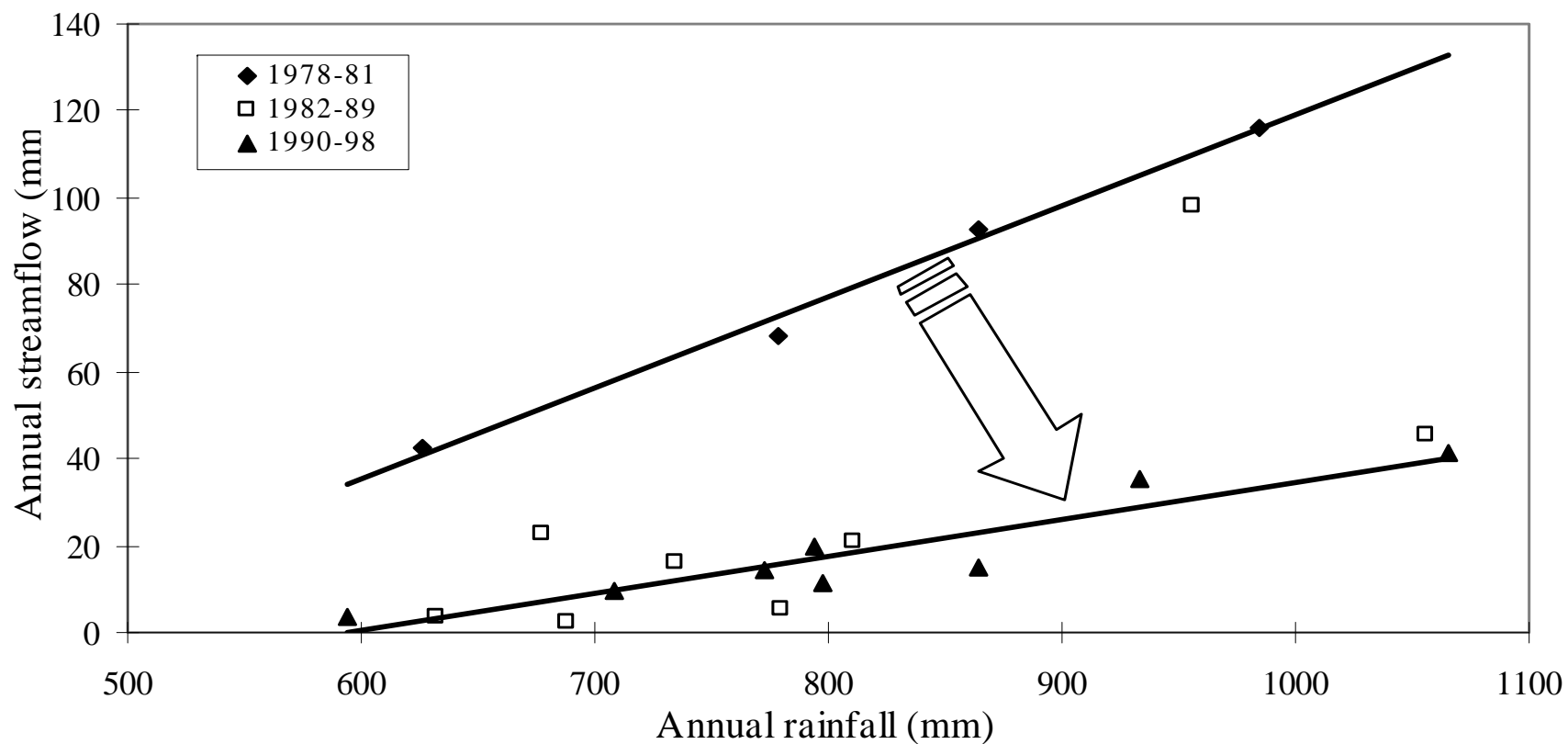


Land use - bauxite mining



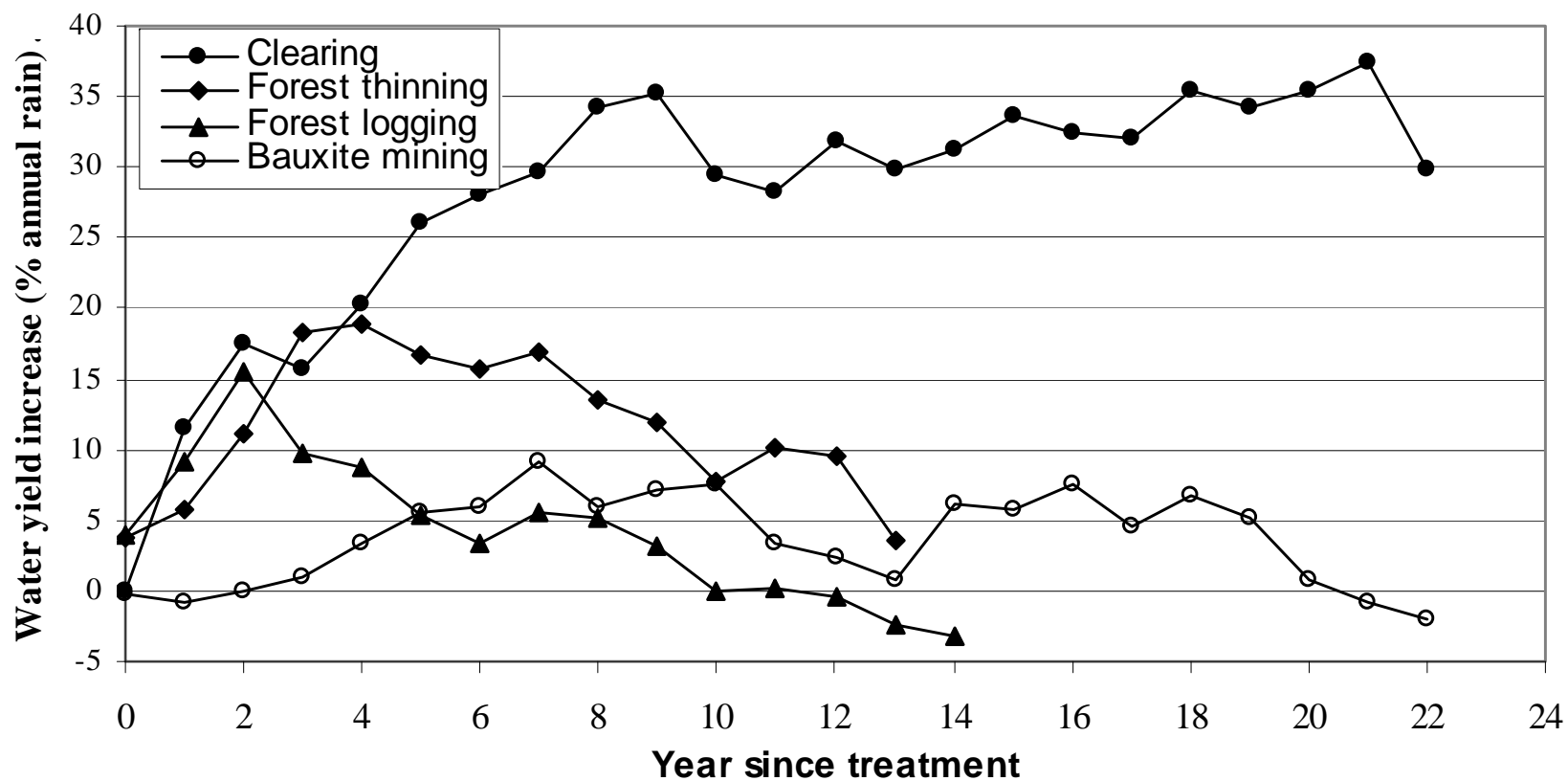


Land use - reforestation





Land use - comparison





Land use - comparison

<i>Catchment</i>	<i>Land use practice</i>	<i>Cover before (%)</i>	<i>Cover after (%)</i>	<i>Max increase in water yield (% rain)</i>	<i>Sustained increase in water yield?</i>
Wights	Clearing then agriculture	80	0	30	Yes
Lewin South	Logging & regeneration	90	20	14.5	No
Hansen	Forest thinning	60	14	20	No
Del Park	Mining and rehabilitation	N/A	N/A	9	No
More Seldom Seen	Mining and rehabilitation	N/A	N/A	21	No



Land use - comparison

<i>Land use</i>	<i>Expected water impacts</i>
Clearing for agriculture	<p>Substantial increase in water yield and flood peaks</p> <p>Substantial salinity increases as mean annual rainfall decreases</p>
Forest thinning and logging	<p>Transient increase in water yield. The increase is likely to be greater with:</p> <ul style="list-style-type: none">– higher mean annual rainfall– more intense thinning or logging <p>Transient, but small, increase in stream salinity. The higher salt risk areas are those where there is a combination of high soil salt storage and high groundwater levels. The current management responses to this risk include stream buffer and phased logging.</p>
Bauxite mining and rehabilitation	<p>Initial increase in water yield followed by decline back to pre-disturbance levels</p> <p>There are some uncertainties with long-term water yields possibly declining below pre-disturbance levels.</p> <p>Negligible salinity increases in higher rainfall areas.</p>
Reforestation	<p>Reduction in water yield — full effect likely to take 10–15 years.</p> <p>Reduction in salt load</p> <p>Impact on stream salinity can vary depending on level and location of reforestation.</p>



Regional Water Resources

Water supply catchment	Catchment area (km²)	Rainfall Zone	Mean annual runoff (mm)	Water yield (% rainfall)
Mundaring	1482	I-L	26	3
Canning	727	I-L	72	7.5
Wungong	130	H	197	15
Serpentine	660	H-I	110	10
North Dandalup	153	H	183	14
South Dandalup	315	H-I	97	9



Control catchment variability

