

Multi-decadal hydrological change in Western Australia's southern forest catchments

Lachlan McCaw
Forest & fire science consultant
Margaret River 6285 Western Australia

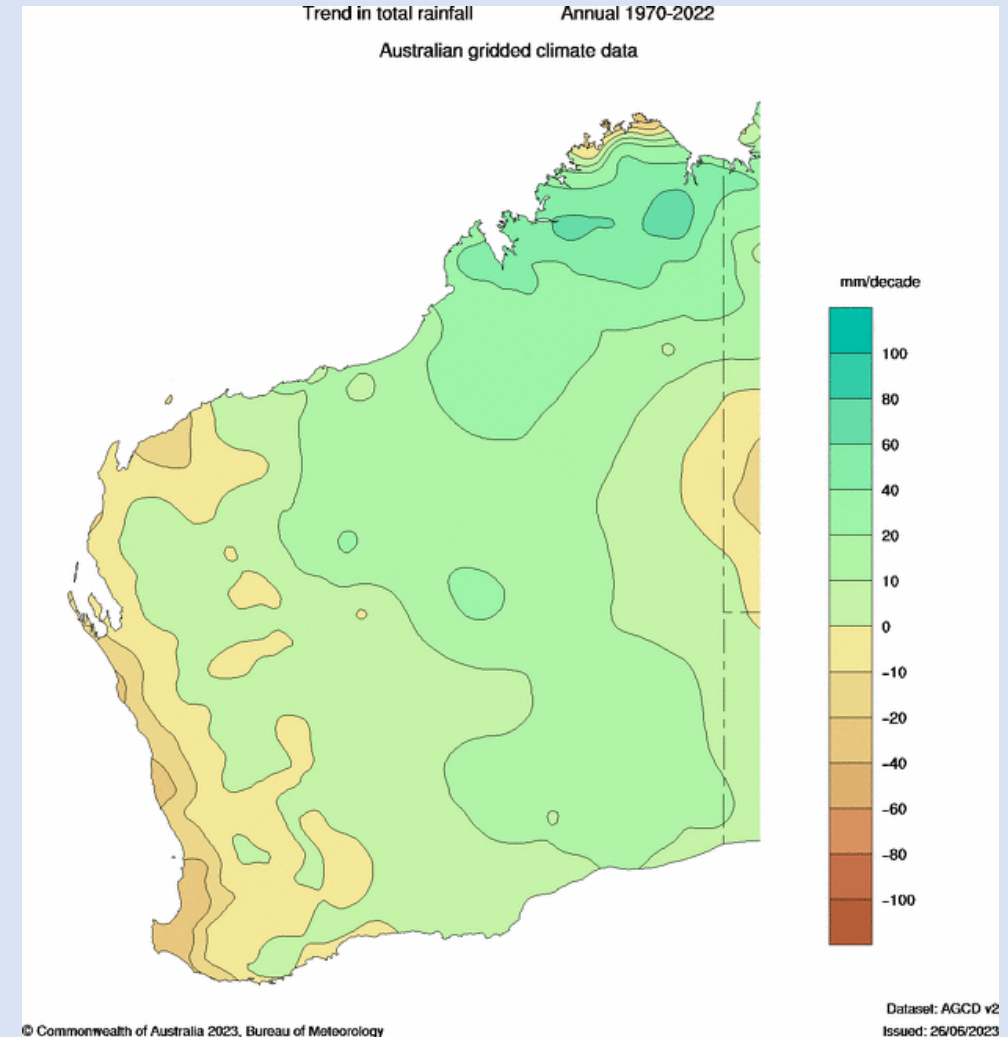
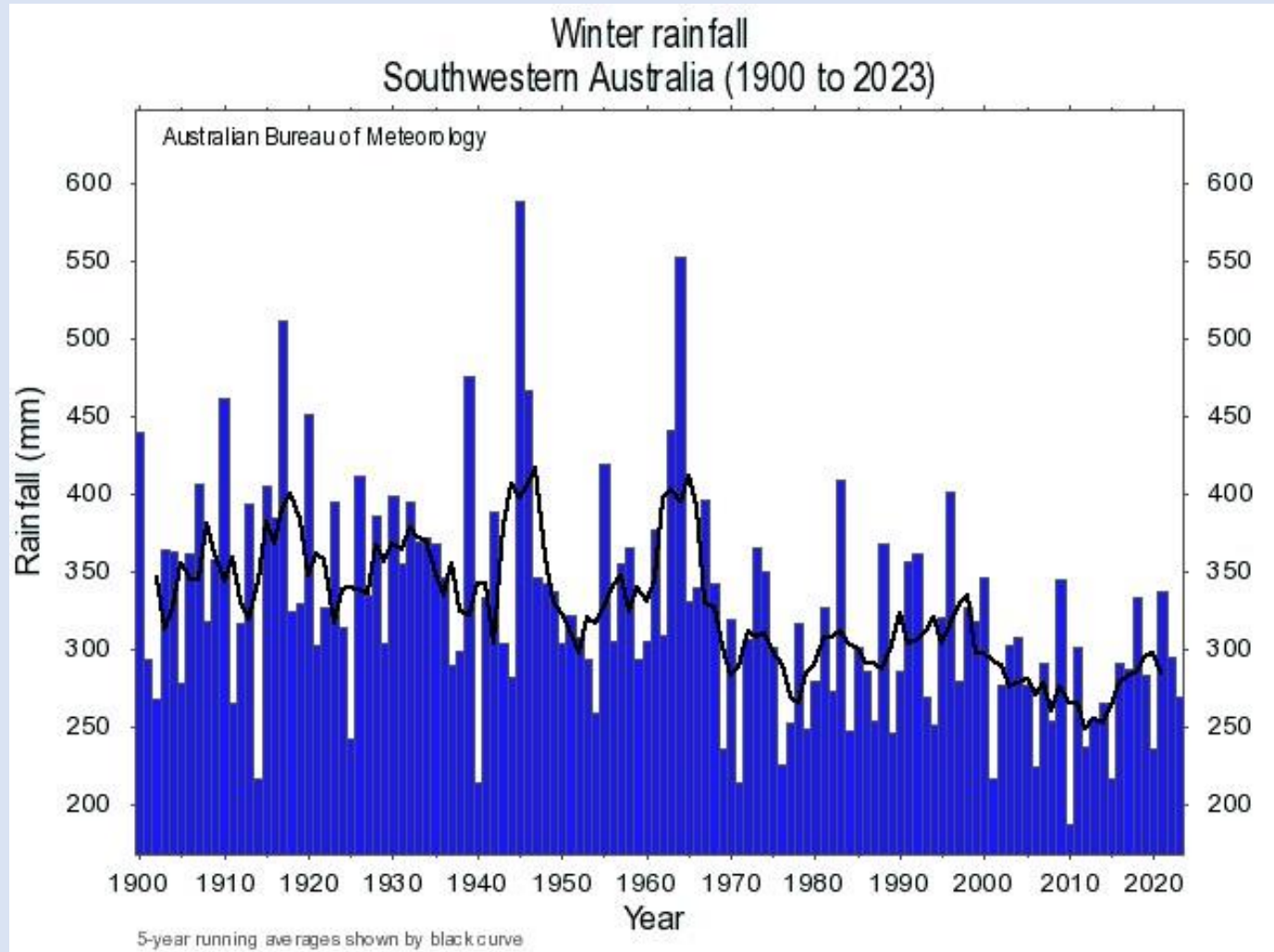


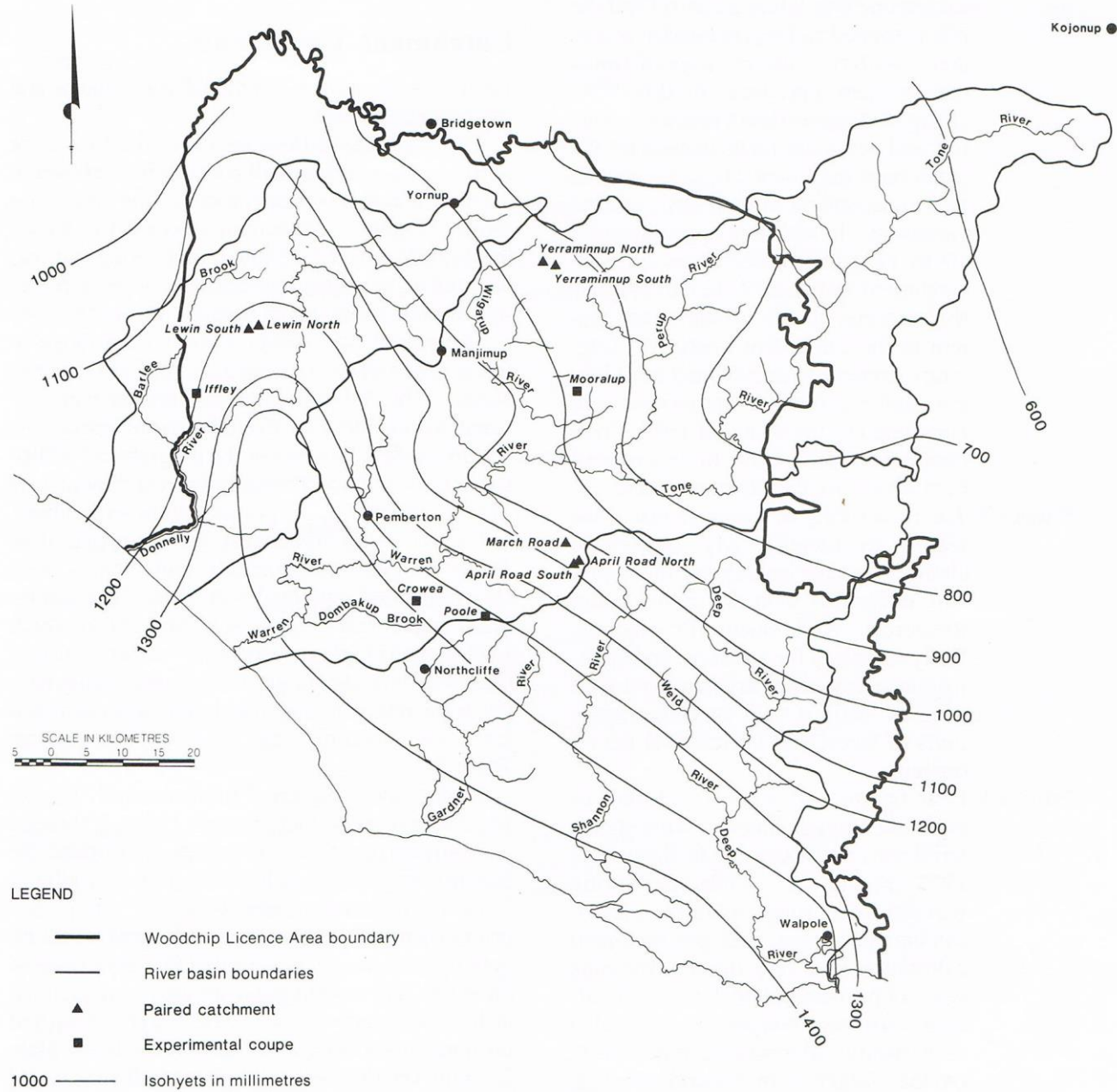
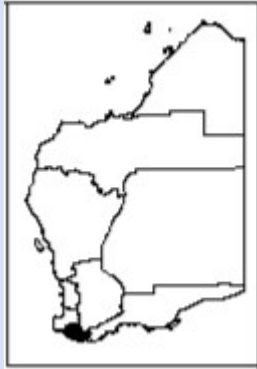
Overview

- WA's southern forest catchments
- Rainfall trends for south-west WA
- Woodchip Licence Area monitoring established 1975
- Trends in groundwater over five decades
- Contemporary context for water and forest health
- Broader learnings for forest monitoring



South-west WA rainfall trending downwards

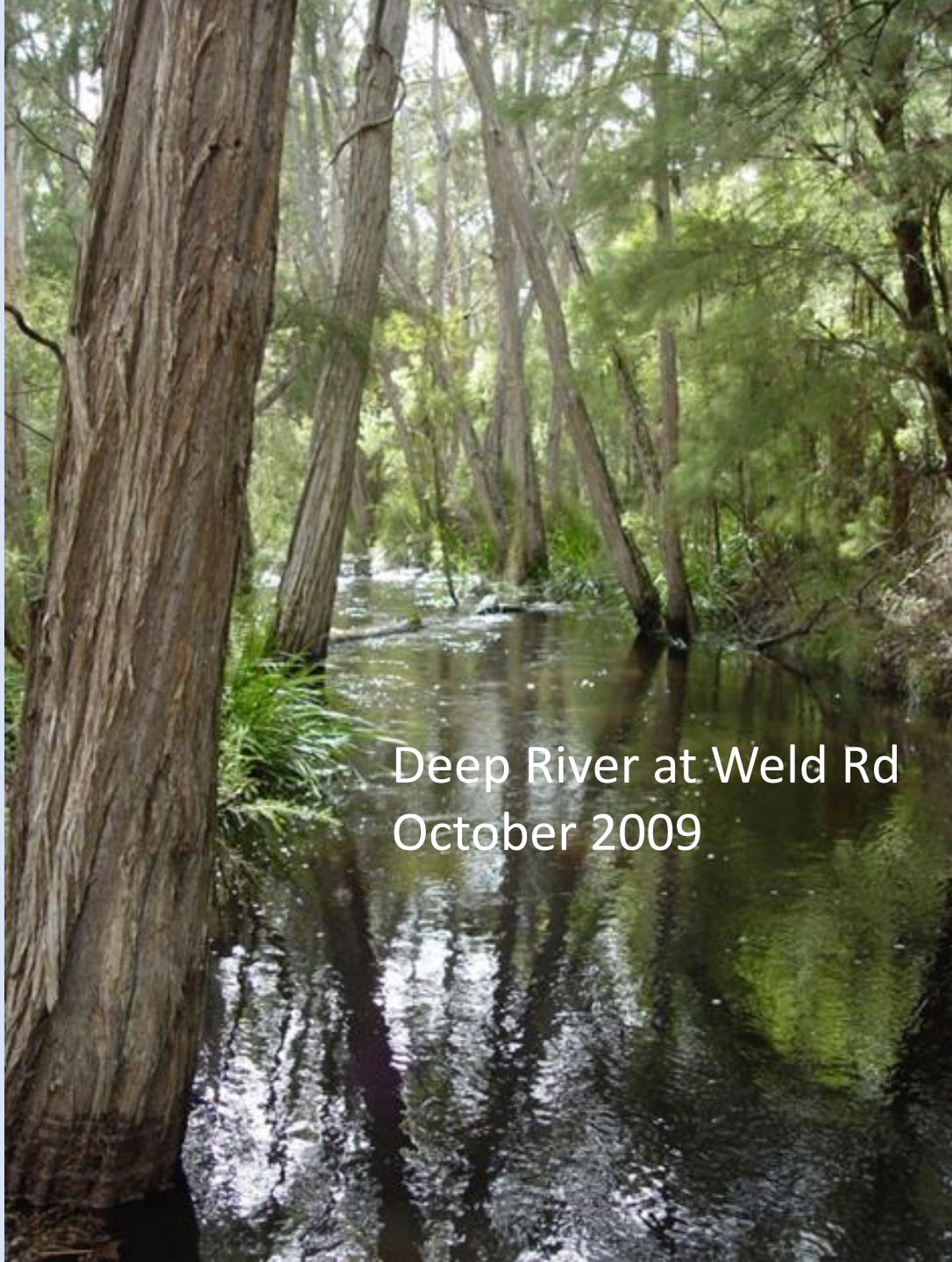




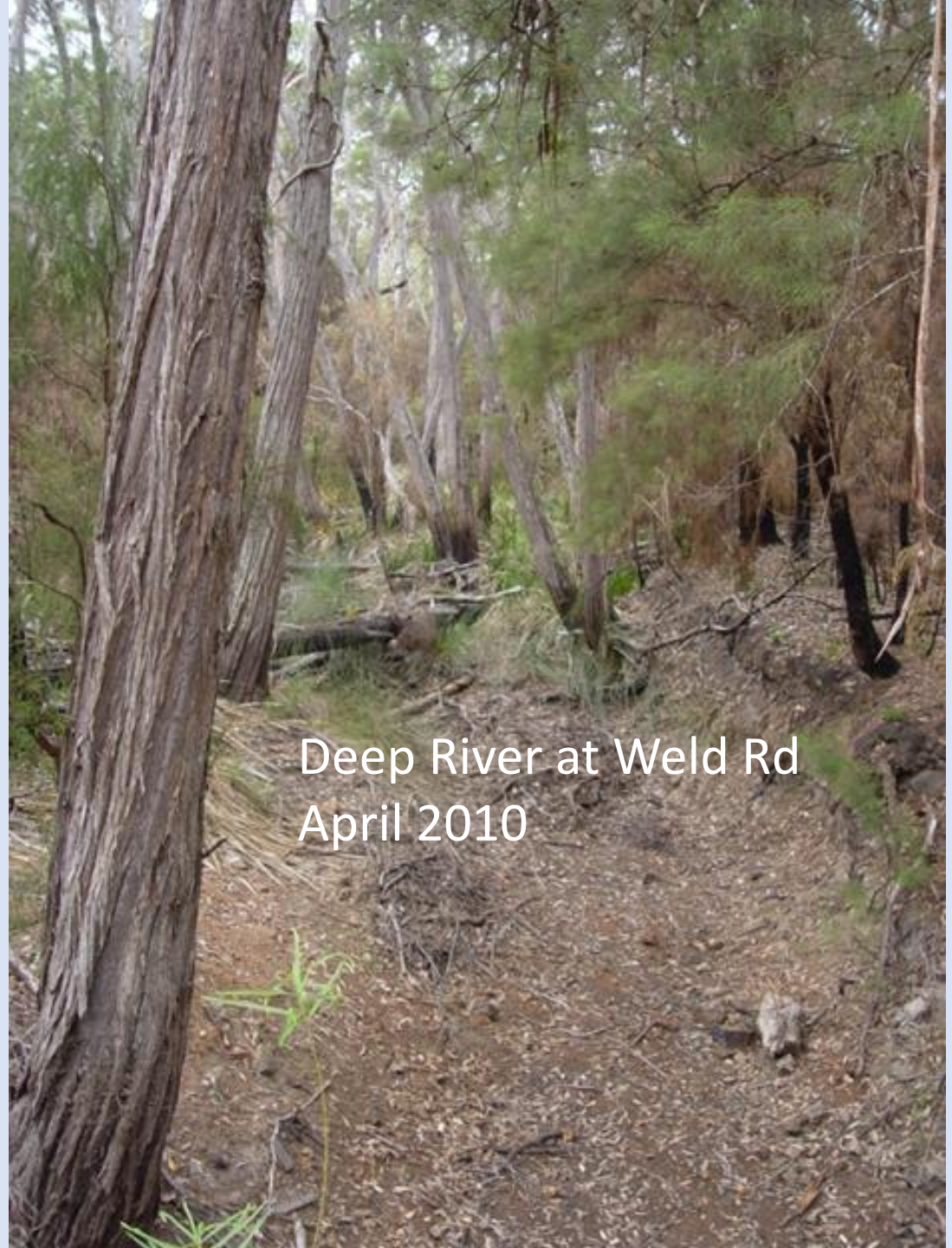
LEGEND

- Woodchip Licence Area boundary
- River basin boundaries
- ▲ Paired catchment
- Experimental coupe
- 1000 — Isohyets in millimetres



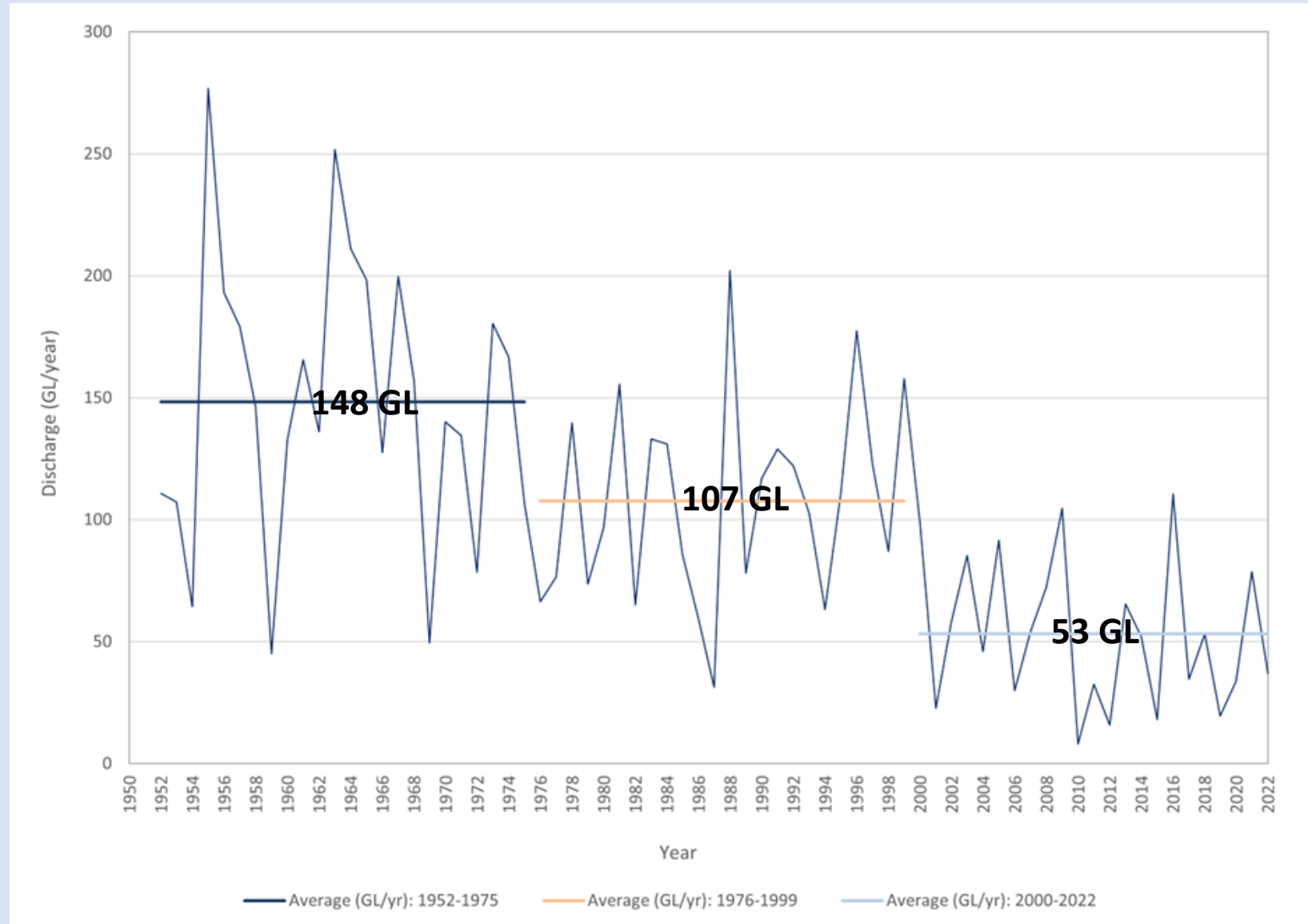


Deep River at Weld Rd
October 2009



Deep River at Weld Rd
April 2010

Streamflow (GL/year) in the Donnelly River 1952-2022



Monitoring established in Woodchip Licence Area catchments from 1975



Groundwater bores



Streamflow gauging

Harvest, regeneration and regrowth



1975 Pre-harvest



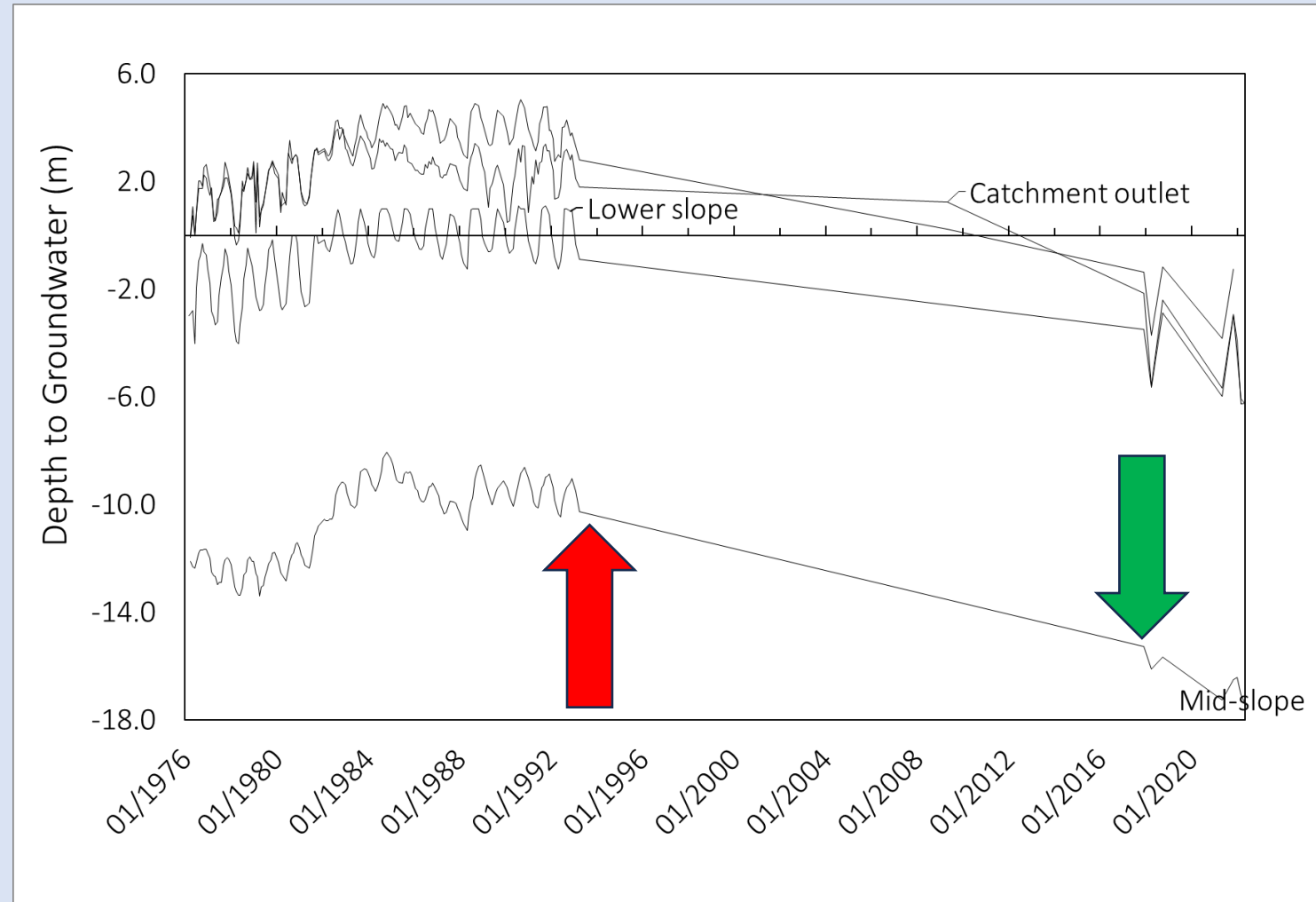
1978 Post-harvest and burning



2022 Regrowth forest after first thinning

Groundwater level change in Lewin South catchment 1976-2022

Monitoring suspended 1994 & resumed 2018



Groundwater bores: *practical challenges of finding and repairing bores after 40 years*



Groundwater trends across six experimental catchments 1975-2022

Catchment type	Treatment	Mean fall in groundwater (m)	Maximum fall in groundwater (m)	Mean reduction in saturated zone (%)
Paired	Unlogged	5.2	7.5	49
	Logged*	8.0	14.3	58
Comparison	Unlogged	4.1	8.3	29
	Logged*	11.2	15.5	69

*For treated catchments falls have been calculated from the maximum groundwater level observed following logging

Data from 62 bores with reliable records.

Data can be further segregated into valley and hillslope topographic positions but are not shown here

Contemporary policy context

Water supply for expansion of irrigated agriculture



The screenshot shows a news article from Farm Weekly. The title is "Southern Forests water modelling flawed" by Mal Gill, dated July 1, 2021. Below the title is a photograph of five people standing in a forest next to a large, circular, rusted metal structure, likely a water storage tank. The background shows tall trees and a clear sky.

is://www.farmweekly.com.au

Ecological thinning to maintain forest resilience



The cover features the Government of Western Australia logo on the left. The title "Draft Forest Management Plan 2024-2033" is in green text on a dark green background. Below it, "Fact Sheet: Ecological thinning" is in white text on an orange background. The main image is a photograph of a dense forest with many thin trees. Below the image is a caption: "Munro trial site before thinning." and a paragraph: "A key focus of the *Draft Forest Management Plan 2024-2033* is forest management and climate adaptation activities to support forest health and resilience. This is captured within the strategic goals of the plan."

Broader learnings for forest monitoring

Alternatively – What can you learn from a bunch of old bores?

- Predicting the future is difficult and new issues will inevitably emerge
- Simple measurements repeated to a consistent standard over long time periods can be very informative
- Skilled field staff with practical knowledge are a scarce and valuable resource
- Harvesting from the period 1970 to 2020 has resulted in a large estate of productive regrowth forest providing a broad range of forest values and ecosystem services

Winter 1988
The way things used to be.....

BROAD AXE BRIDGES

