SUSTAINABILITY OF THE VALUES OF THE GNANGARA MOUND

Biological Diversity as Key Element

Presentation to Gnangara Groundwater Mound Workshop

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GOVERNMENT OF WESTERN AUSTRALIA

DEPARTMENT OF Conservation AND LAND MANAGEMENT

Sustainable Management

- Sustaining the resource at a usable level, while maintaining other values.
- Sustaining biological diversity: the maintenance of species and discrete ecosystems.
- Identify and conserve species and ecosystems most at risk.

Threatened Species and Ecological Communities

Group	Critical	Endangered	Vulnerable	Legal Status
Threatened plants (5)	2	1	2	WC Act, some EPBC
Threatened animals (2)	2			WC Act, EPBC
Threatened ecological communities (5)	3		2	EPBC (CR only)

Blue Babe in Cradle Orchid
(Critically Endangered)

Western Swamp Tortoise
(Critically Endangered)

Western Swamp Tortoise

- Most threatened reptile in Australia
- Partial dependence on Gnangara water levels
- Research, recovery actions over 30 years, including pumping water to swamps
- Captive breeding by Zoo: translocation

Threatened Ecological Communities Influenced by the Gnangara Mound

- Perth to Gingin Ironstone Association (Critical)
- Tumulus Organic Mound Springs Community (Critical)
- Aquatic Root Mat Community of Yanchep Caves (Critical)
- Forests and woodlands of deep seasonal wetlands (Vulnerable)
- Herb rich saline shrublands in clay pans (Vulnerable)

Perth to Gingin Ironstone Community

Perth to Gingin Ironstone Community
(Critically Endangered)

- Number of occurrences - 3
- Total area - ~ 60 ha
- Level of dependence on Gnangara water is uncertain

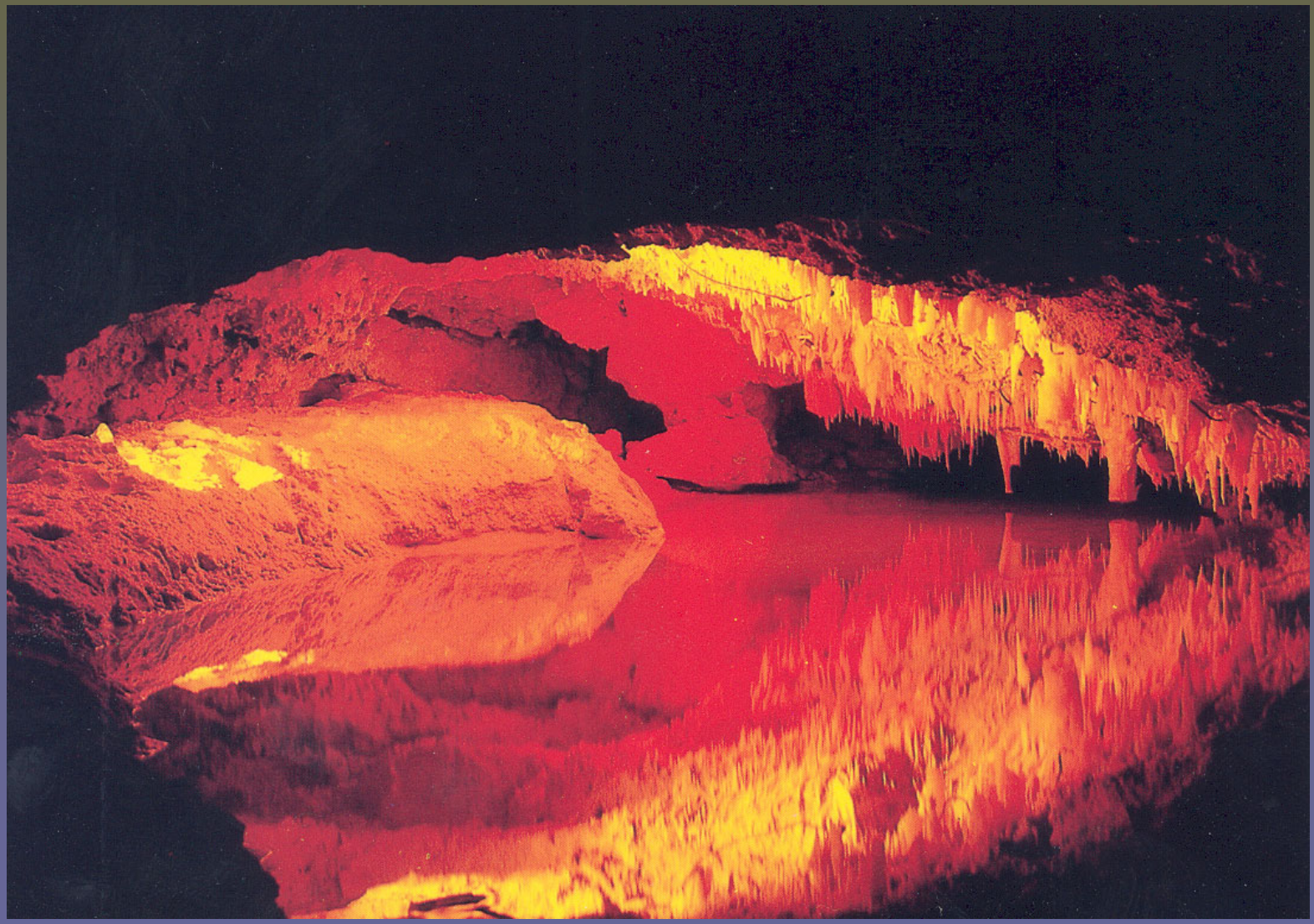
Tumulus Spring at Ellenbrook

Communities of Tumulus Springs (Organic Mound Springs)

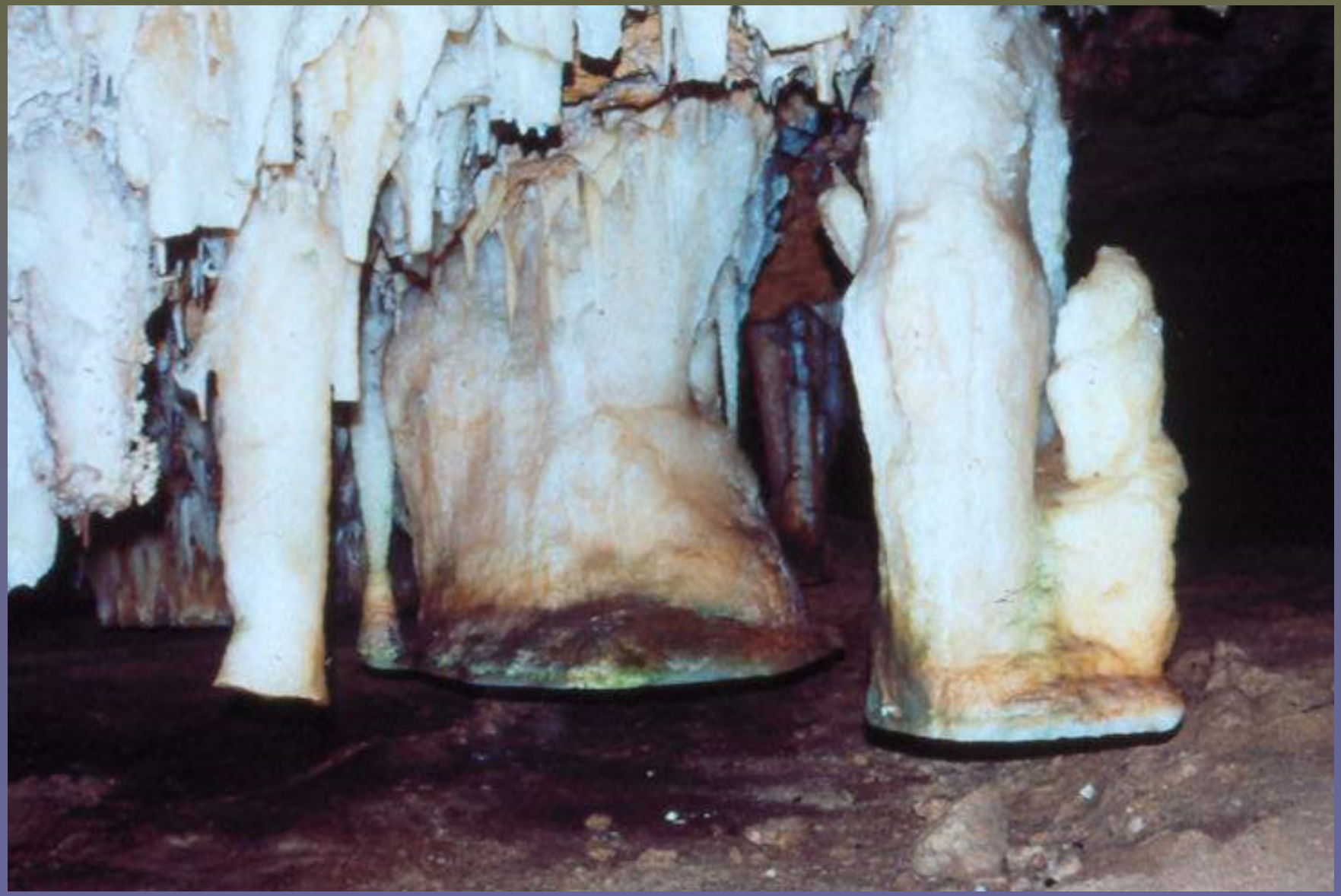
- Totally dependent on Gnangara water
- Number of occurrences - 3
- Total area - 7.4 ha
- Total number of species - >50
- Several known only from these springs

Exposed Tuart Root Mat

Crystal Cave With Water



Crystal Cave

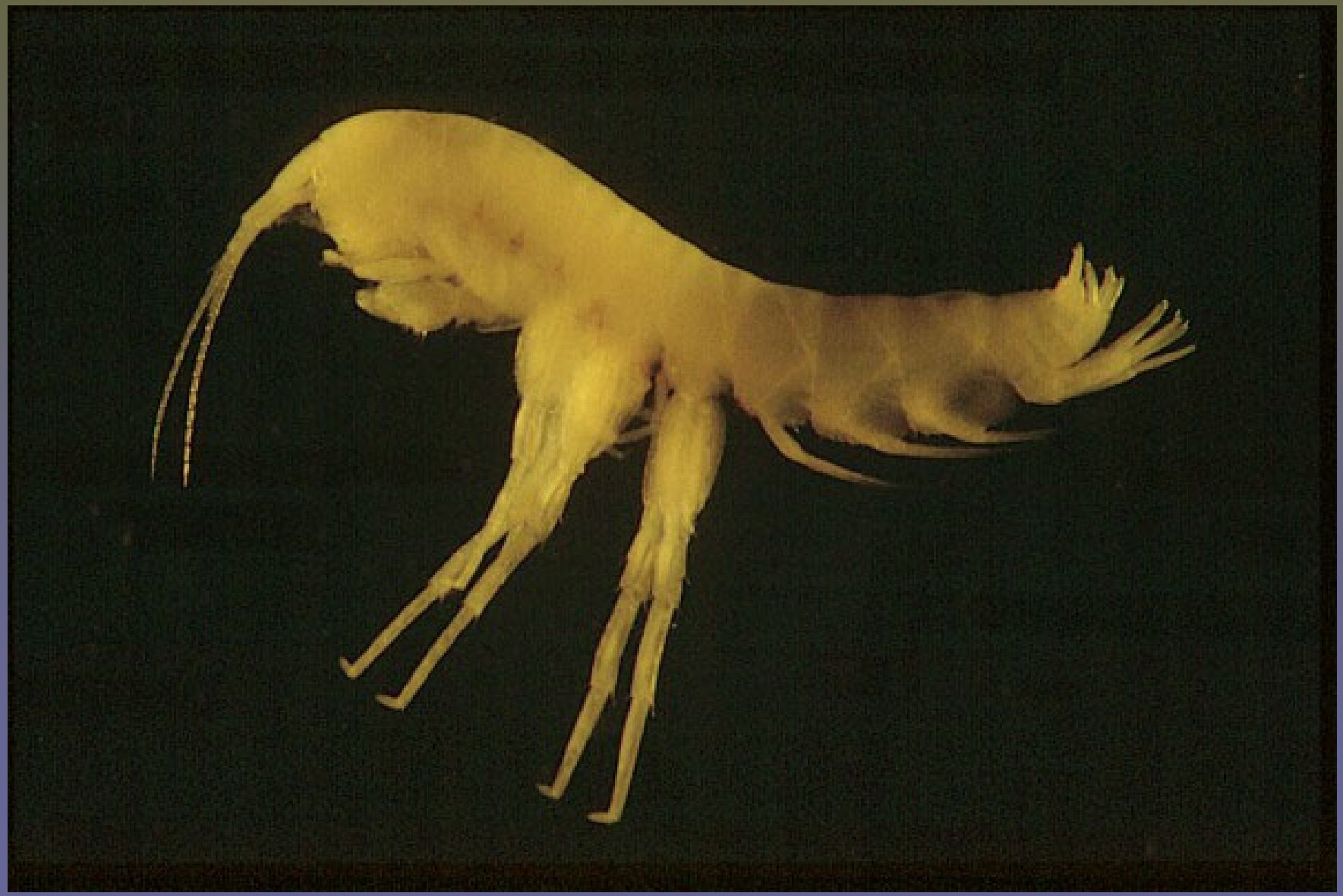


Aquatic Root Mat Community of Yanchep Caves

(Critically Endangered)

- Totally dependent on Gnangara water
- Number of occurrences - 6
- Total area - ~1 ha
- Total number of species - ~100

Crystal Cave Crangonyctoid



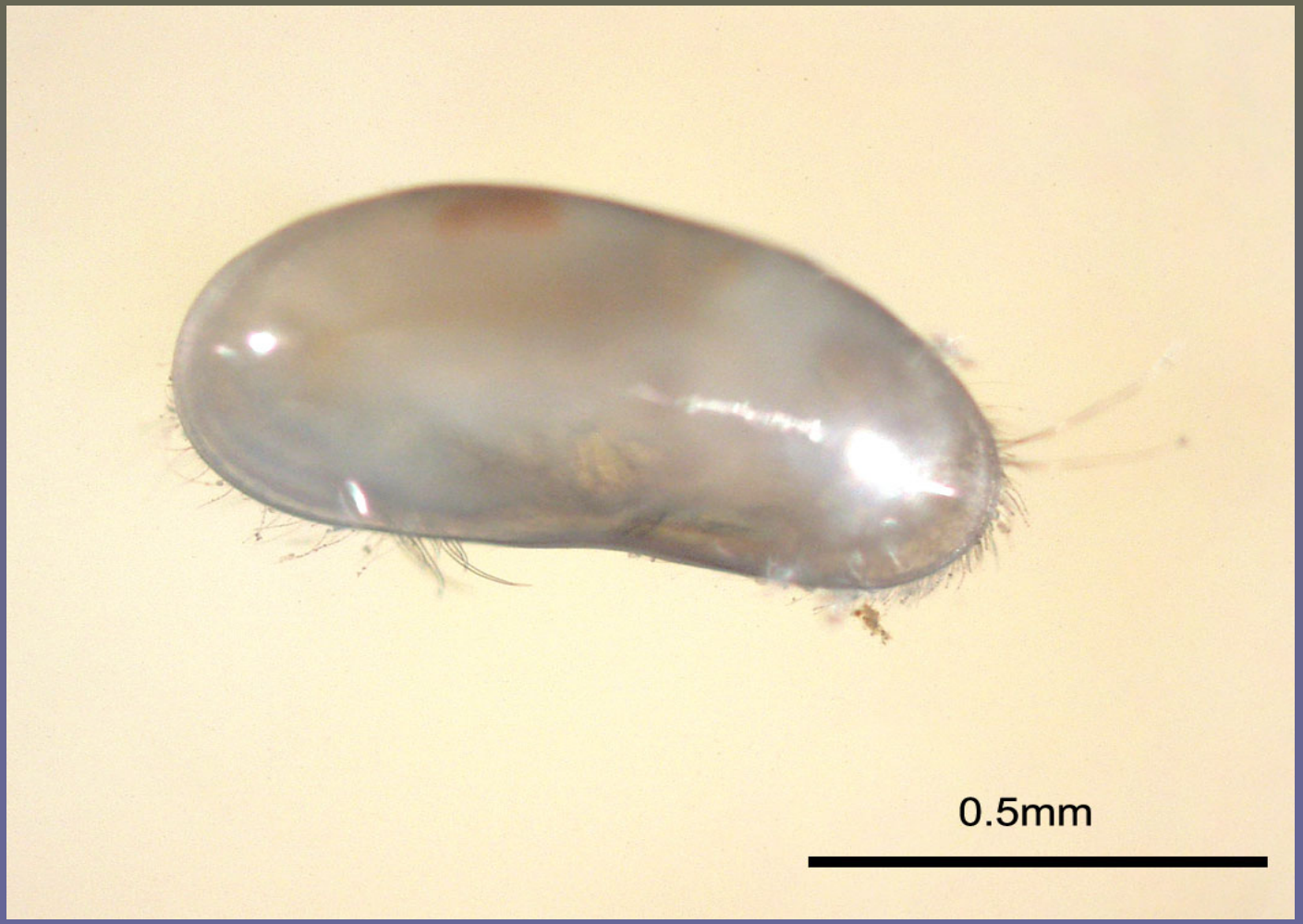
Crystal Cave Crangonyctoid

- Totally dependent on Gnangara water
- About 60 animals remaining
- Artificial watering for 30 in cave pool
- 33 in aquaria

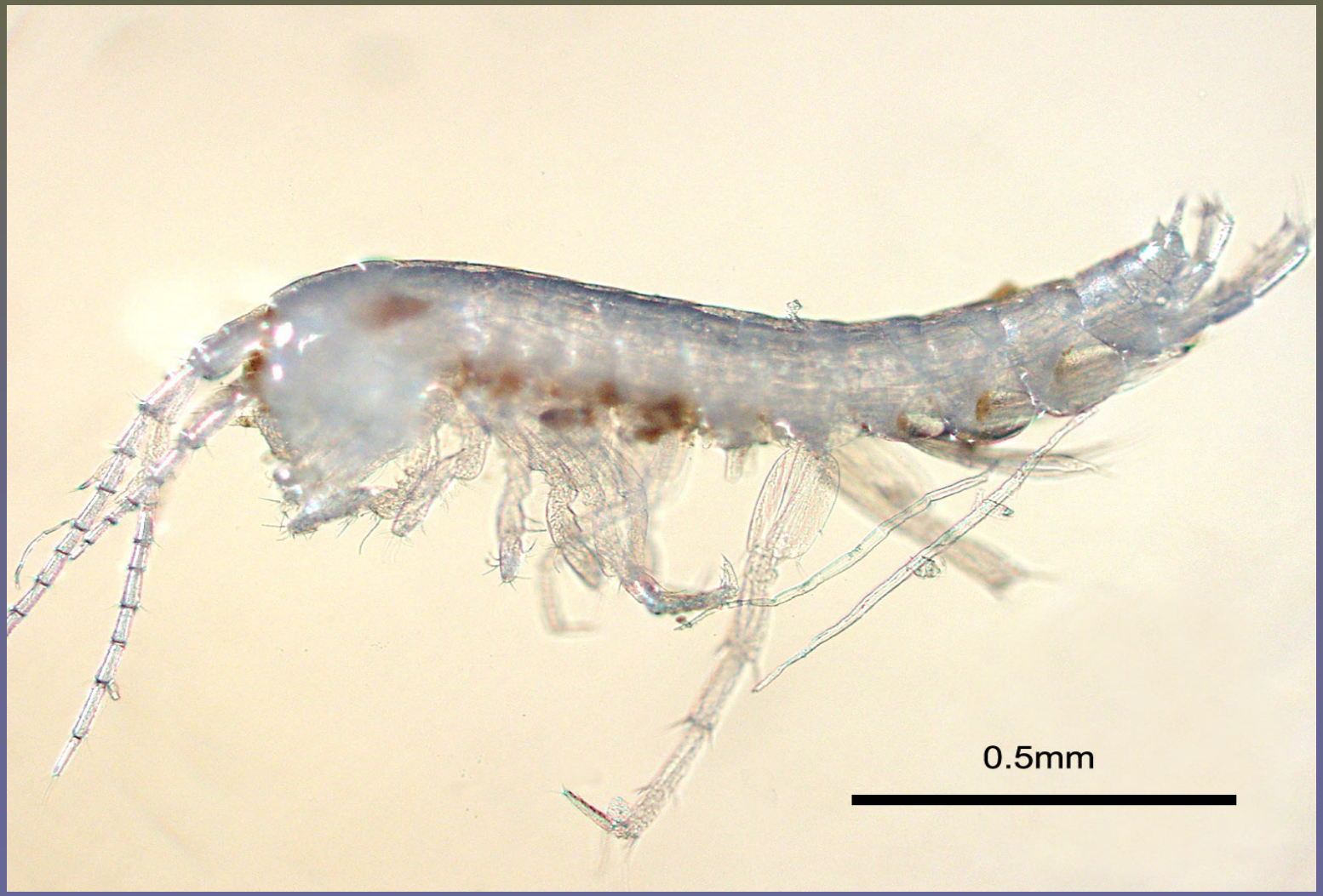
Entrance to Cabaret Cave

Phreatoicid isopod

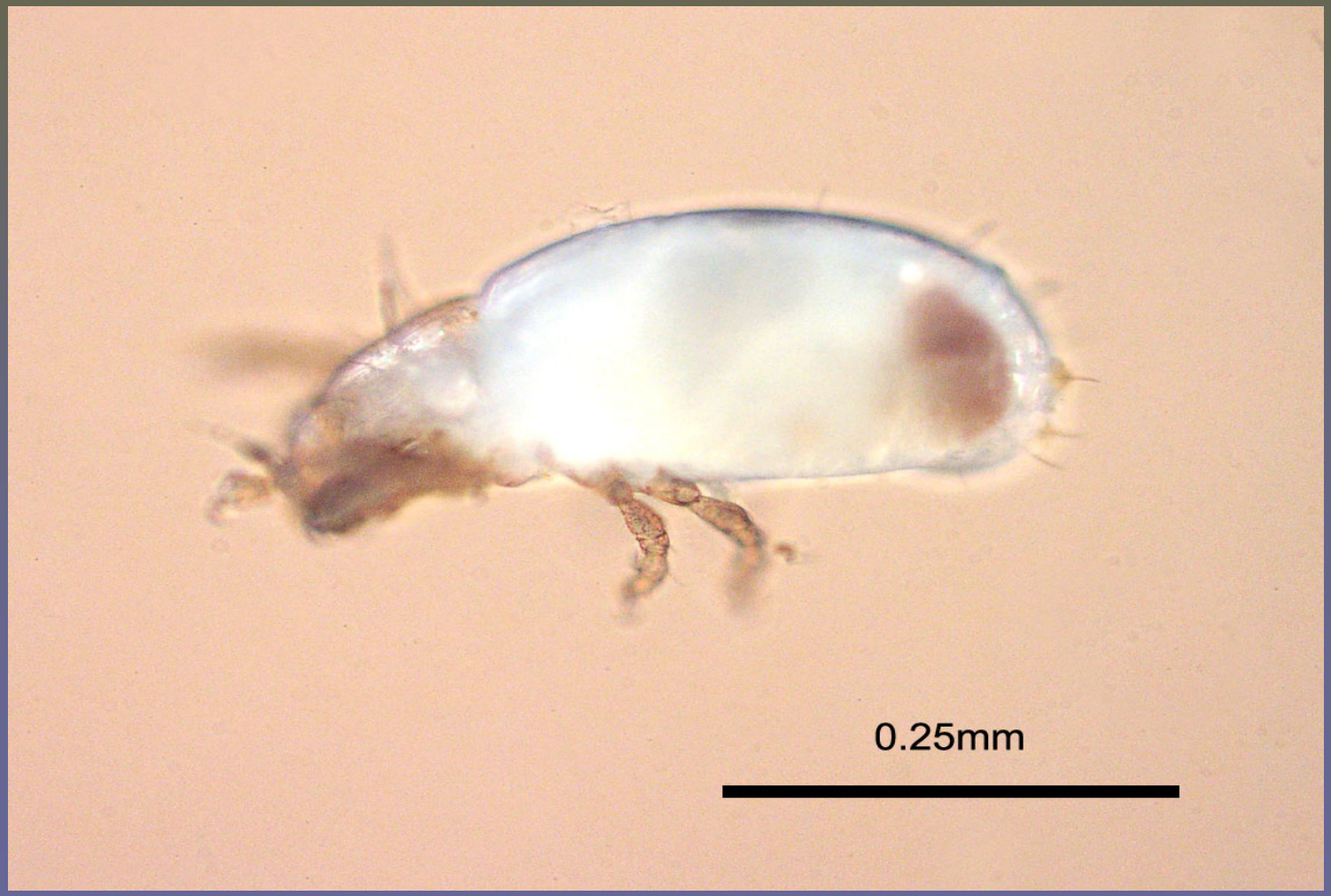
Ostracod



Amphipod



Water mite



Declining Water Levels in Caves

- Mound declined by 2.5 m since 1976
- Cave streams stable until early 1990s
- Jilgie Cave dried out in summer 1996
- 4 out of 5 caves artificially watered since 1998

Key Points

- Many cave and spring species are totally dependent on Gnangara Mound.
- Many species cannot tolerate drying out.
- Cave and spring waters have been permanent in the past, including during very dry periods.

Current Emergency Actions

- Artificial watering
- Regular monitoring: fauna; water levels
- Upgraded watering system since apparent decline in 2001
- 2004, installation of a major supplementation scheme to seven caves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Achieving Sustainability

- Continue emergency actions while needed
- Clarify drivers and contributors to groundwater decline
- Participate in integrated (multi-agency and stakeholder involvement) approaches towards achievement of sustainability
- Long-term strategy - recovery of water level

Photo courtesy Canberra fires website

Fire for Life

CALM implements fire regimes to:

- conserve biodiversity and
- provide an acceptable level of protection to life and property in south-west WA.

Key Fire Planning Principles

Adapted from Parks Victoria (1999) and Abbott & Burrows (2003)

Fire is a natural environmental factor that has and will continue to influence the nature of south-west landscapes

Key Fire Planning Principles

Species and communities vary in their adaptations to, and reliance on, fire.

Key Fire Planning Principles

Other environmental factors will influence the way in which ecosystems respond to fire

Key Fire Planning Principles

Fire management should be precautionary and adaptive

Key Fire Planning Principles

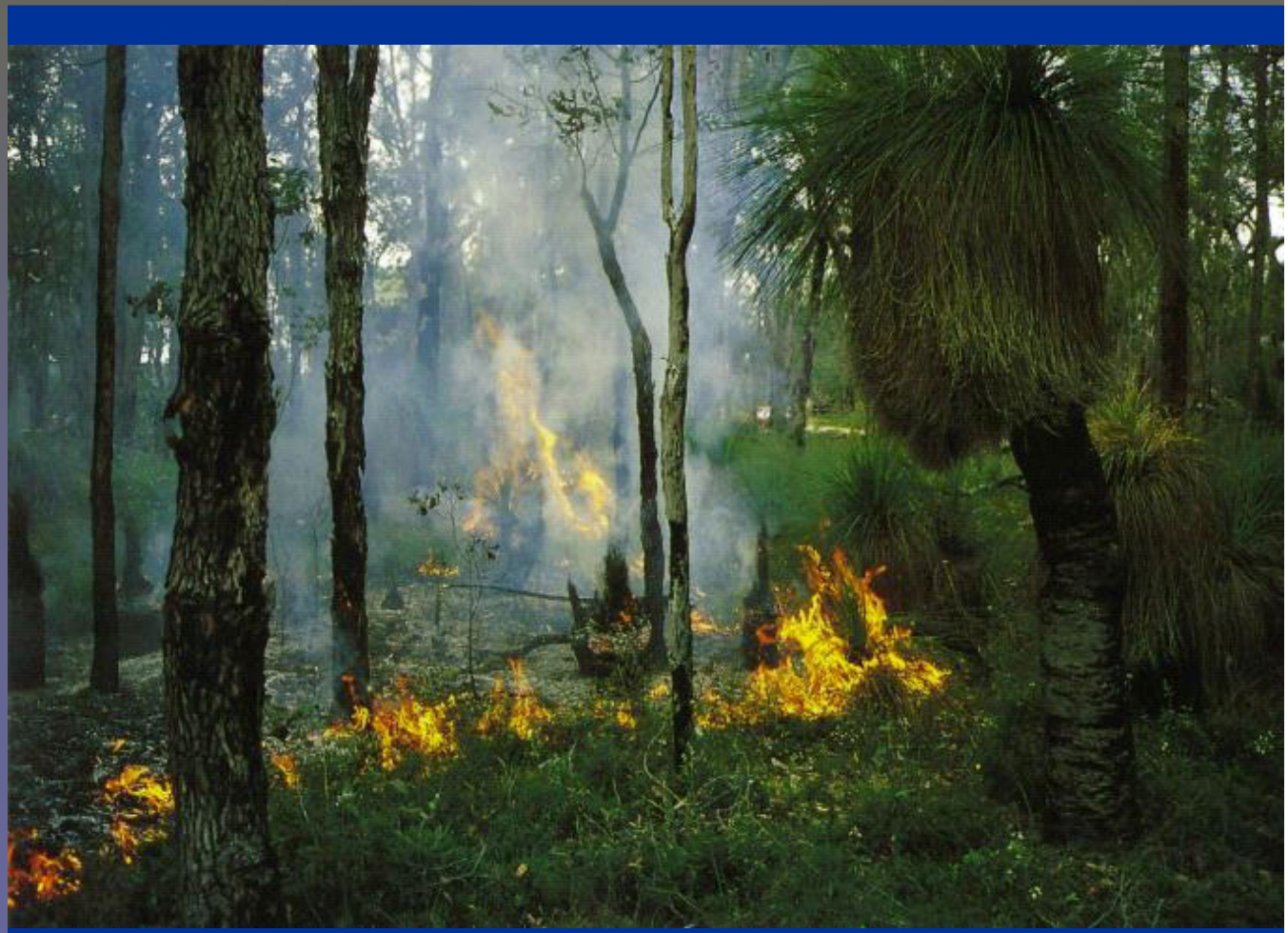
Fire diversity enhances biodiversity at both the landscape scale and the local scale

Key Fire Planning Principles

Avoid applying the same regime over large areas for long periods of time

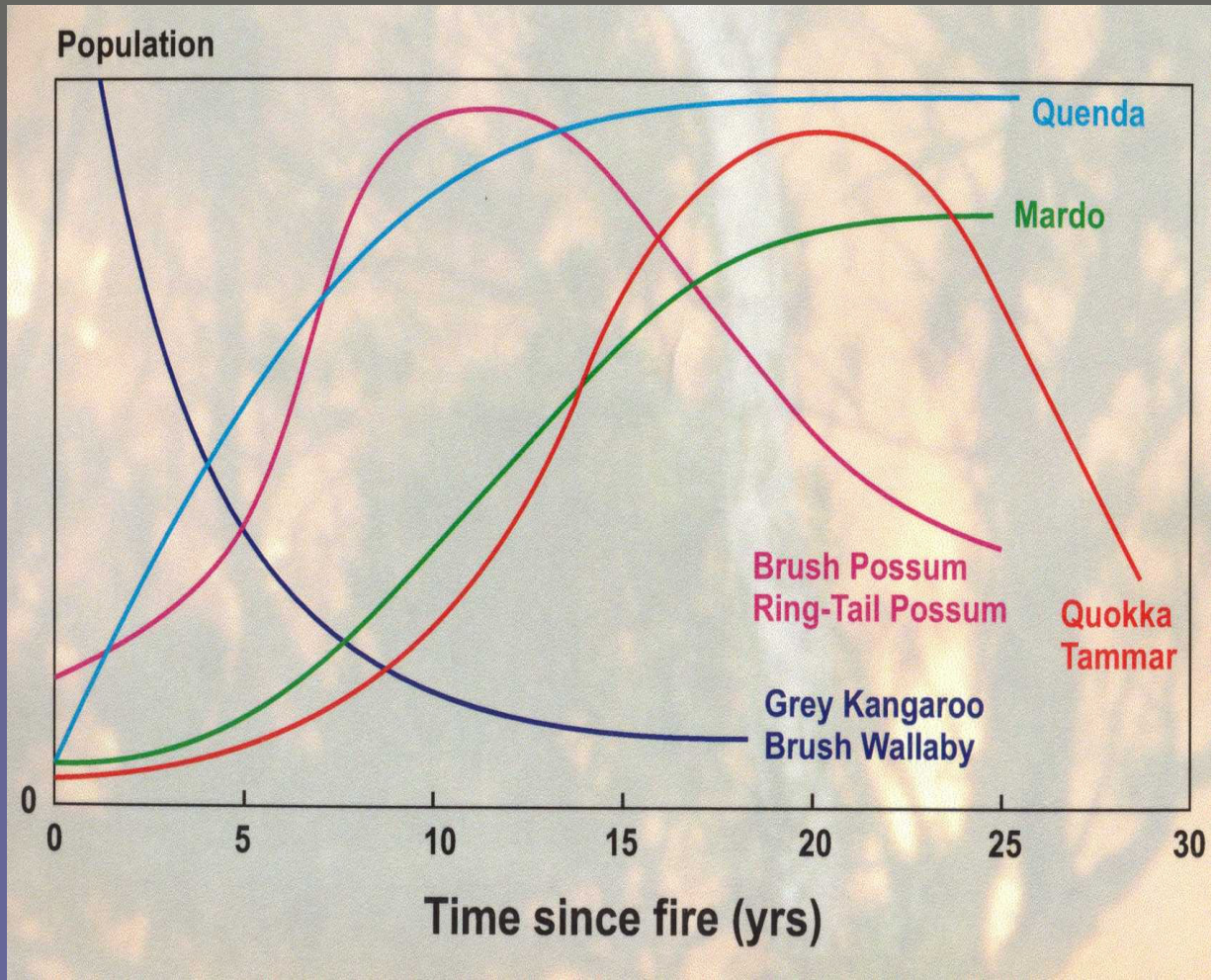
Key Fire Planning Principles

Fine scale fire-induced mosaics promote habitat diversity



Key Fire Planning Principles

Use available knowledge to determine regime and scale



Key Fire Planning Principles

Know your fire history

Key Fire Planning Principles

Assess and manage the wildfire risk

Key Fire Planning Principles

Adaptive management, continuous improvement

Broad Strategies - Landscape Scale

- Maintain a mosaic of patches of vegetation at different stages of seral succession including recently burnt and long unburnt, and patches burnt at different seasons and frequencies.
- The range of fire interval, season, intensity and patchiness (scale) set by knowledge of vital attributes of flora and fauna.

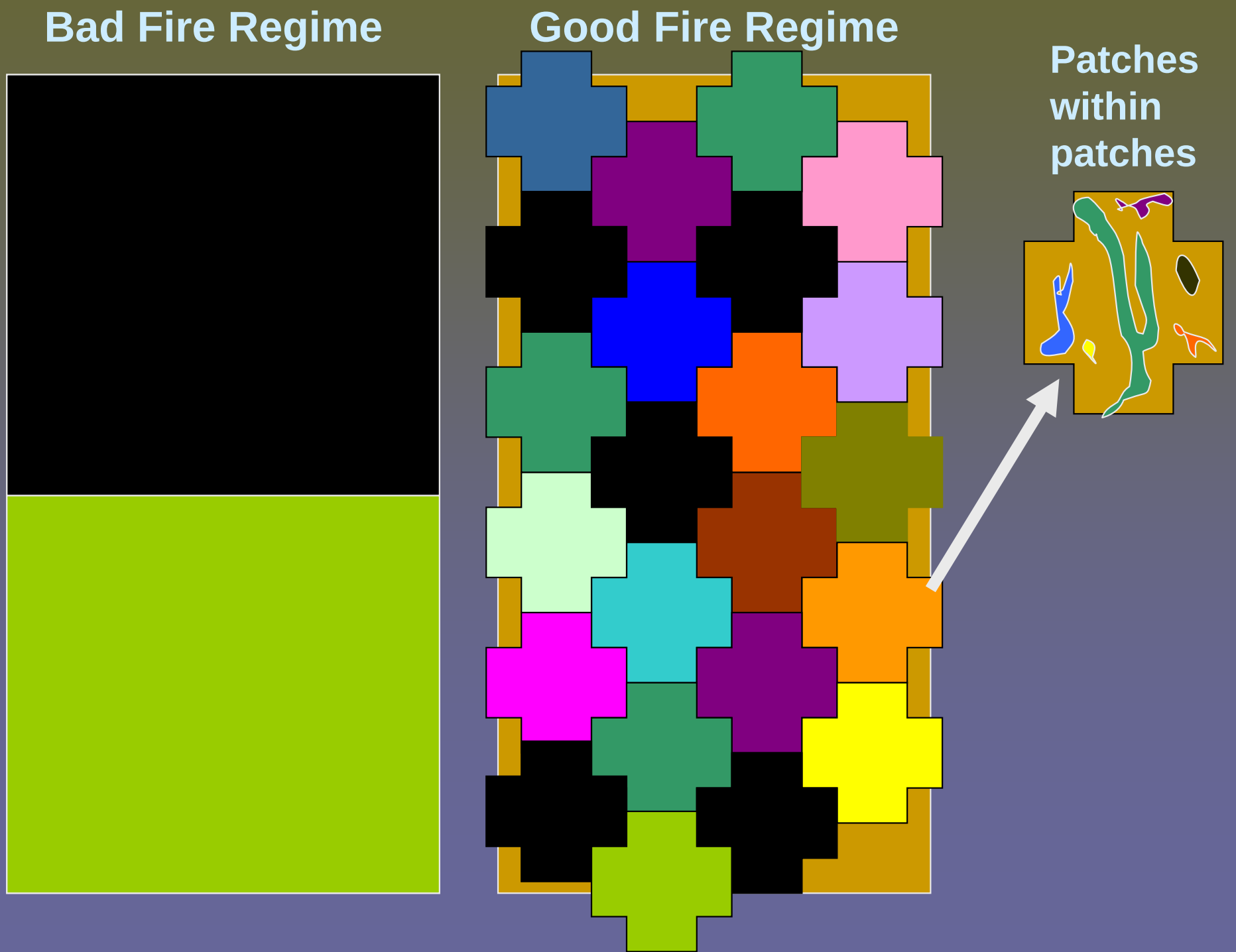
Fire Management Objectives - Fire Management Unit Scale

Objective: To conserve biodiversity through time

Broad strategies

- Implement patchy burns at various intervals and seasons to provide a variety of habitats, seral states and structures through time.
- More flammable (fire resilient) habitats burned at intervals ranging from frequent (eg. 2-4 yrs) to infrequent (eg. 12-16 yrs).
- Less flammable (fire sensitive) habitats (eg. riparian zones, some swamps, valley floors, granite outcrops) should be burned less frequently (eg. 15-25 yrs) or not at all.

Fire-induced Fine Grained Habitat Mosaic

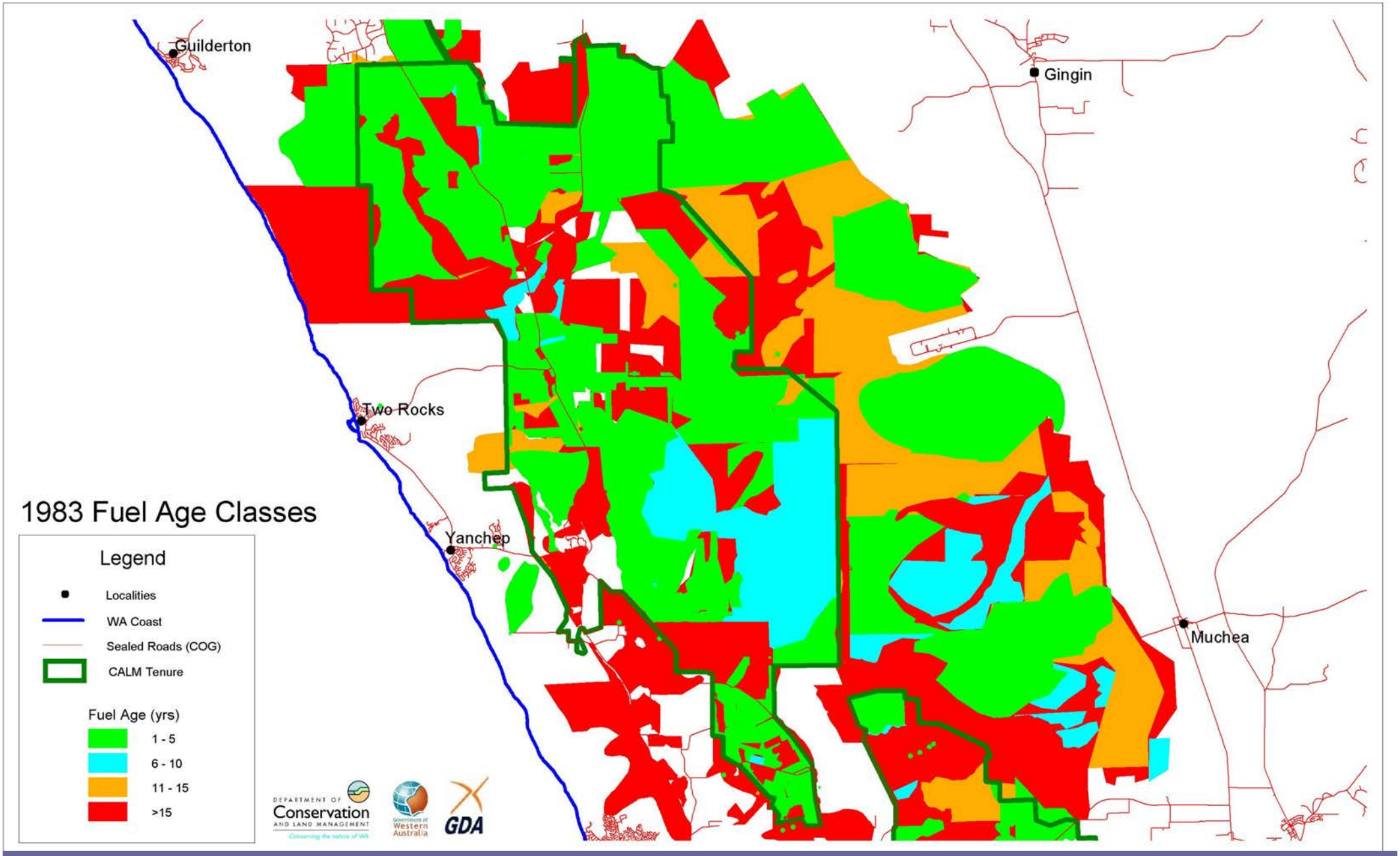


Incorporating Other Needs

For example:

- Protection of life and property
- Silviculture
- Water production
- Research
- Reference areas

FIRE HISTORY AT GNANGARA


Guilderton
Gingin
Two Rocks
Yanchep
Muchea
1983 Fuel Age Classes
Legend
Localities
WA Coast
Sealed Roads (COG)
CALM Tenure
Fuel Age (yrs)
1 - 5
6 - 10
11 - 15
>15
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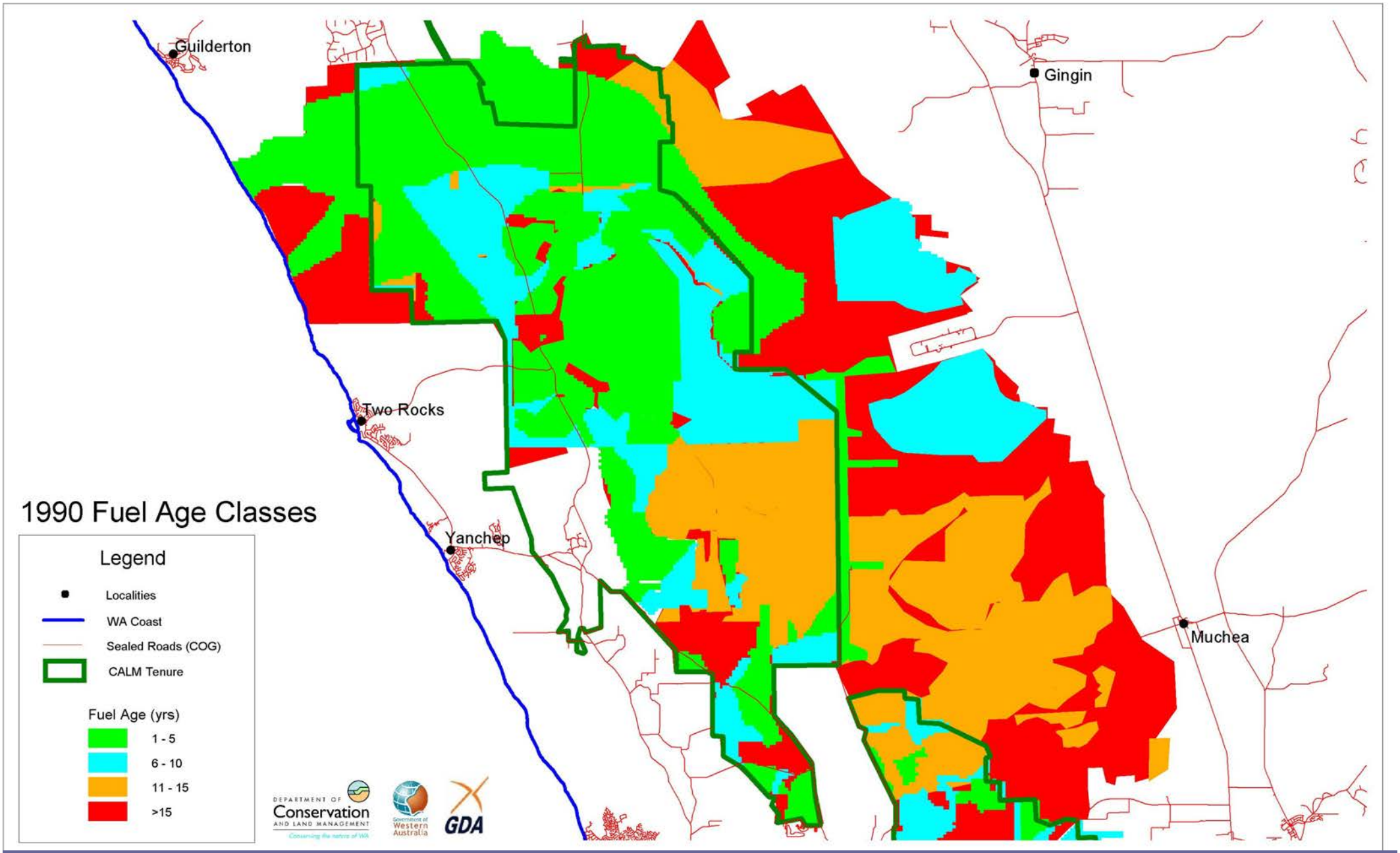
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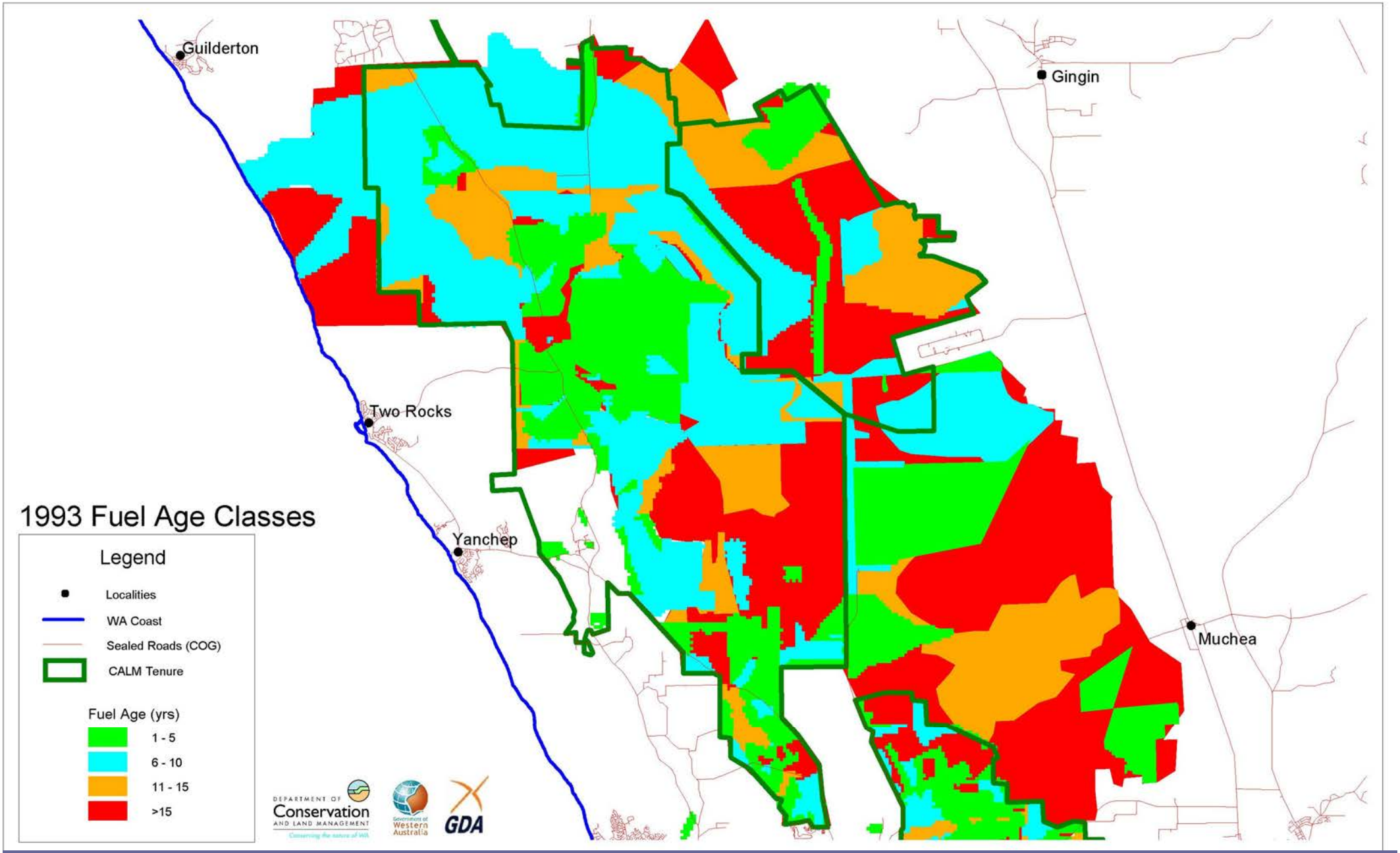
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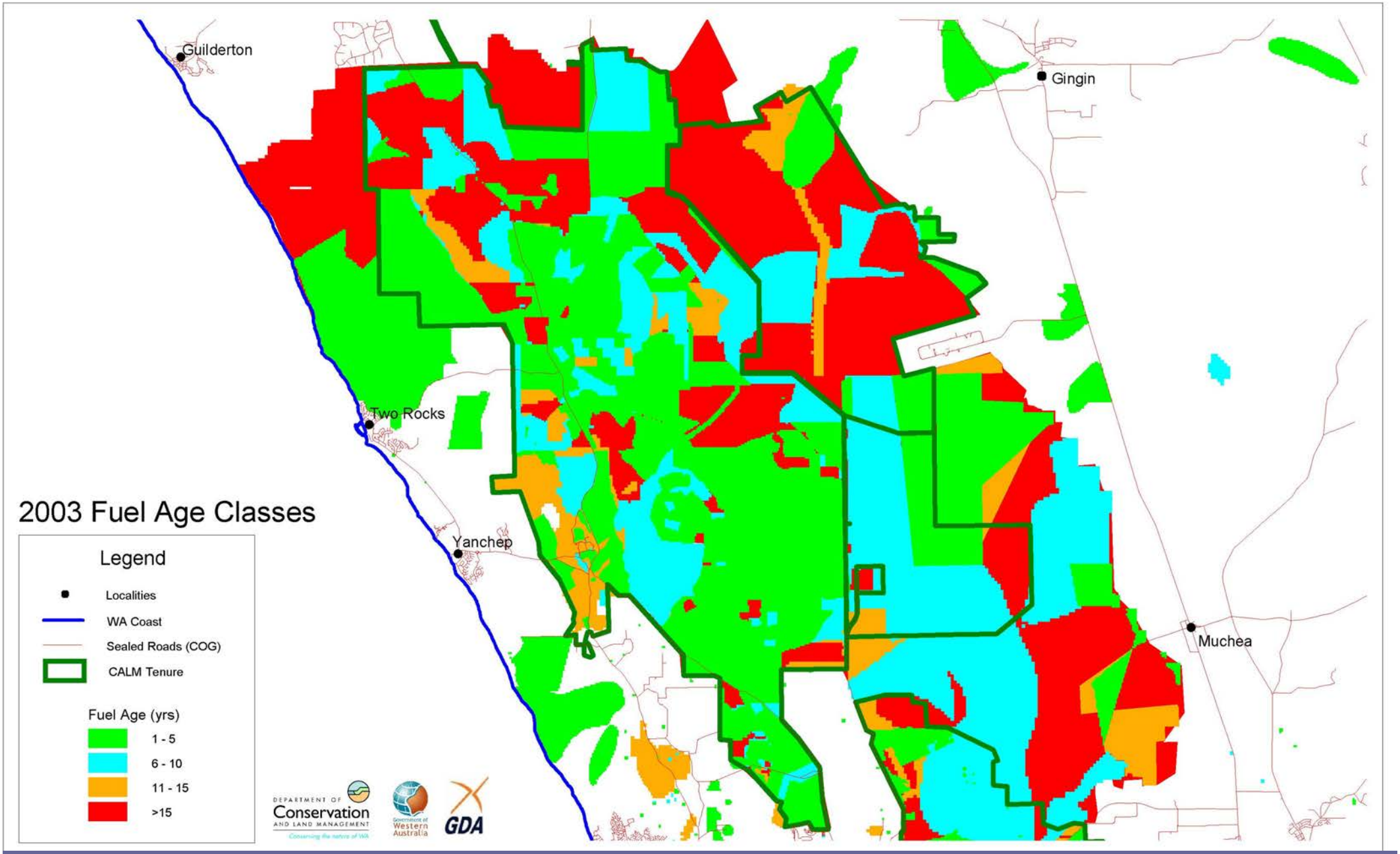
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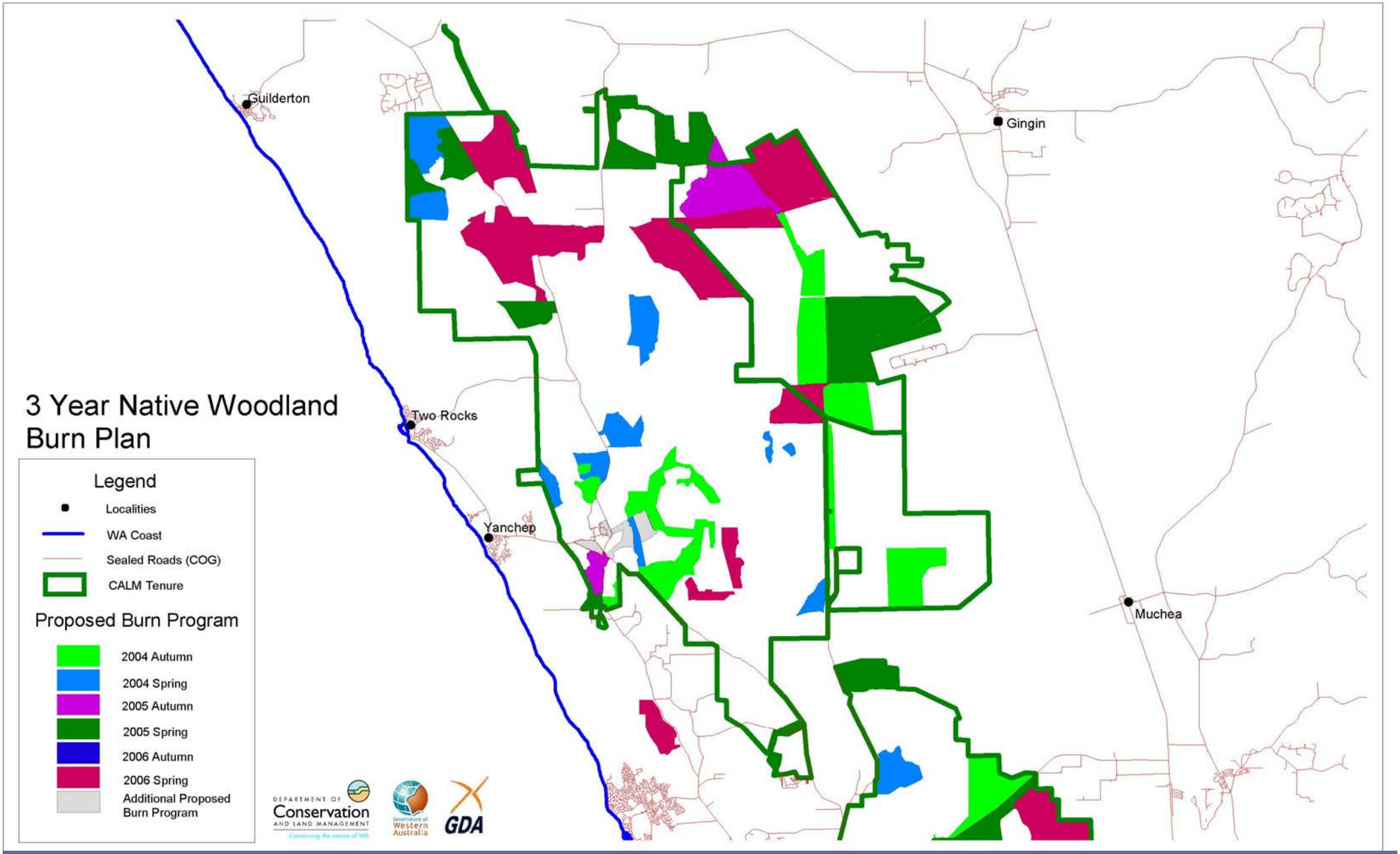
Guilderton
Two Rocks
Yanchep
Gingin
Muchea
3 Year Native Woodland Burn Plan
Legend
Localities
WA Coast
Sealed Roads (COG)
CALM Tenure
Proposed Burn Program
2004 Autumn
2004 Spring
2005 Autumn
2005 Spring
2006 Autumn
2006 Spring
Additional Proposed Burn Program
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THANK YOU