

*The management
of GGRP sites: Fire as
a tool in maintaining
diversity and influencing
vegetation structure*

Why burn?

- Protection of life
- Protection of property
 - Biomass reduction
 - Weed control
 - Biodiversity attributes
 - Cultural connections




Burning



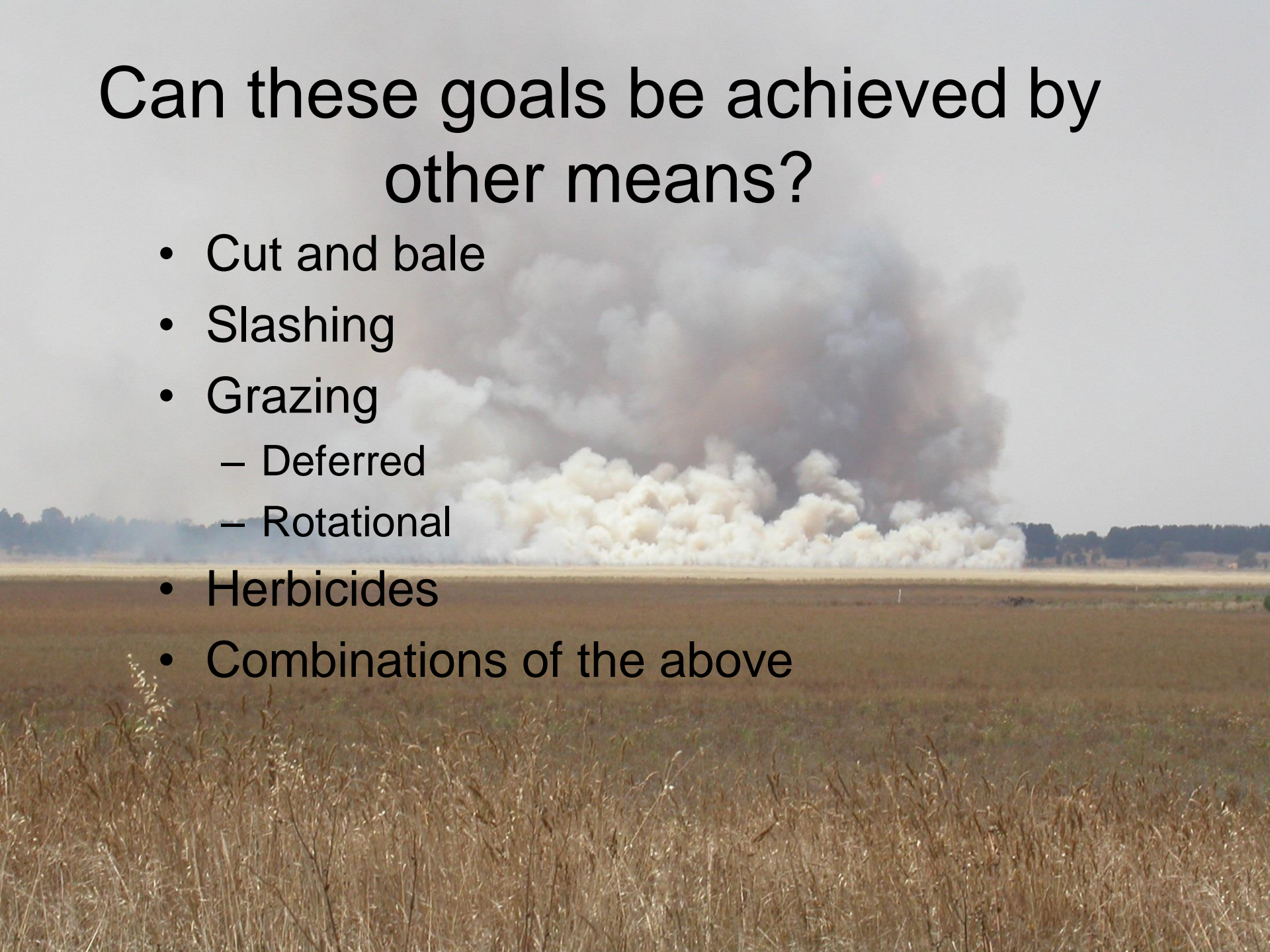
- Many studies have shown that most mature plants in native grasslands are relatively robust and insensitive to the effects of fires
- Most grassland species respond to fire by re-sprouting from underground vegetative structures
- Few grassland species seem to be fire germination cued
- It is generally accepted that grasslands should not be burnt until species have finished flowering and shed their seed
- Therefore, late summer to autumn is considered the most appropriate time to burn

Why do we burn GGRP sites?

- 
- Reduce grassy biomass
 - Rejuvenate vegetation (grasses and forbs)
 - Inhibit community dominants (grasses)
 - Allow for persistence of sub-dominants (forbs)
 - Maintain canopy gaps for recruitment
 - Cost (?)
 - Ease (?)
 - Effectiveness (?)

Can these goals be achieved by other means?

- Cut and bale
- Slashing
- Grazing
 - Deferred
 - Rotational
- Herbicides
- Combinations of the above



Grazing



- Grazing has been shown as effective in maintaining or increasing native cover in semi-natural grasslands, but as a management tool requires good stock management skills
- Deferred (short or long term) or rotational grazing aims to graze pasture intensively (crash or cell grazing) at the point where annual grasses have raised (but not ripened) seed heads (early spring), and then remove stock over summer when natives are setting and dropping seed
- Conversely, set-stocking has been shown to have negative effects including selective grazing of native herbs, trampling, soil compaction, importation of weed seed, localised deposition and return to the soil of dung and urine



Mowing/baling



- Due to the ready access to machinery and relatively low cost grass biomass (native and exotic) on public road reserves is often reduced by slashing or mowing
- Ideally, mowing is followed by raking and baling to remove lawn biomass as herbage can return unwanted nutrients to soils, smother vegetation or restrict seedling recruitment
- Mowing restricting excessive grass canopy in late winter can benefit the growth of early flowering forbs, while a late summer-autumn mowing and baling can provide recruitment canopy gaps for autumn germinating forb species
- Drawbacks of mowing include the possible introduction of weed seeds on equipment, soil compaction, and physical damage to plant structure by the tires of mowing equipment

Fire response in remnant vegetation



















Roadside burns – Hamilton region





Rokewood Cemetery - Fire & slashing









Pre-European Fire Management

Structure and Composition

Historical evidence suggests aboriginal management mimicked natural fire disturbance to maintain some landscapes as grasslands and open grassy woodlands



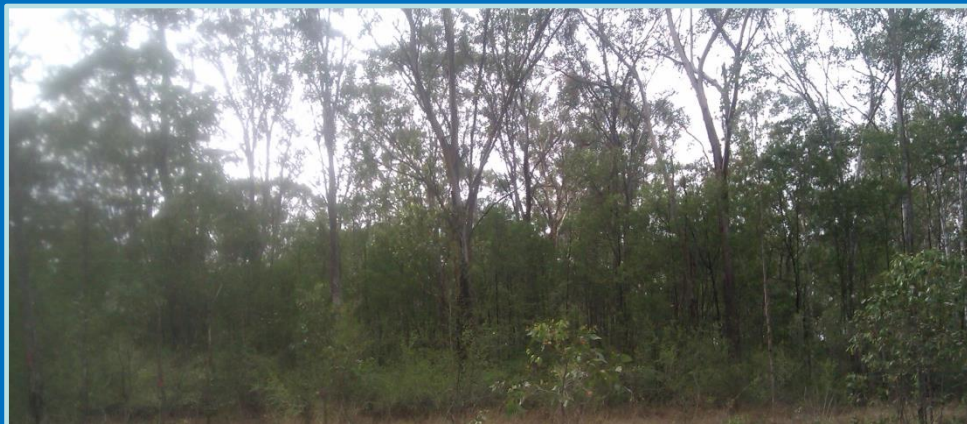




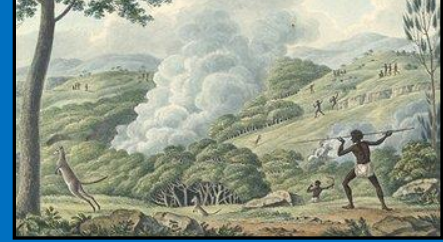


Cessation of Aboriginal Fire Management





Post-1788



- Cessation/disruption to traditional land management
- Increased human population
- Introduction of new species (plant & animal)
- Permanent settlements
- Infrastructure
- Altered land use (farming, forestry, mining, recreation)
- Competing community interests

Burning becomes a **WHOLE** lot more complicated



















Iconic Australian landscapes

- Cropping, grazing and rangelands – huge footprint
- High inputs of energy to maintain desired states
- Skewed toward low complexity
- Low tolerance for biodiversity (native or exotic)



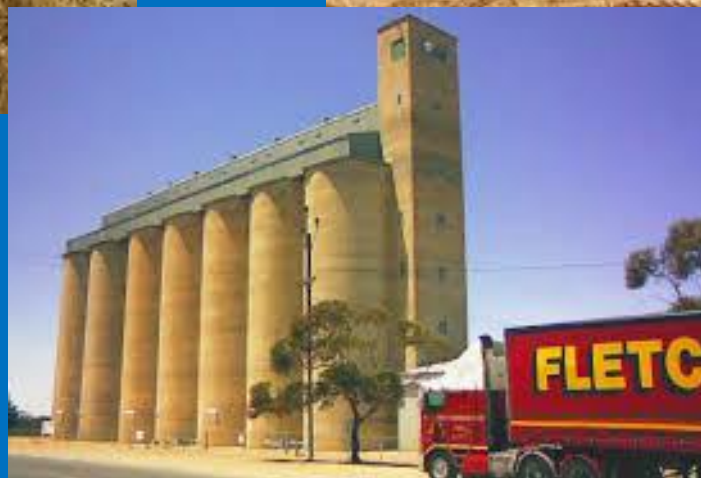




















Issues with fire in current-day Australia











Biodiversity and altered landscapes – some questions

- What do we really mean by biodiversity?
- What types of biodiversity or trophic complexity are we prepared to accept?
- Are we realistic in acknowledging our impact on natural systems?
- How do we accommodate “nature” in a human-centric world?





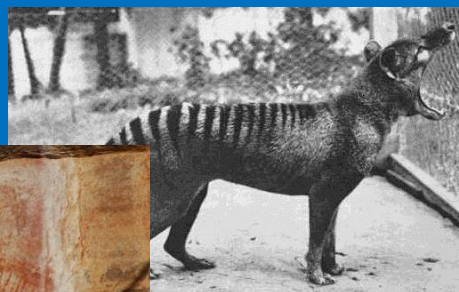


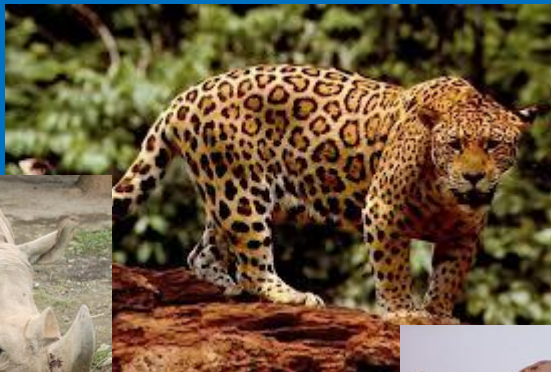


So what is missing...

Humans essentially say “no” to the big and the bad

- Megafauna
- Apex predators
- Trophic cascade/collapse
- Meso-predator release
- Novel ecosystems
- Unforeseen outcomes





Meso-predator release







Why burn again?

- Protection of life
- Protection of property
- Biodiversity????



Is burning always best?



- Cost
- Impact
- Ease
- Effectiveness
- Competing agendas

North Head Sanctuary Sydney

- Eastern Suburbs Banksia Scrubland
- Three sites, 1.5, 0.8 and 1.8 ha
- 150 person incident management structure
- 36 fire appliances (incl. 4 helicopters)
- 121 staff for on-ground burn
- Total cost – 300K (conservative estimate)





Managing for healthy Eastern Suburbs Banksia Scrub



Eastern Suburbs Banksia Scrub (ESBS) is an endangered ecological community recognised at both state and national levels.

Almost half of all remaining ESBS is found here at North Head.



Fire at intervals of 8-20 years is important in keeping ESBS strong, healthy & diverse. Without that, a few species take over.

However, managing fire safely in densely settled areas, close to national heritage buildings, is difficult and costly.

Hazard reduction burns done in September 2012 provided an opportunity to study whether selective burning to take out dominant species in old, dominant stands of ESBS is a healthy management alternative to fire.



What we've found:

- Fire stimulates healthy diversity
- By one year after fire, the burnt plots have more plants, a richer mix of species and fewer weeds than do thinned plots.
- Fencing is essential to stop rabbits eating most of the new growth.



Constructed by:



Managed by:



Funded by:





Fire + Rabbit Fence



Fire Minus Rabbit Fence



Thinning Response

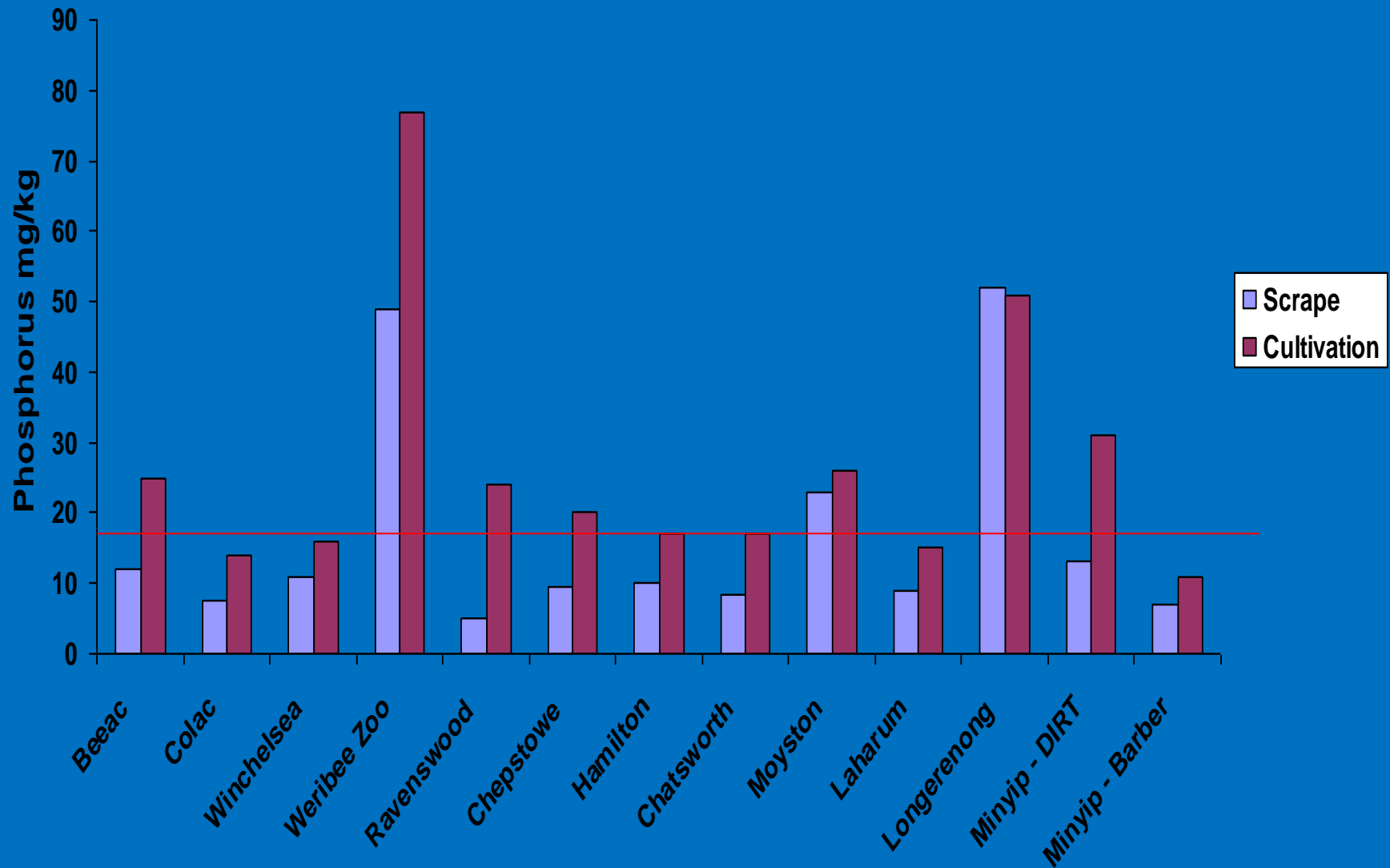




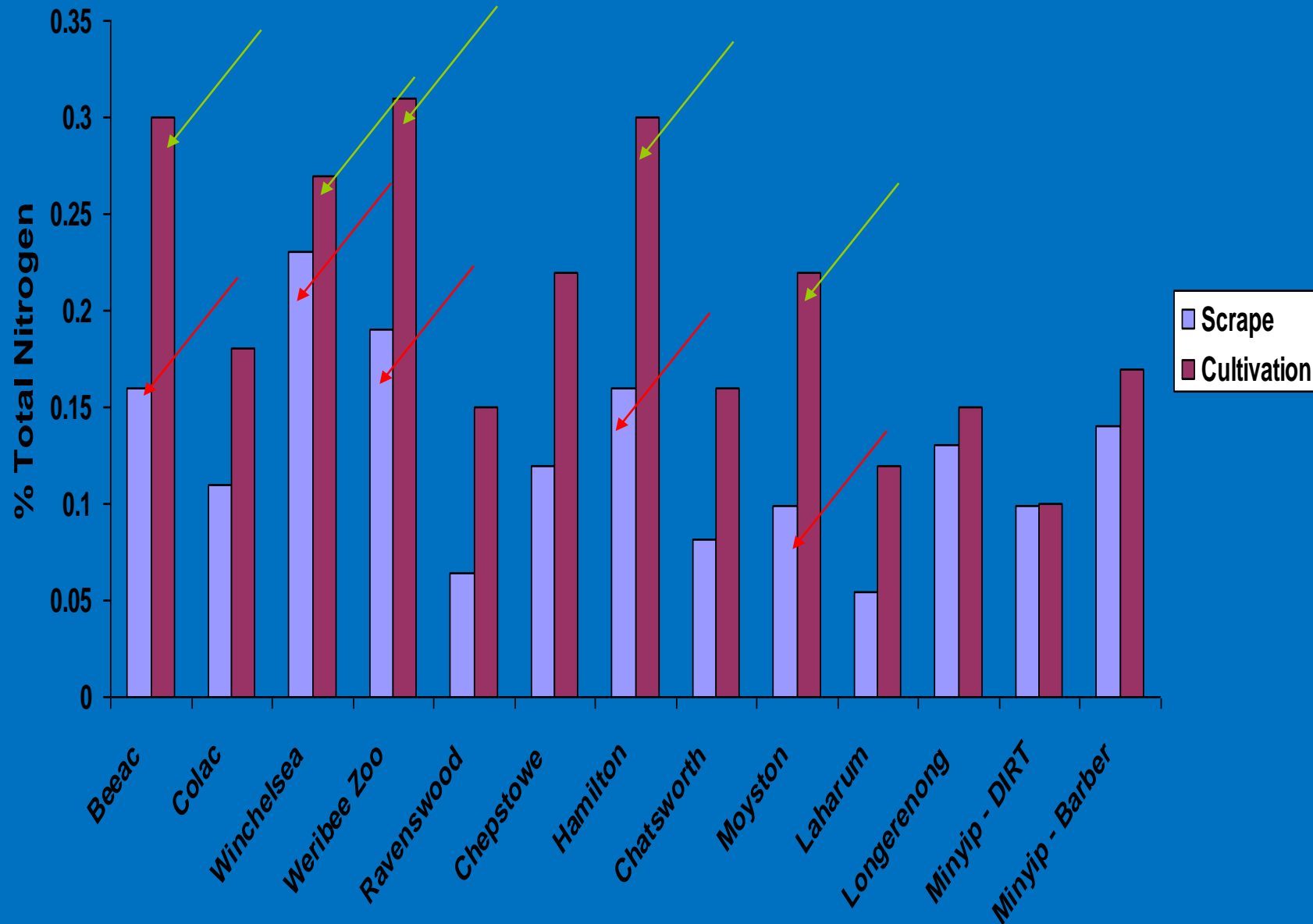
A photograph of a field filled with numerous small yellow flowers, possibly buttercups, growing among tall green grass. In the foreground, a single purple flower is in focus, its stem and leaves clearly visible. The text "GGRP experience and learnings" is overlaid in the center of the image.

GGRP experience and learnings

Nutrients: Phosphorus



Nutrients: Nitrogen







	Location	Year	Treatment	2007	2008	2009	2010	2011				
	Barber Property	2006	Scalp		Spot Spray	Burn	Spot Spray	Burn				
	Barber Property	2006	Non-scalp		Spot Spray	Burn	Spot Spray	Burn				
	Barber Property	2007	Scalp		Spot Spray	Burn	Spot Spray	Burn				
	Barber Property	2007	Non-scalp		Spot Spray	Burn	Spot Spray	Burn				
	Beeac Reserve	2006	Scalp			Burn	Burn					
	Beeac Reserve	2007	Scalp			Burn	Burn					
	Beeac Reserve	2007	Non-scalp			Burn	Burn					
	Chatsworth Property	2006	Scalp			Cut & Bale	Burn					
	Chatsworth Property	2006	Non-scalp			Cut & Bale	Burn					
	Chatsworth Property	2007	Scalp			Cut & Bale	Burn					
	Chatsworth Property	2007	Non-scalp			Cut & Bale	Burn					
	Chepstowe Property	2006	Scalp			Burn	Cut & Bale		Burn			
	Chepstowe Property	2006	Non-scalp			Burn	Cut & Bale		Burn			
	Chepstowe Property	2007	Scalp			Burn	Cut & Bale		Burn			
	Chepstowe Property	2007	Non-scalp			Burn	Cut & Bale		Burn			
	Dennis Property	2006	Scalp			Cut & Bale	Burn		Cut & Bale	Burn		
	Dennis Property	2006	Non-scalp			Cut & Bale	Burn		Cut & Bale	Burn		
	Dennis Property	2007	Scalp			Cut & Bale	Burn		Cut & Bale	Burn		
	Dennis Property	2007	Non-scalp			Cut & Bale	Burn		Cut & Bale	Burn		
	DIRT Property	2006	Scalp									
	DIRT Property	2006	Non-scalp									
	DIRT Property	2007	Scalp									
	DIRT Property	2007	Non-scalp									
	Hamilton (DPI)	2006	Scalp						Cut	Burn		
	Hamilton (DPI)	2006	Non-scalp						Cut	Burn		
	Hamilton (DPI)	2007	Scalp						Cut	Burn		
	Hamilton (DPI)	2007	Non-scalp						Cut	Burn		
	Laharum Property	2006	Scalp							Cut & Bale	Burn	Burn
	Laharum Property	2006	Non-scalp							Cut & Bale	Burn	Burn
	Laharum Property	2007	Scalp							Cut & Bale	Burn	Burn
	Laharum Property	2007	Non-scalp							Cut & Bale	Burn	Burn
	Moolapio Property	2008	Scalp							Spot Spray	Cut & Bale	Cut & Bale
	Moolapio Property	2009	Scalp									Cut & Bale
	Moolapio Property	2010	Scalp									
	Moyston Property	2006	Scalp	Burn	Burn	Burn						
	Moyston Property	2006	Non-scalp	Burn	Burn	Burn						
	Moyston Property	2007	Scalp	Burn	Burn	Burn						
	Moyston Property	2007	Non-scalp	Burn	Burn	Burn						
	Ravenswood Property	2006	Scalp				Burn					
	Ravenswood Property	2007	Scalp				Burn					
	Ravenswood Property	2007	Non-scalp				Burn					
	Wickliffe Road Site 1	2009	Scalp									
	Wickliffe Road Site 2	2009	Scalp									
	Werribee Zoo	2006	Scalp									
	Werribee Zoo	2006	Non-scalp									
	Werribee Zoo	2007	Scalp		Spot Spray							
Werribee Zoo	2007	Non-scalp	Spot Spray									
Werribee Zoo	2010	Scalp	Spot Spray									

GGRP Sites

	Scalped (n = 28)	Fallowed (n = 20)
	Mean	Mean
Native Species Number	38	13
Plant Number Native m ⁻²	66	25
Plant Number Exotic m ⁻²	66	124
Percentage Vegetative Cover		
Sown Native	50	34
Non-sown Exotic	15	61
Bare earth	35	5

Burn cues –
> 70% vegetative cover



**Burn cues –
Dry material above 150 mm**



Opening Canopy





Grass dropping seed into gaps
after fire





Resprouting







Perenniality



Opening
niches for
species to
move to in
adjoining
vegetation



Allowing sub-dominants to
persist



Post burn weeds
high nutrient settings



Post burn in low nutrient settings



Grassy woodland management study

- Burn
- Cut and bale
- Carbon (high and low)
- Scalp
- Seed (plus/minus)



Control



Fire H-C



Slash H-C



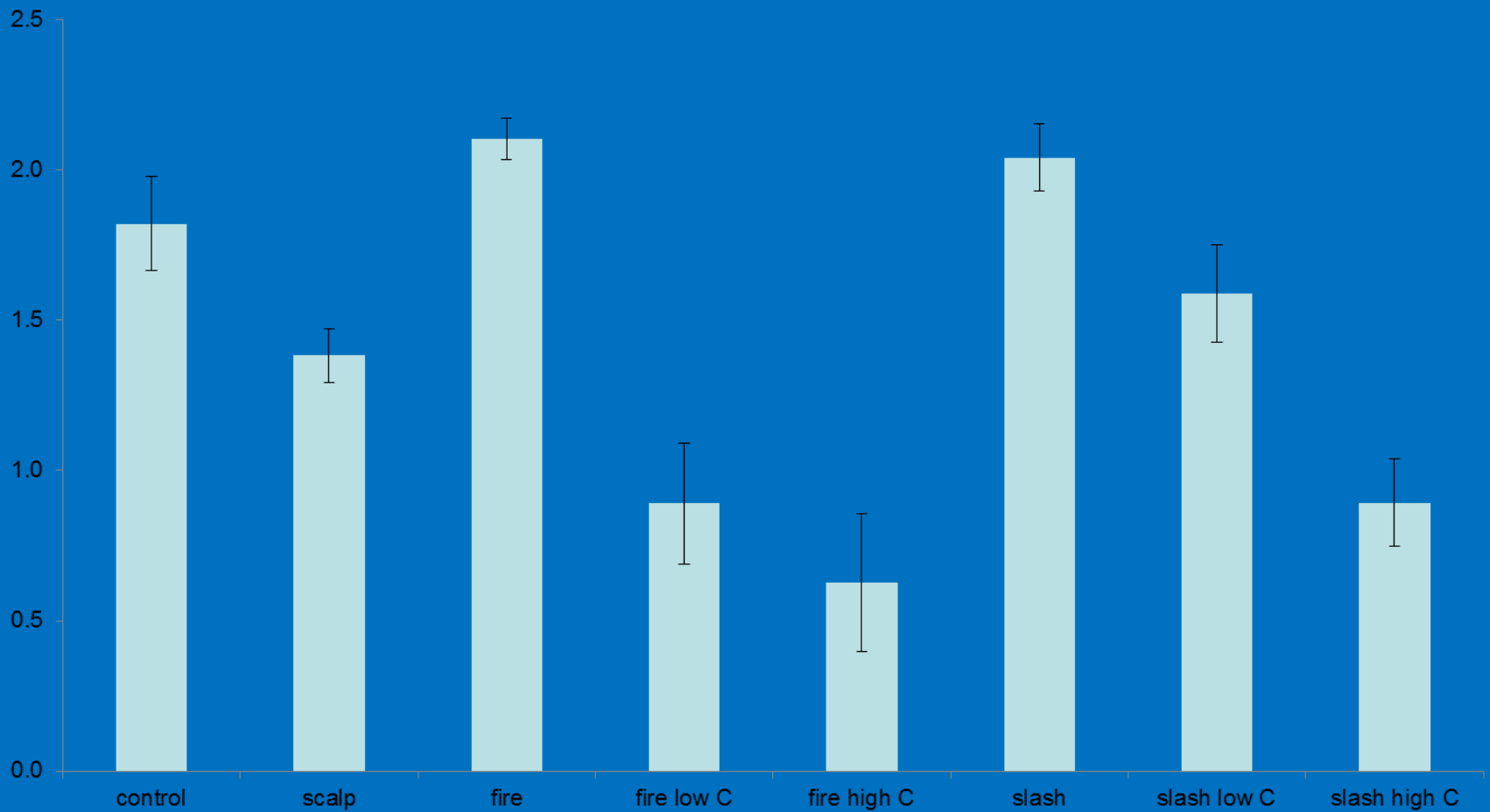
Fire



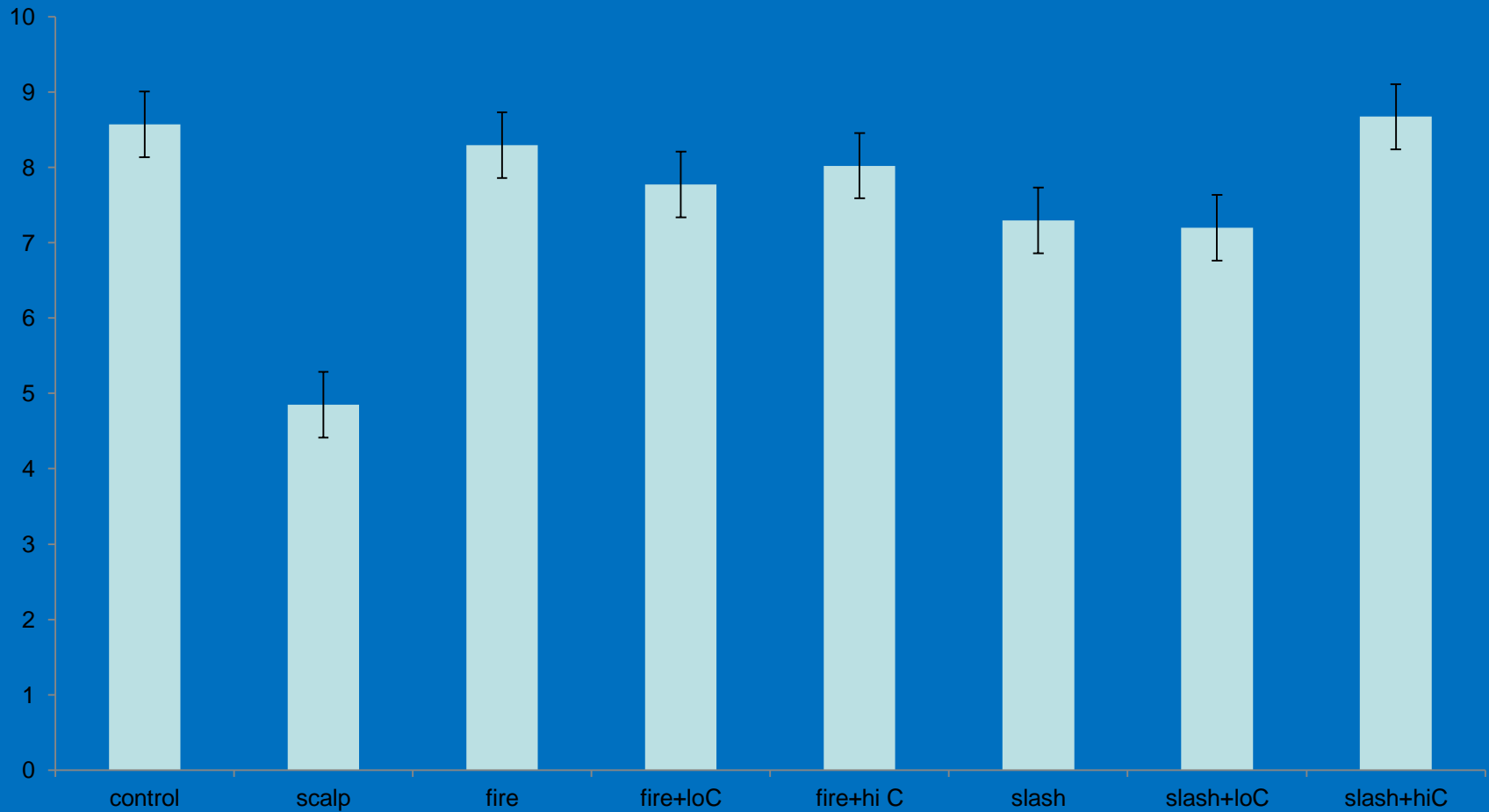
Slash



Nitrate (NO₃)



Phosphorus (Colwell)



GGRP Burns





Point Henry Grasslands

The establishment of a native grassland ecosystem at Point Henry is a testament to nature's resilience. It is a place of biodiversity and scientific value, and it is a place of great importance to the local community.

The landscape and its history are a testament to the resilience of nature. It is a place of great importance to the local community.

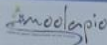
Point Henry has been a place of great importance to the local community for many years. It is a place of great importance to the local community.













Point Henry Grasslands

The world heritage of an original grassland association will define Point Henry as a refuge of national and international importance in terms of its conservation and scientific value. It will also provide a unique showcase for restoration practices used by industry partners and the wider community.

The technique used to restore this grassland is based on scientific research conducted under the Greening Victorian Research Program managed by Greening Australia and Melbourne University. The technique involved soil based seed restoration works, using the cutting 1.1 tons of Alcoa bauxite (per hectare) native grassland seed (10 years).

Victoria has lost more than 95% of its original grasslands, most have been cleared through development and farming. Native grassland is an open habitat that is predominantly covered by growing with a few scattered trees. It also contains herbs, wildflowers, shrubs and grasses.







Cut & Baling







Seed Hay



Werribee Open Range Zoo











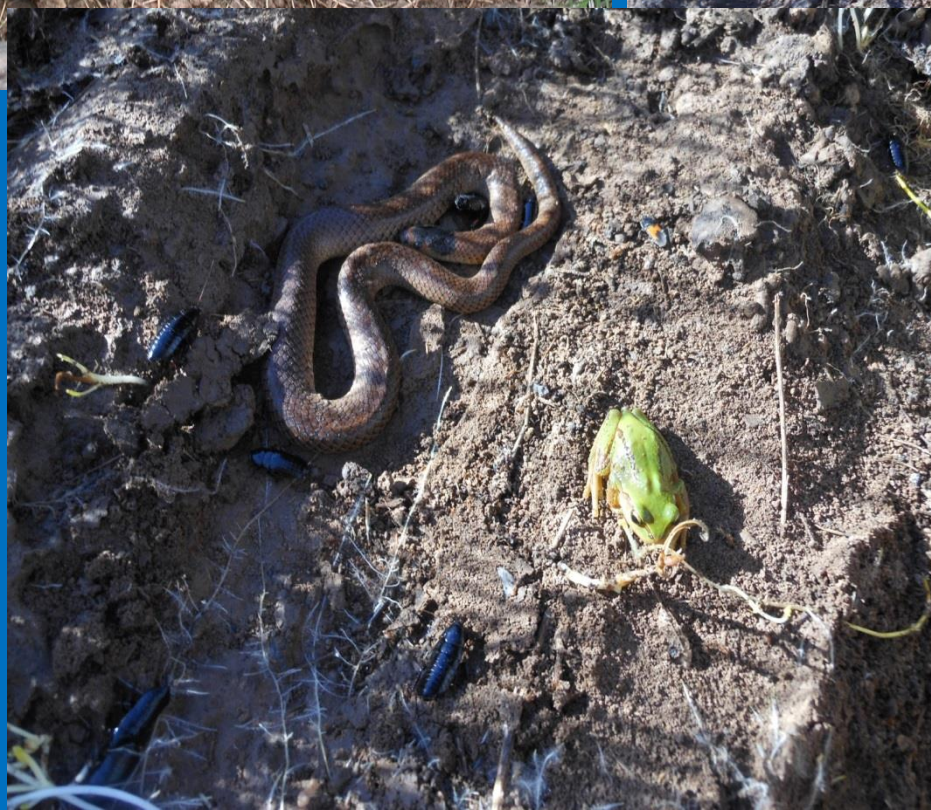
Chepstowe























Colac















Beeac











Chatsworth













Hamilton























Gibson-Roy's Summary



- Can we restore and manage temperate grassland and grassy woodland vegetation communities.....Yes
- Is it more complicated than it seems...Yes
- Do we need to be realistic about our objectives, capacity, expectations....Yes
- Should better recognise and take responsibly for human impacts on the planet...Yes
- Is this likely to happen in a human-centric paradigm???????