FOREST CHECK

Department of Environment and Conservation

Monitoring Biodiversity in Jarrah Forest

Science Division

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Forest Products Commission WESTERN AUSTRALIA

Monitoring Biodiversity in Jarrah Forest

FORESTCHECK - Context

- Integrated system to monitor changes and trends in key elements of forest biodiversity associated with forest management activities
- Developed to comply with:
    - Conditions placed in Forest Management Plan 1999-2003 through Ministerial conditions and Codd Report (1999)
    - Reporting on ESFM against Montreal Process Criteria
- Recognised by Action 9.2 Forest Management Plan 2004-13
- Supplement the Kinsgton Project – detailed experimental research at a single site

Monitoring Biodiversity in Jarrah Forest

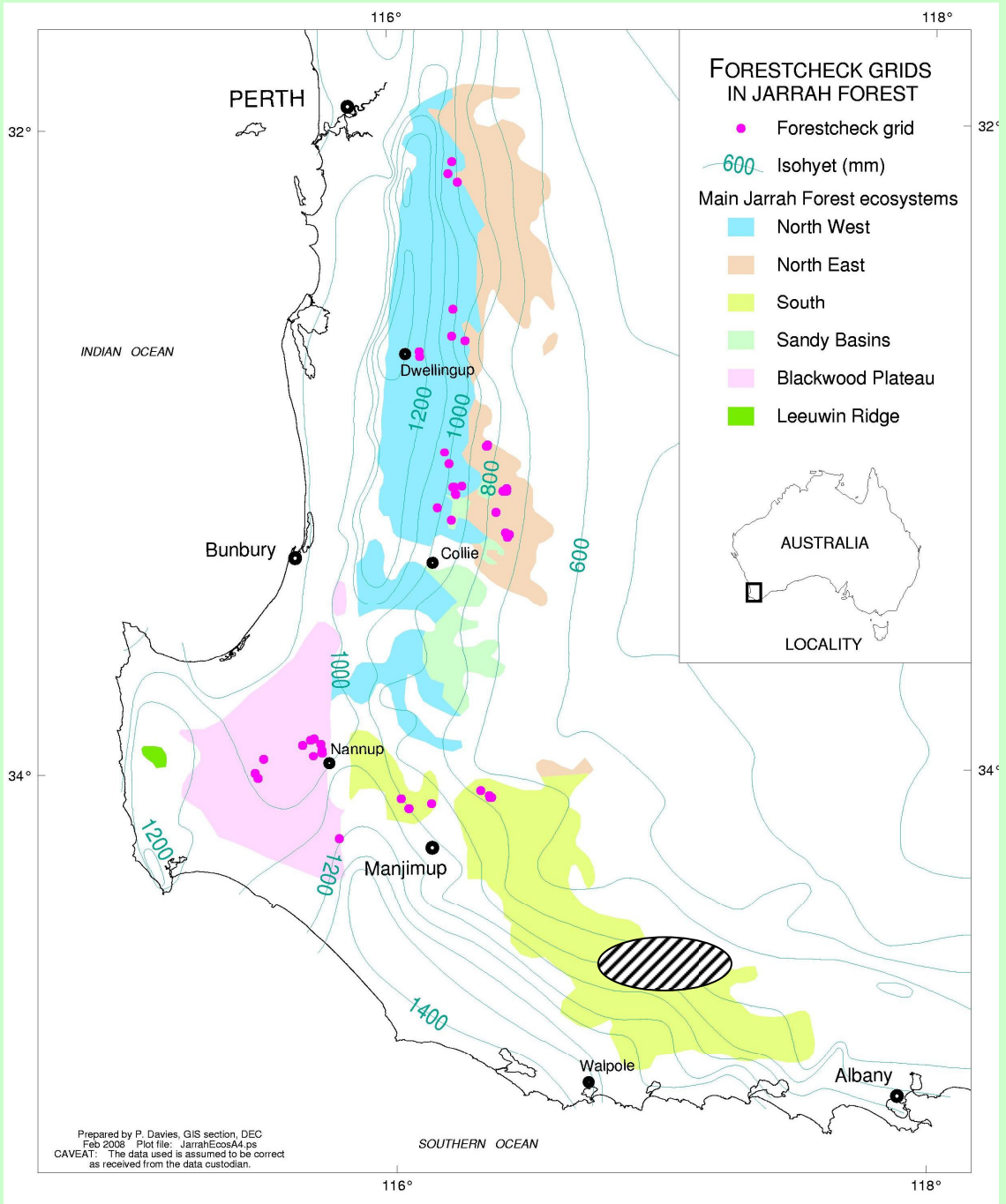
At each location (Forest Ecosystem):

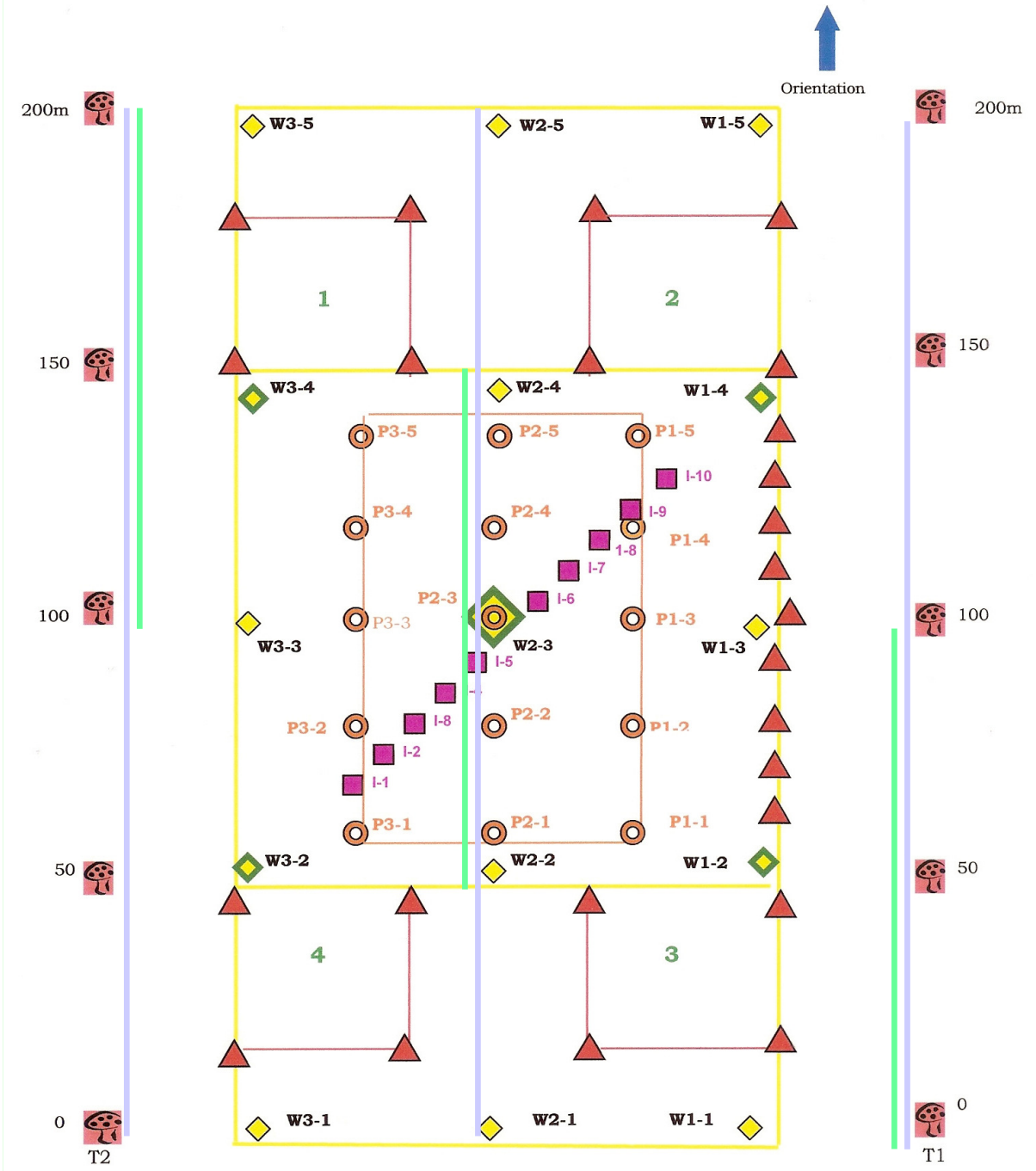
- Treatments based on SILREC data verified by field visit
- Grids matched by Havel and Mattiske vegetation complex
- Three sets of grids established to represent recent (<3 yr), intermediate (5-7 yr) & longer (9-10 yr) times since treatment
- A set of grids consists of :
    - Reference forest – unlogged (and buffer if available)
    - Shelterwood harvest (and/or selective cut present)
    - Gap release
- Reflect implementation of Silvicultural Guideline 1/95

Sampling locations

48 monitoring grids established over 5 years

- 2001 & 2007 remeasure – Jarrah south (Donnelly, 10 grids)
- 2002 & 2008 remeasure – Jarrah north west (Wellington, 9 grids)
- 2003 & 2009 remeasure – Jarrah north west (Perth Hills, 8 grids)
- 2004 – Jarrah north east (Wellington East, 10 grids)
- 2005 – Jarrah Blackwood (Blackwood Plateau, 11 grids)





FORESTCHECK

Monitoring grid

- Grid/Plot Centre – overall grid size 100m x 200m
- Corner pegs for main plot (100m x 100m)
- Wire cage x15
- Small vertebrate pit traps x15
- Macrofungi transect 2 x 200m
- Invertebrate pit traps x10
- Vegetation plots 4 x 30x30m
- Cryptogams
- Forest structure and regeneration
- Soil nutrients
- Soil disturbance
- CWD, SWT & Litter

Monitoring Biodiversity - Objectives

Elements of biodiversity monitored include: Vascular Flora, Macrofungi, Cryptogams (lichens, mosses & liverworts), Invertebrates (> 1cm), Birds, Mammals and Herpetofauna.

For each we:

- Record species richness and abundance on each grid
- Determine species composition within each treatment, and
- Analyse trends in species richness, abundance and composition between treatments and forest types (regional)

…as well as other characteristics specific to each group





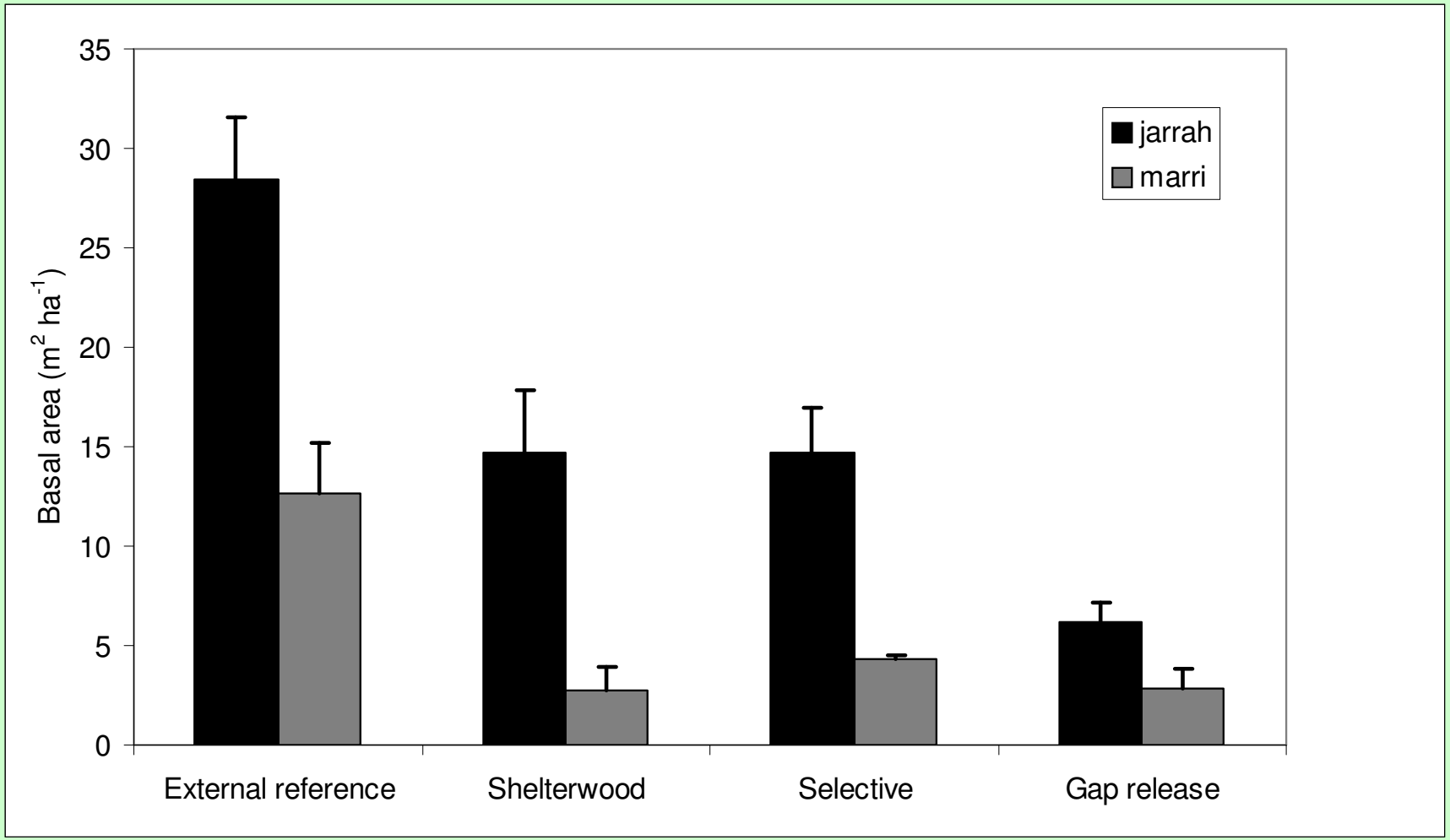


Results from first 5 years of monitoring: Forest Attributes

Stand Structure and Regeneration

- Gap release stands generally are well stocked and have good potential for future growth
- Shelterwood has been applied conservatively with retained basal area above specified limits, and some treated areas having adequate existing ground coppice
- Proportion of jarrah regeneration consistently above the minimum required threshold

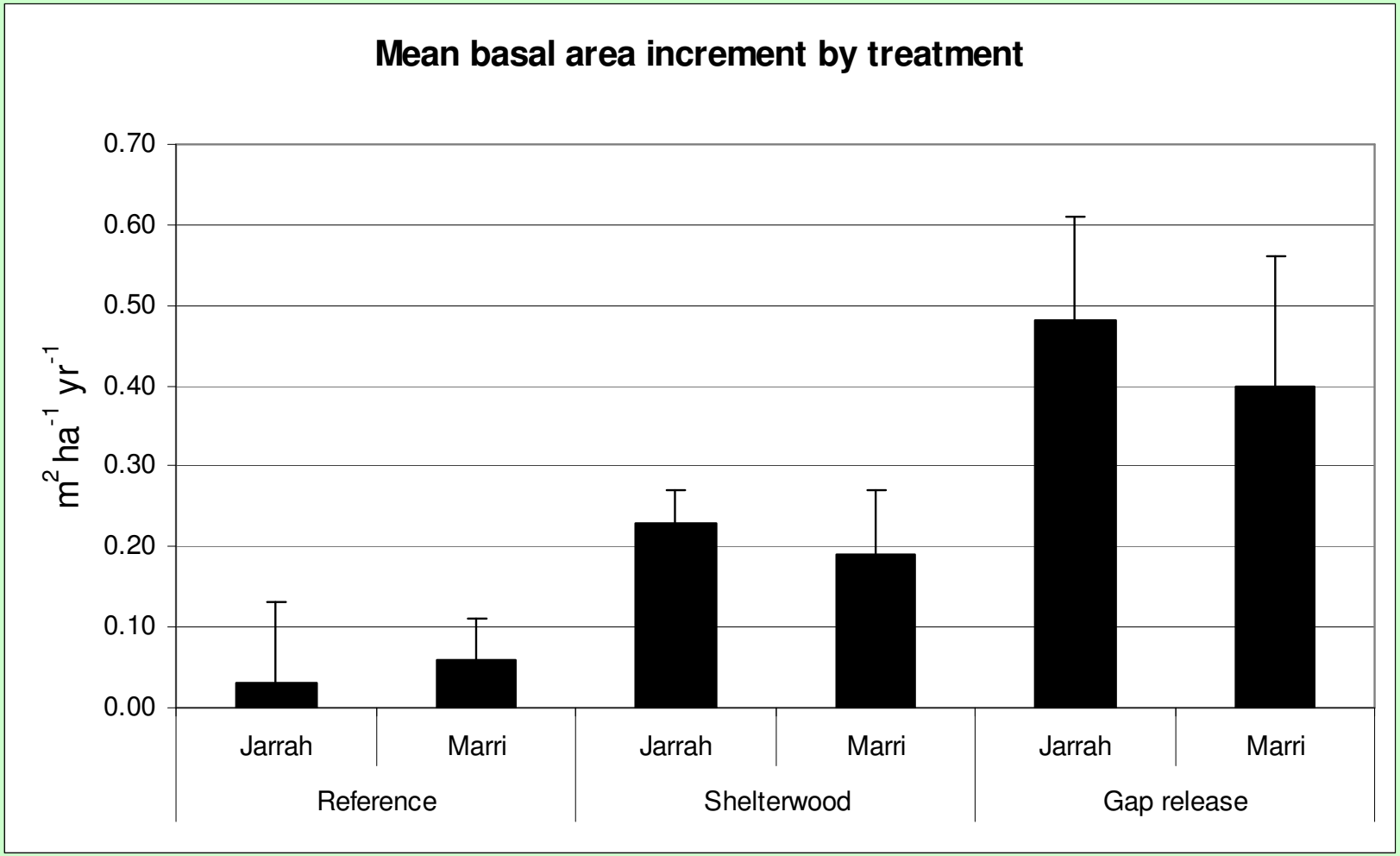
Results from first 5 years of monitoring: Forest Attributes



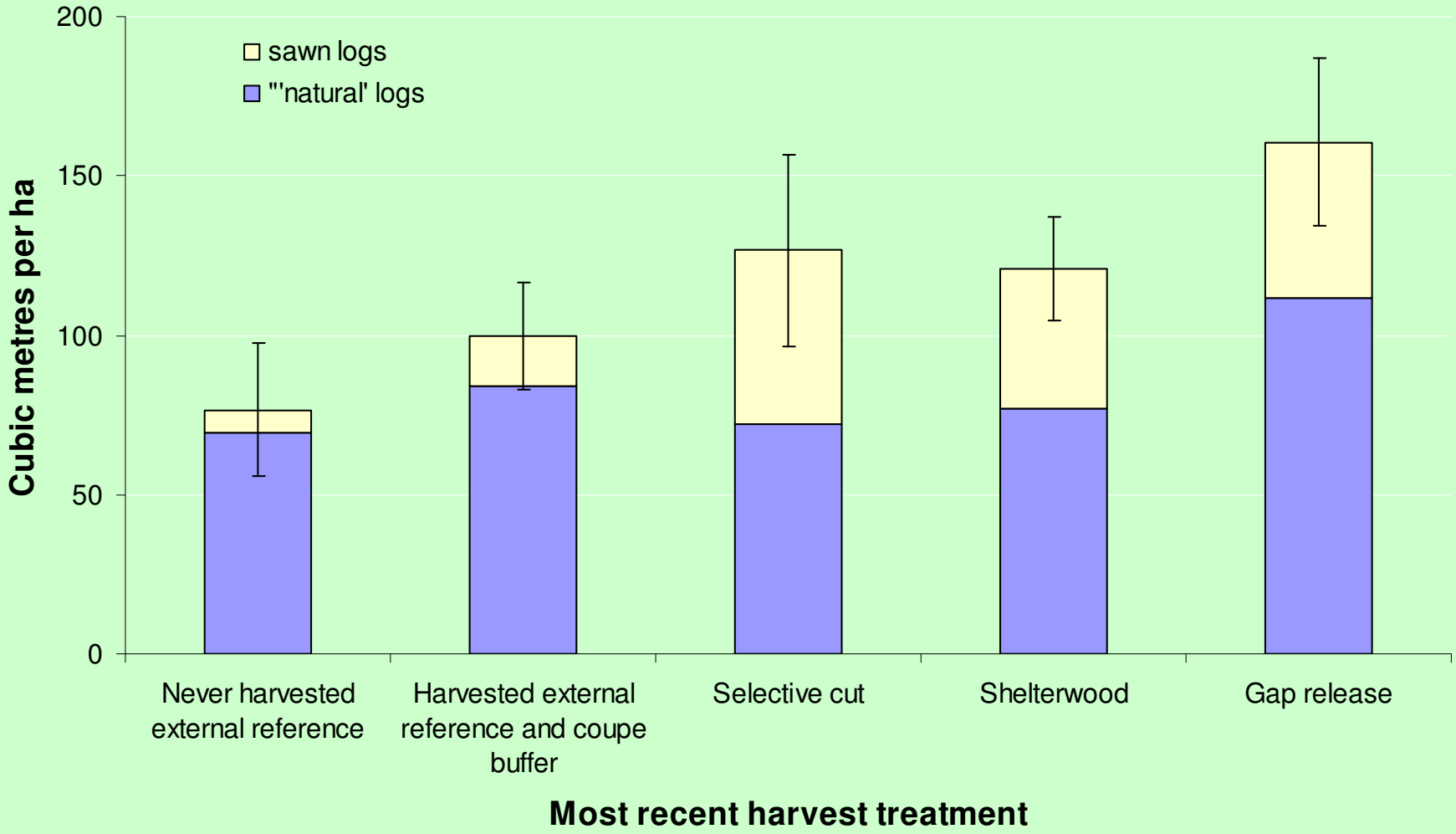
Basal area retained for different silvicultural treatments

Basal area change by treatment

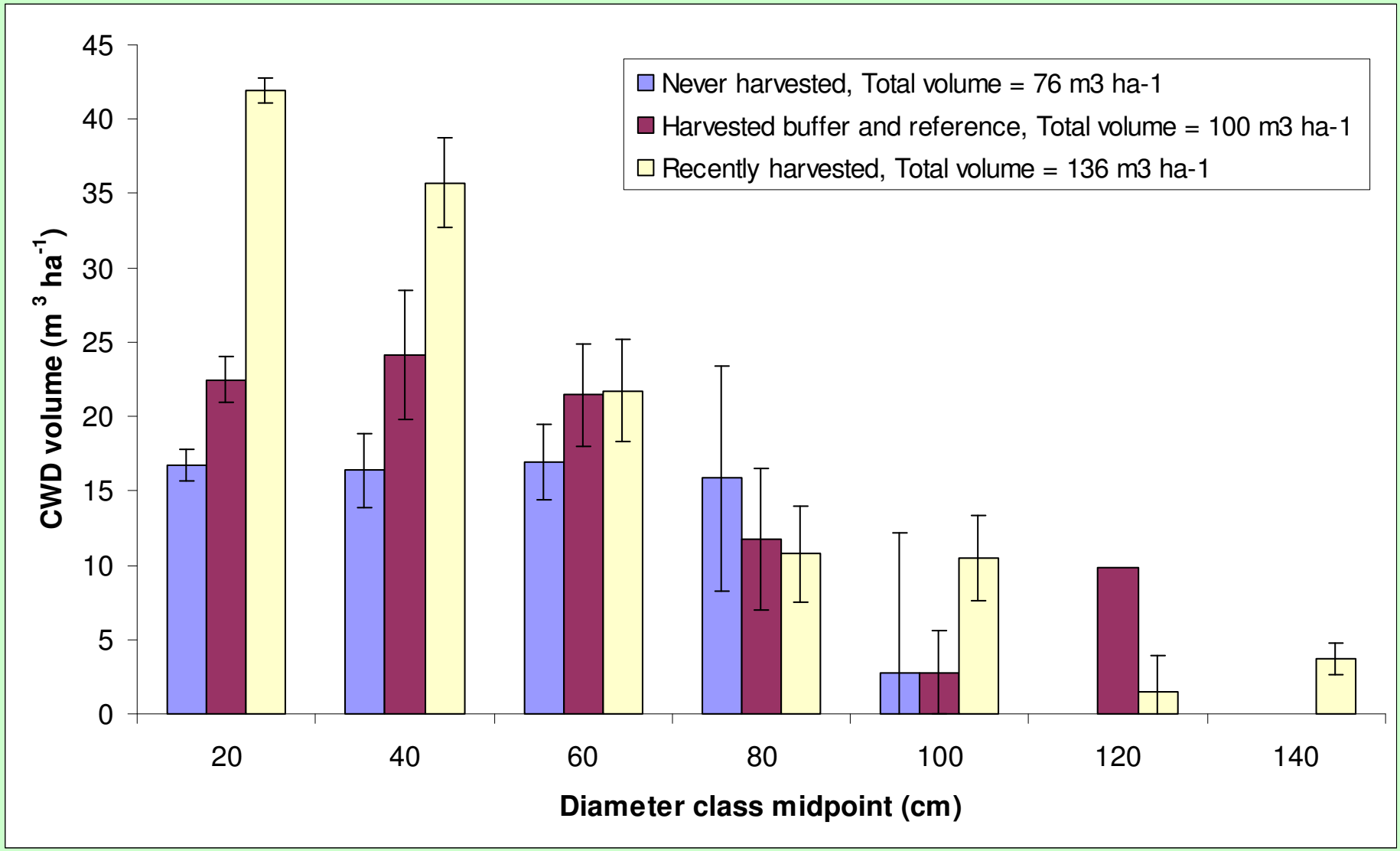
27 grids in Donnelly, Wellington & Perth Hills



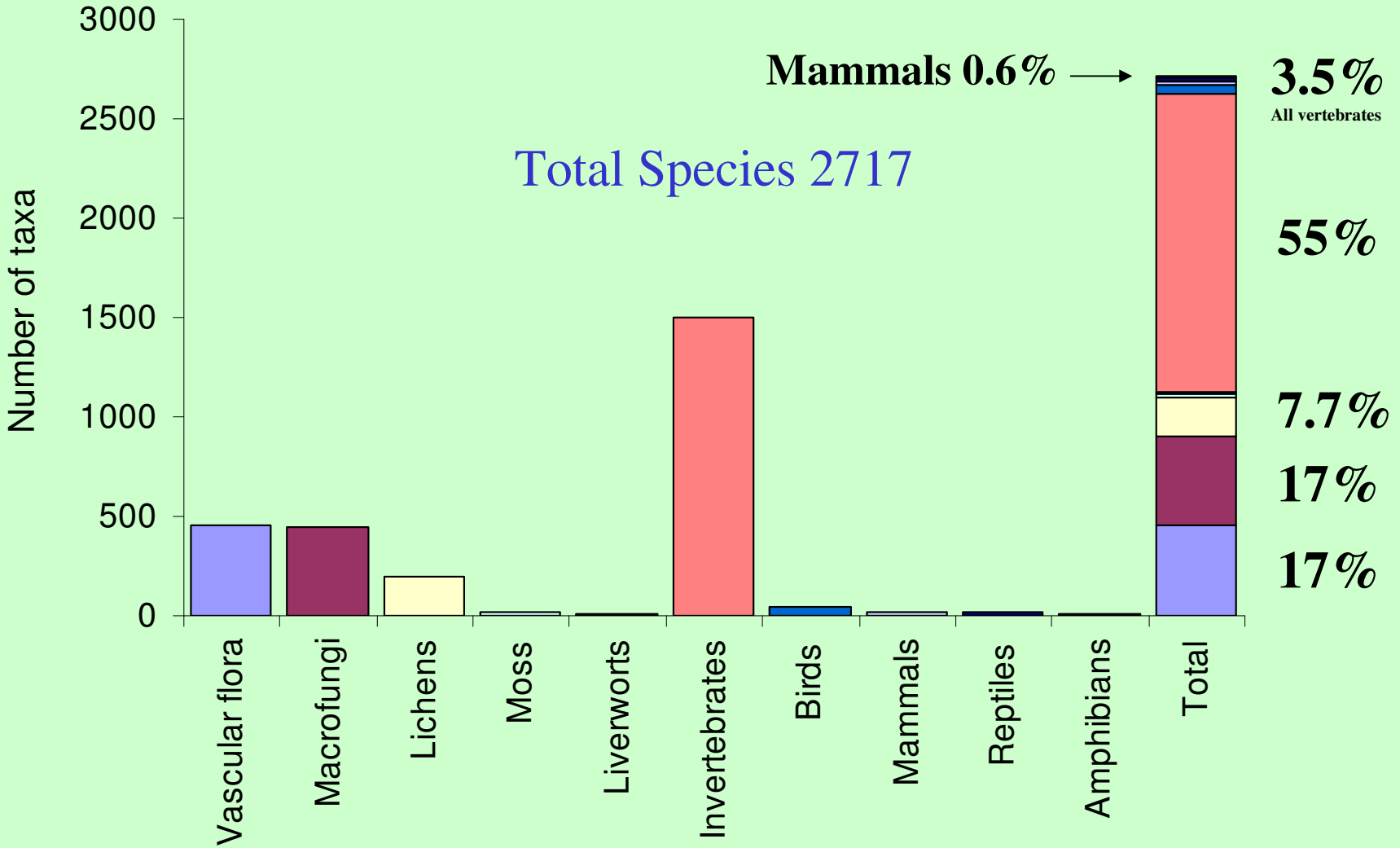
Results from first 5 years of monitoring: Forest Attributes



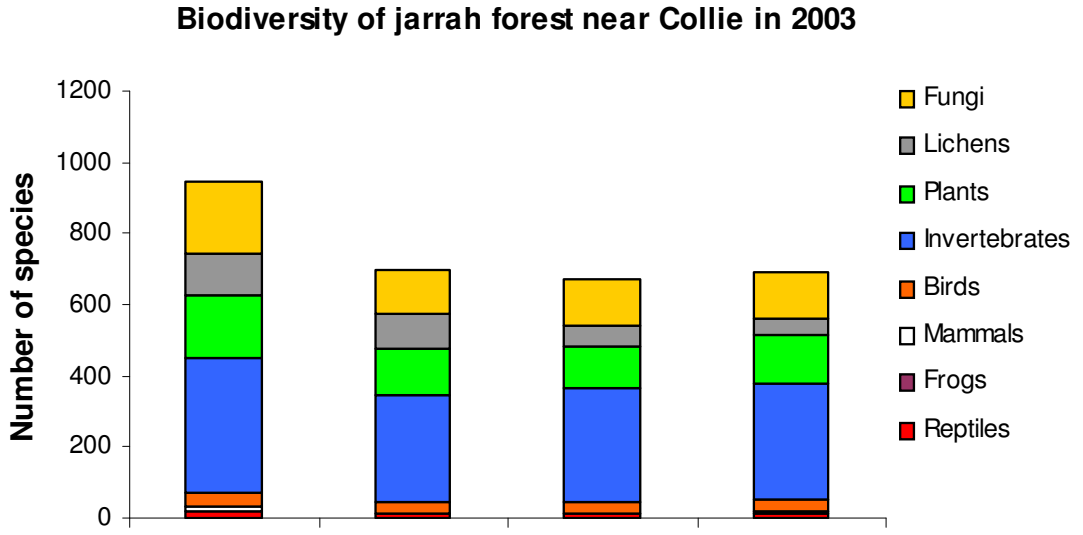
Results from first 5 years of monitoring: Forest Attributes

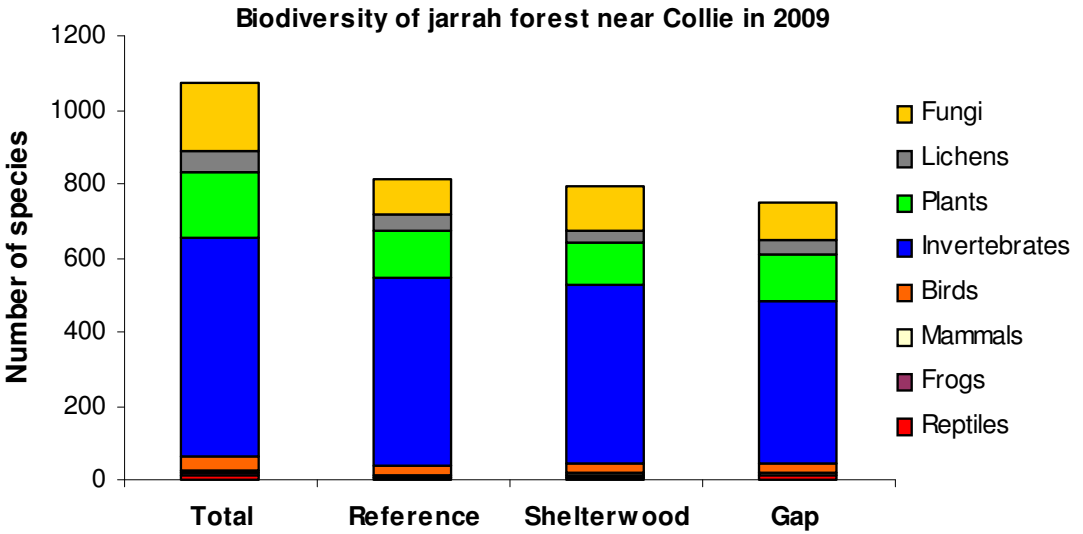


Results from first 5 years of monitoring: Biodiversity



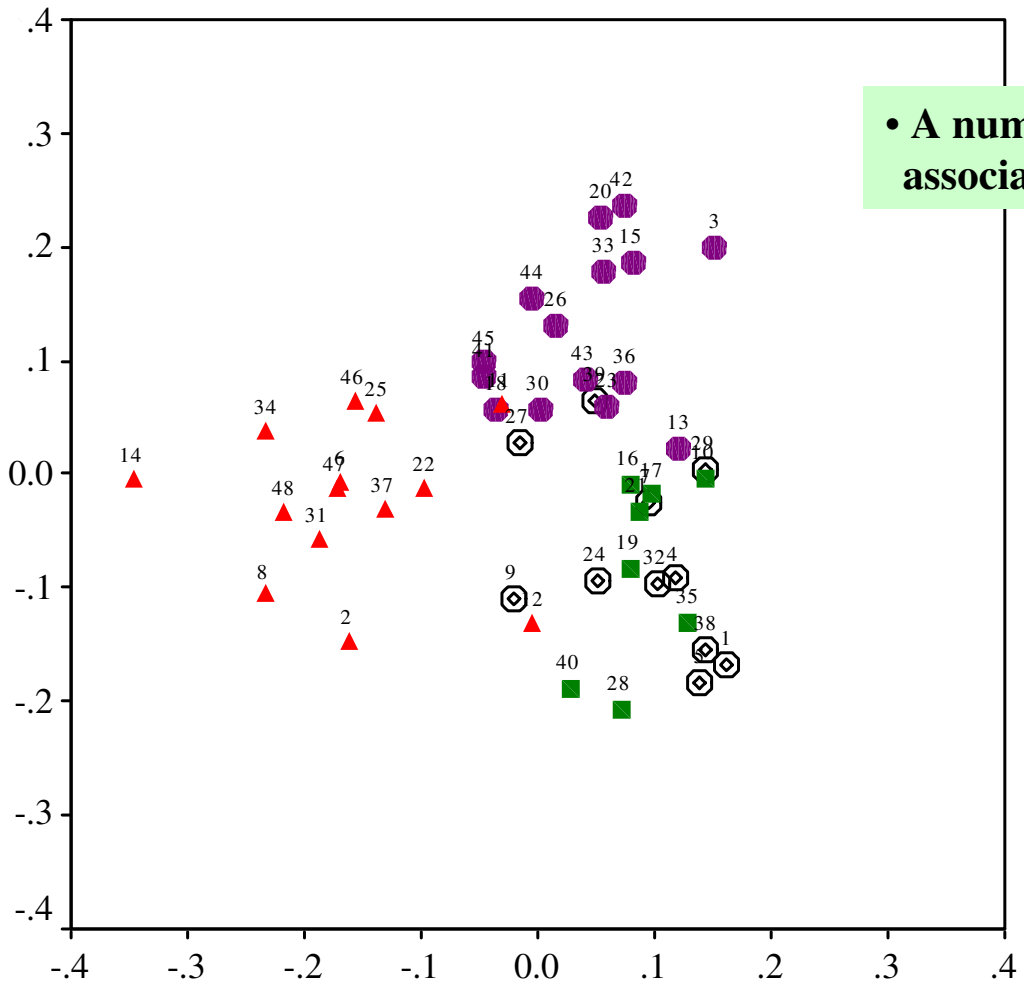
Results from first 5 years of monitoring: Biodiversity





- Number of species increased by 141
  - NB. Invertebrates
- Species richness for other groups similar to that of 2003 and similar between treatments

Results from first 5 years of monitoring: Biodiversity - CAP - Species assemblage Vs Treatment



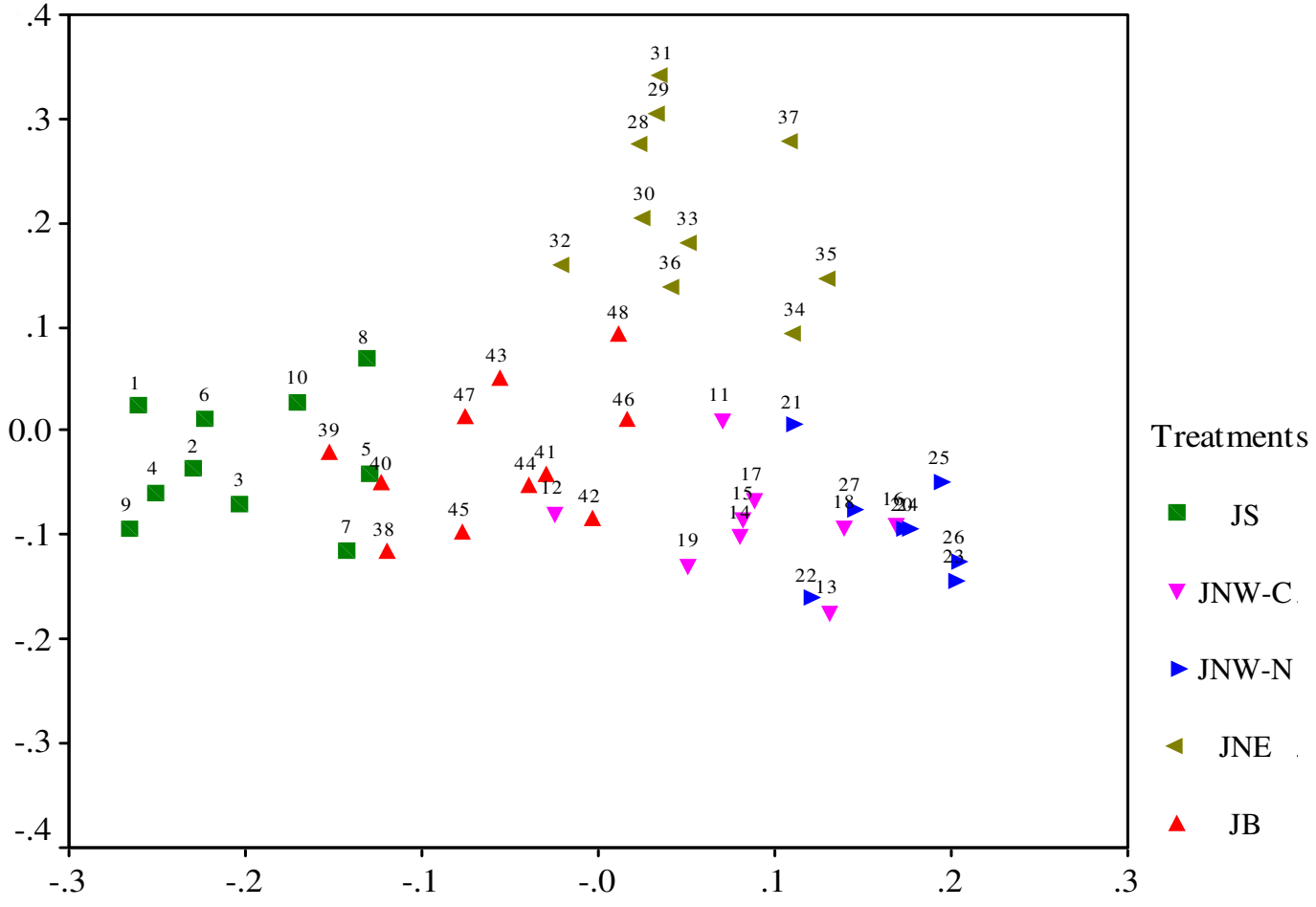
- **A number of lichens are only associated with mature trees**

Treatments

- External reference and Coupe buffer
- Never logged
- Shelterwood and Selective cut
- Gap release

Cryptogams: p-value = 0.0001

Results from first 5 years of monitoring: Biodiversity - CAP - Species assemblage Vs Forest type



Terrestrial vertebrates: p-value = 0.0001

Conclusions and management implications

- Jarrah forest ecosystems are resilient to the effects of current timber harvesting practices
- Impacts of disturance vary between different groups of organisms - cryptogams and arboreal mammals appear more sensitive to treatment than invertebrates or vascular plants
- Impacts at site level need to be viewed in context of landscape matrix of retained habitat elements, informal reserves, fauna habitat zones and formal reserves
- Results highlight the importance of avoiding severe soil compaction and disturbance during timber harvesting, already addressed by actions in FMP 2004-13

Reporting, Analysis & Data Management

5-year Analysis - Progress to date

- Eight papers submitted to Australian Forestry
  - Introduction
  - Forest structure
  - Soil disturbance
  - Macrofungi
  - Invertebrates
  - Birds
  - Vascular flora
  - Mosses, lichens & bryophytes
- Two manuscripts in draft
  - Mammals
  - Whole of biota

Other DEC research relevant to Wungong Project

- Stream invertebrate monitoring (KPI 20) at 50 sites across the FMP area 2005-2010
- Effect of timber harvesting on streamflow and groundwater level in the jarrah forest (900 mm rainfall zone) – paper to appear in *J Hydrology*

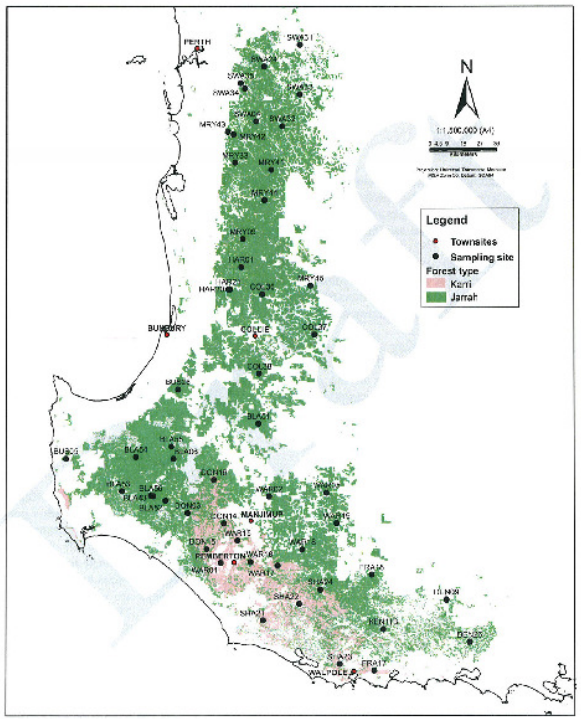


Figure 1. Site locations and forest areas.

7