



Dr David H Duncan

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Department of Sustainability
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Day 2, 9.45am

Area of work: Plant ecology

Specialty: My interest is in the functional integrity of remnant native habitat.

What's worked to improve extent and condition of native vegetation on private land?

Our team is working to understand how NRM investments on private land have contributed to landscape change in native vegetation condition in northern Victoria. Three study areas were chosen, based on vegetation type, degree of fragmentation, mixed land-use and good local and institutional knowledge of NRM investment history on private land [Muckleford (North Central CMA), Violet Town–Longwood (Goulburn Broken CMA) and Chiltern–Springhurst (North East CMA)]. Native vegetation plays a vital role in the landscape, supporting biodiversity conservation, ecosystem services and ecological functions. There is considerable uncertainty around the effectiveness of management interventions designed to improve native vegetation condition (extent and quality), particularly at the landscape scale. The management of native vegetation in Victoria is undertaken by public and private land managers with support from regional Natural Resource Management (NRM) teams, comprising Catchment Management Authorities (CMAs), non-government organisations and state agencies. The NRM teams allocate funding to carry out on-ground works including revegetation, vegetation protection and enhancement. These bodies are eager for new understandings, models and tools to help them learn about the effectiveness of their work, and make better decisions. This project aims to identify the relative impacts of targeted interventions for native vegetation condition (extent and quality). However, the effectiveness of interventions must be considered in the context of native vegetation change resulting from other drivers such as historical and contemporary land-use and land-management change. Through biophysical and social research techniques this project is providing new knowledge and improving assumptions about the responsiveness of native vegetation condition to targeted interventions. This is being used to develop models and tools that can assist partner CMAs (and other stakeholders) in understanding, managing and reporting likely change in native vegetation condition.

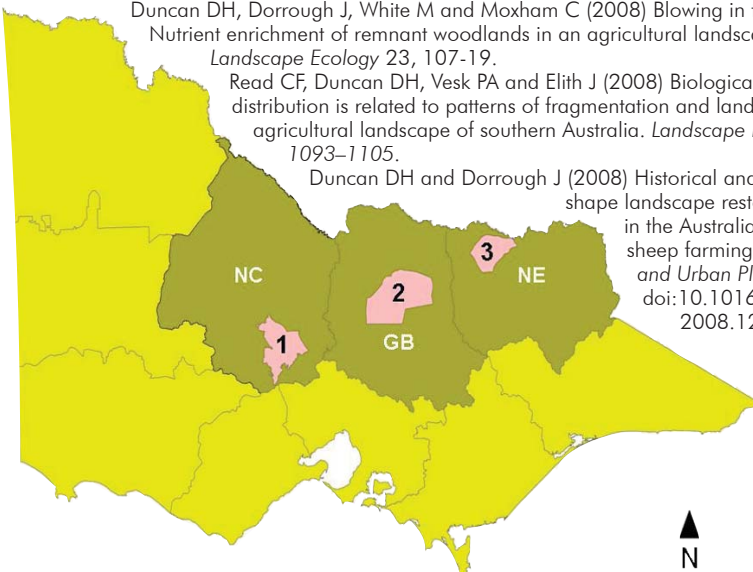
Relevant publications

Duncan DH and Wintle BA (2008) Towards adaptive management of native vegetation in regional landscapes. In *Landscape Analysis and Visualisation. Spatial Models for Natural Resource Management and Planning* (Eds. C Pettit, W Cartwright, I Bishop, K Lowell, D Pullar and D Duncan). Springer, Verlag GmbH, Berlin.

Duncan DH, Dorrrough J, White M and Moxham C (2008) Blowing in the wind? Nutrient enrichment of remnant woodlands in an agricultural landscape. *Landscape Ecology* 23, 107-119.

Read CF, Duncan DH, Vesk PA and Eliith J (2008) Biological soil crust distribution is related to patterns of fragmentation and landuse in a dryland agricultural landscape of southern Australia. *Landscape Ecology* 23, 1093-1105.

Duncan DH and Dorrrough J (2008) Historical and current land use shape landscape restoration options in the Australian wheat and sheep farming zone. *Landscape and Urban Planning*, doi:10.1016/j.landurbplan.2008.12.007.



Our focus case study areas in Northern Victoria:

- 1) Muckleford (North Central CMA)
- 2) Violet Town–Longwood (Goulburn–Broken CMA) and
- 3) Chiltern–Springhurst (North East CMA).

These areas were chosen for their location in fragmented landscapes, with mixed land-use, and good knowledge of NRM investment on private land.

Take-home messages:

1. Systematically identifying areas of change and no change comparing historical aerial photography to contemporary cover provide invaluable context within which to examine cause and effect relationships in vegetation change.
2. Regional workshops with landholders and other local experts using aerial photographic mapping, GIS and conversation have been very effective in identifying and dating vegetation change, canvassing likely cause for further scrutiny and enthusiastically received by participants.



LINKING LAND AND WATER MANAGEMENT TO RESOURCE CONDITION TARGETS

What's worked to improve extent and quality of native vegetation on private land?

David Duncan & Garreth Kyle, to name a few

March 2009



LANDSCAPE LOGIC

LINKING LAND AND WATER MANAGEMENT TO RESOURCE CONDITION TARGETS



Stuff we (co)invest in





Stuff we (co)invest in

Stuff we (co)invest in



How does veg quality change over 5 – 10 years?



Stuff that happens, e.g. cessation of grazing

cessation of grazing



Changes that emerge over longer time scales, decades?



Clueless?

Vic DSE and our partner CMAs already employ basic system models for investment and reporting

Coarse yes

Generic yes

Very receptive to targeted research input: improved cause and effect models, and problem exploration/representation tools (dss)



Our objectives

- Construct models of site responses to management treatments (retrospective study)
- Contribute to new monitoring frameworks (Libby Rumpff, collab with AEDA, GB)

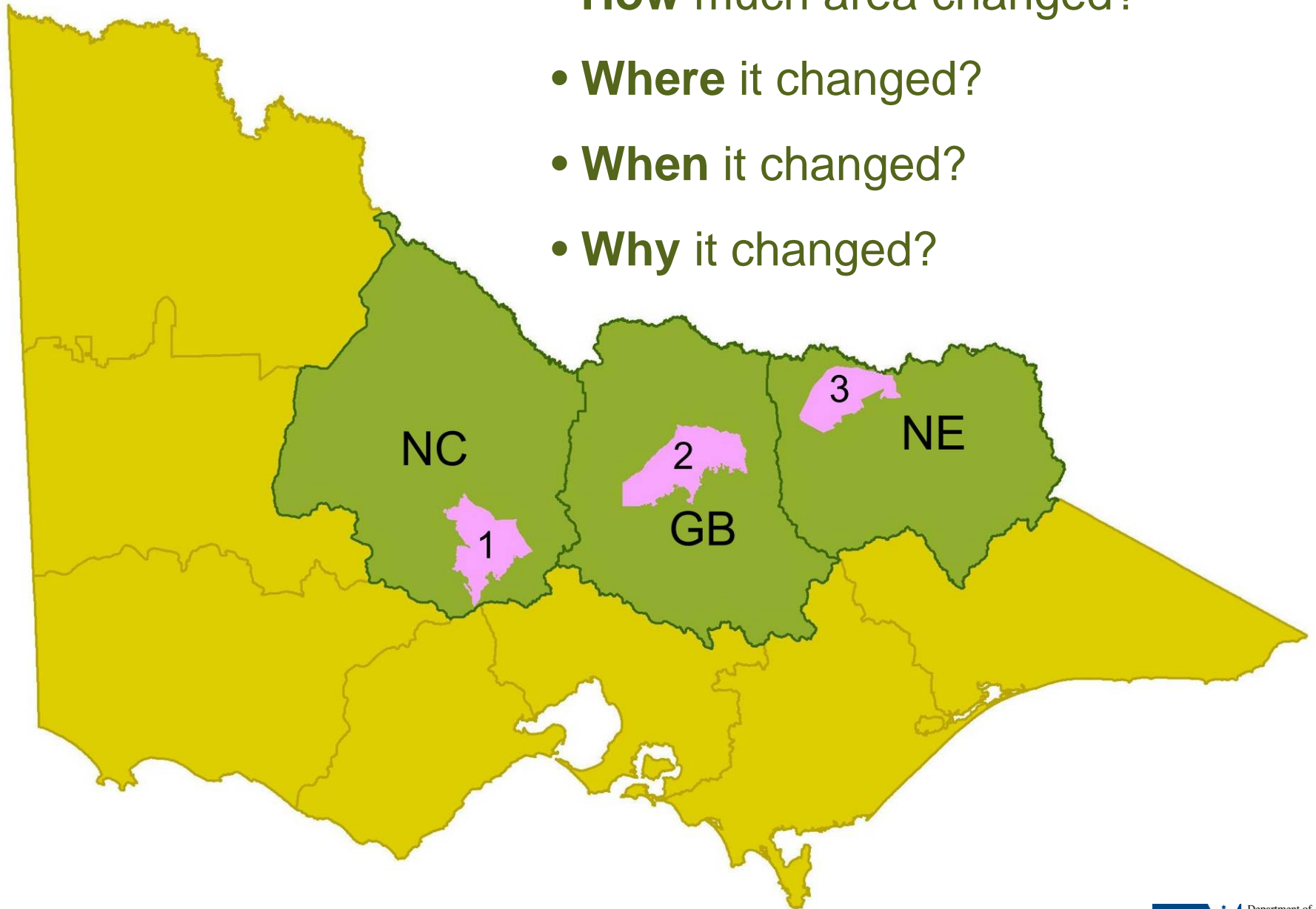
Analyse the magnitude and drivers of landscape extent change

- “funded” vs “unfunded” regen and reveg works
- magnitude of above changes in context of clearing and spontaneous regen since 1940s?
 - Aerial photo interpretation, biophysical and social drivers (with CSU)

- Integrate major findings using BBNs (with ANU)

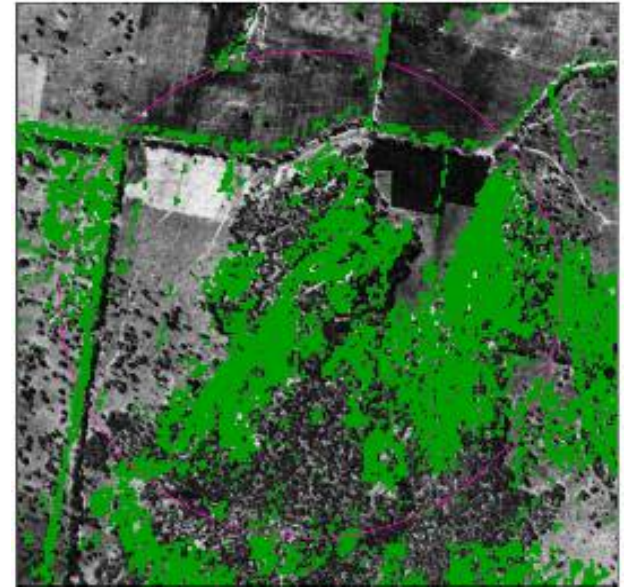
case study areas

- **How** much area changed?
- **Where** it changed?
- **When** it changed?
- **Why** it changed?

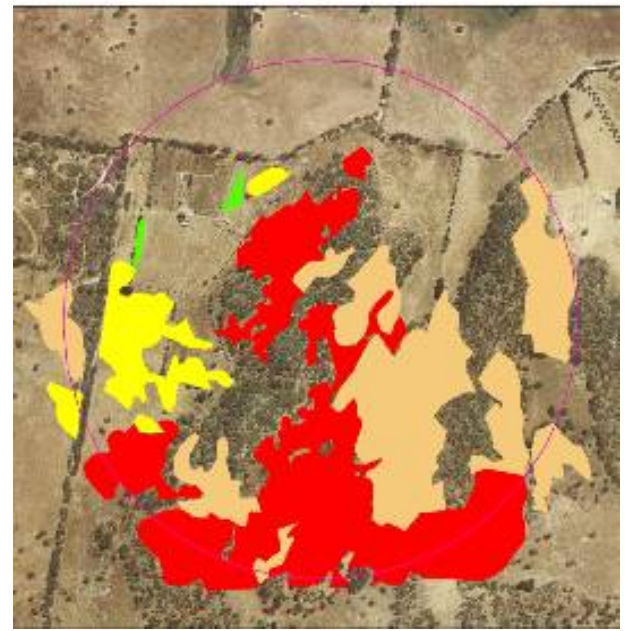


Landscape cover change analysis

Air photo
interpretation

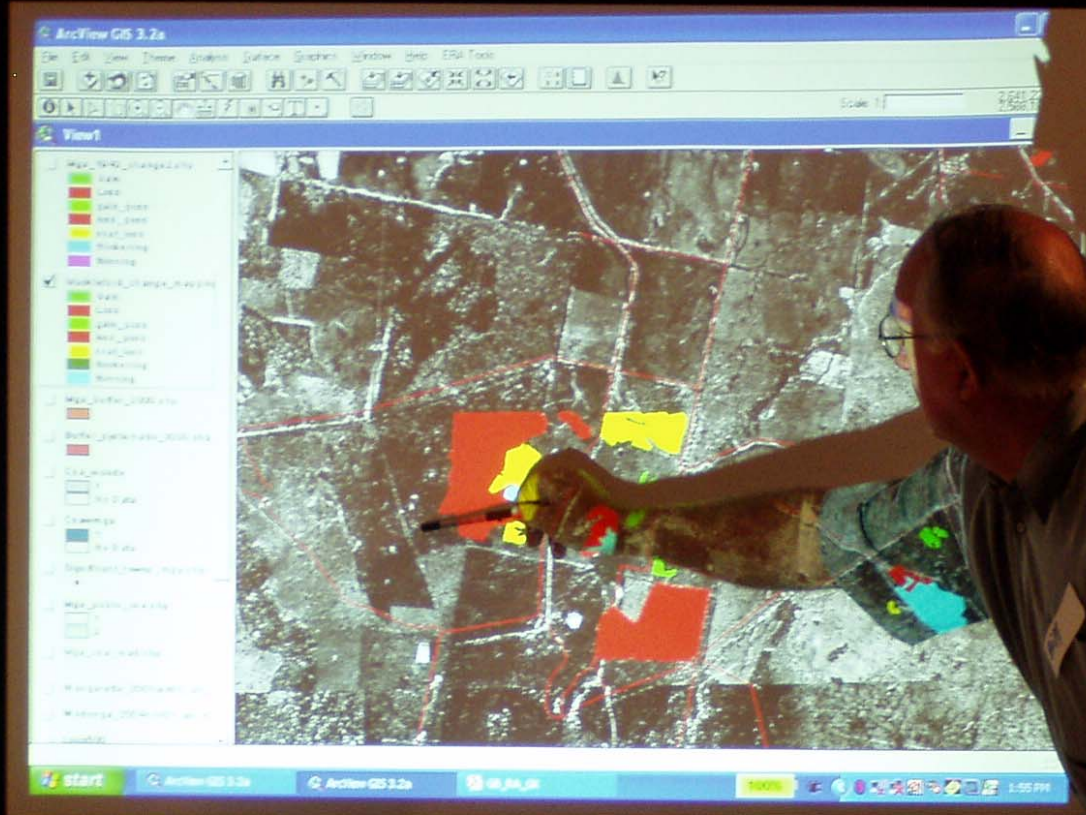


Regional
consultation



GIS modeling

regional vegetation change workshops





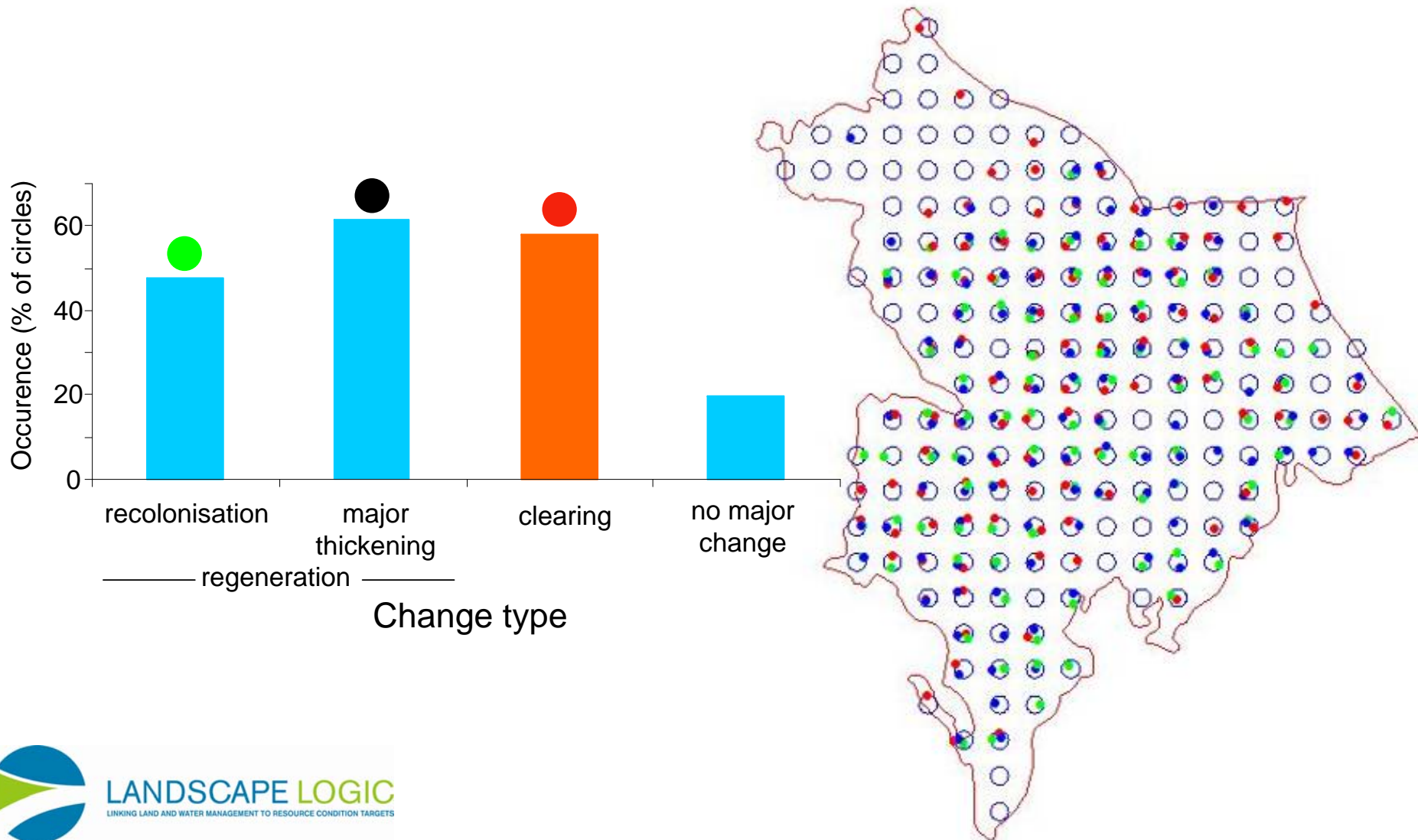
LODGE STANDISH No 60

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Eileen

DELL

A dynamic landscape 1946-2006



Emerging messages



- Digitised historic aerial photos and GIS highly effective
 - elicit valuable and specific data about drivers of change from locals
- An appreciation of long-run land cover change can contribute to enlightened forward planning
- Seeking to influence land management in dynamic landscapes
- We can't anticipate future developments
- Strong, updatable system models needed

Thankyou

- **DSE colleagues**
- **CERF LL partners**
- **AEDA colleagues**
- **DEHWA and CERF scheme**
- **Field and office assistants**