Assessing the values of native vegetation

Three alternative landscape models and their implications for conservation

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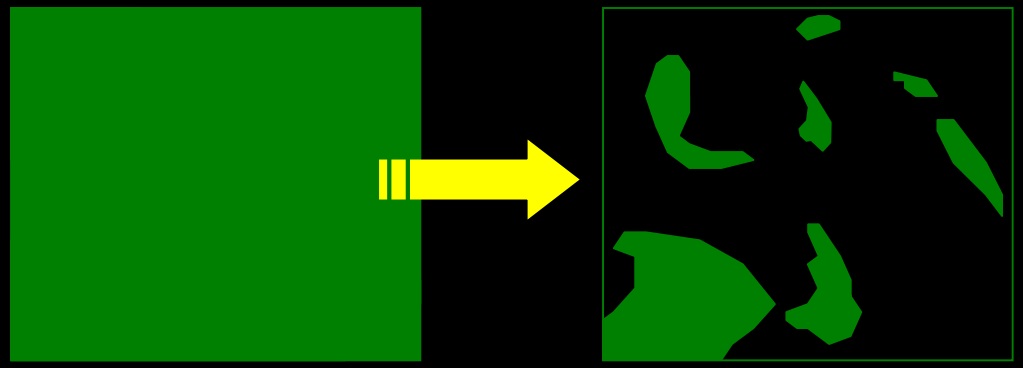
Human activity changes landscapes & biodiversity that inhabits them

- Habitat loss
- Habitat fragmentation
- Changes in habitat structure
- Species declines
- Extinctions
- Biological invasions
- Population explosions
- Changes to soils (moisture, nutrients, structure)
- Changes to landforms

Landscape transformation may be represented in 'models'

- representations of reality
- useful tools for understanding, communicating about & managing landscapes
- implicit in any assessment of bushland values
- crucial in conservation planning and impact assessment

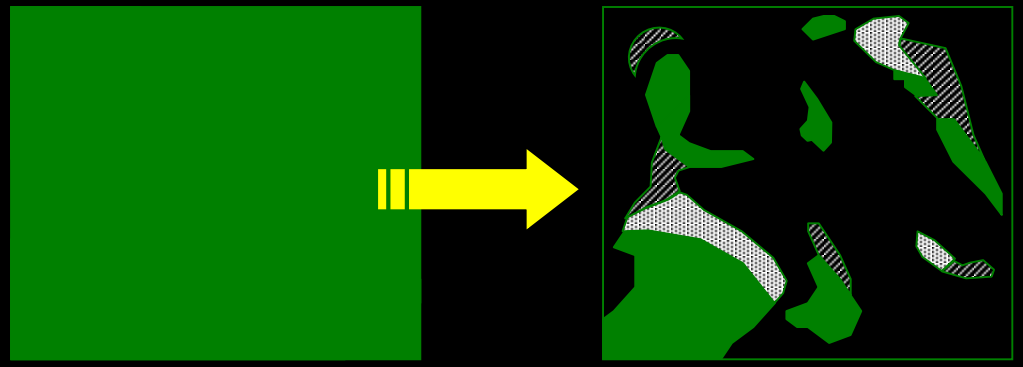
Models of Landscape Transformation



Remnant – *habitat depletion*

- Extant (remnant)
- Extinct (cleared)

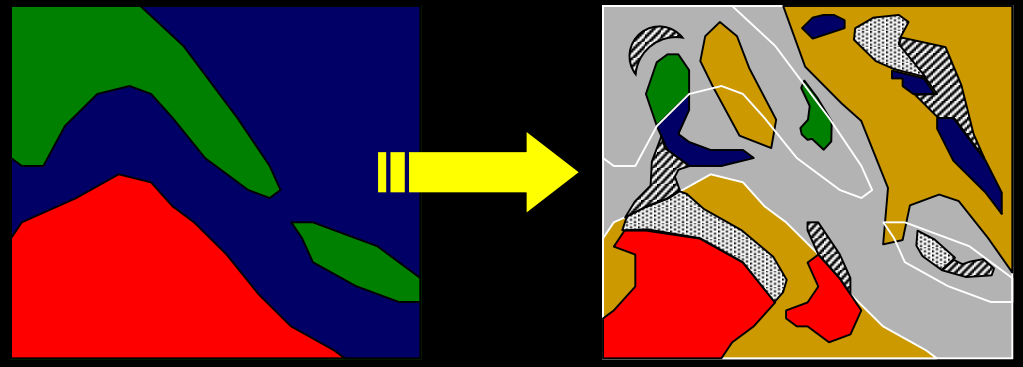
(binary)



Condition – *habitat degradation*

- Good
- Bad
- Ugly
- Gone

(ordinal)



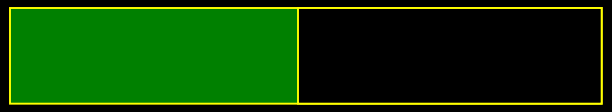
Mosaic – *habitat variegation*

- Type A
- Type B
- Type C
- Type D
- Type E

(multi-facted)

Properties of the models: biodiversity values

Remnant model (binary)

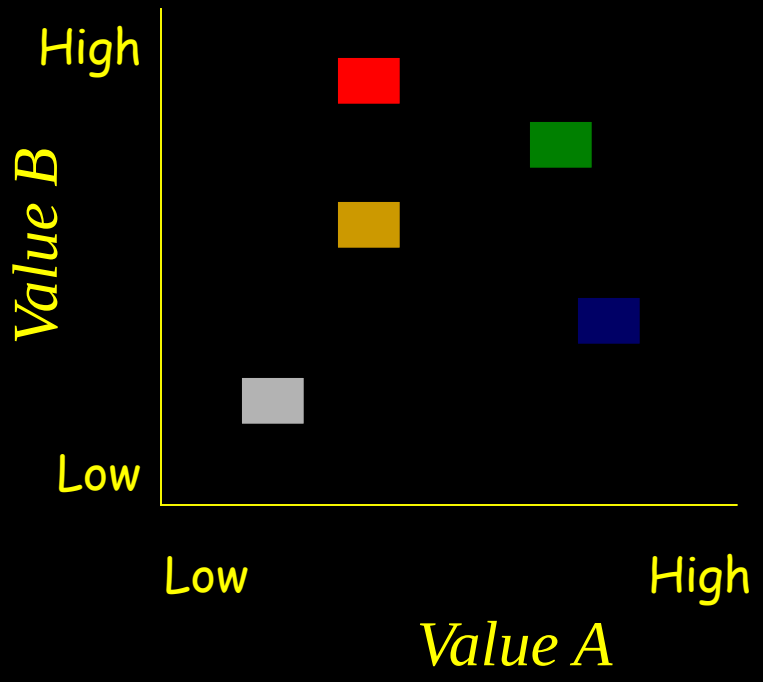


Present Absent

Condition model (ordinal)

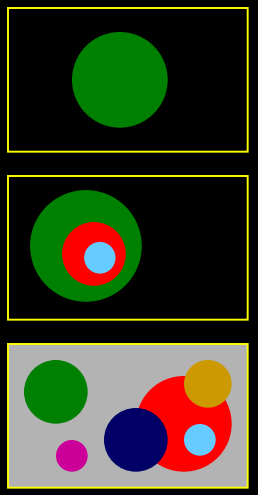
High Medium Low

Mosaic model (multi-faceted)



Testing the models

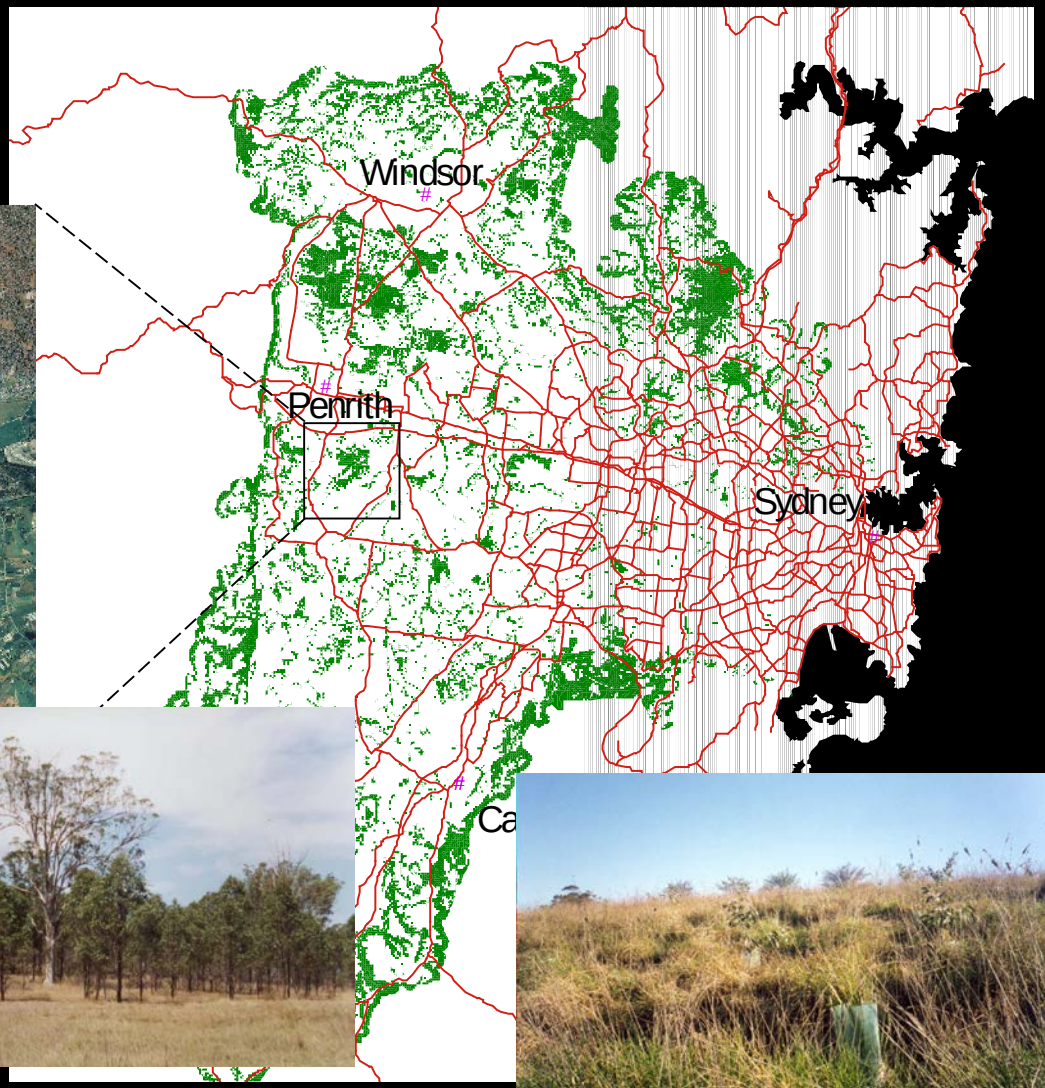
Model	Expected pattern of biodiversity
Remnant	Values present or absent across classes
Condition	Values increasing and nested across classes
Mosaic	Values complementary, varied in magnitude and identity across classes



How to assess biodiversity values?

- Species compositional relationships
- Native/exotic species richness & abundance
- Representation of rare spp
- Abundance of key species
- Structural complexity
- Functional diversity
- Regeneration capacity

Study area: Orchard Hills

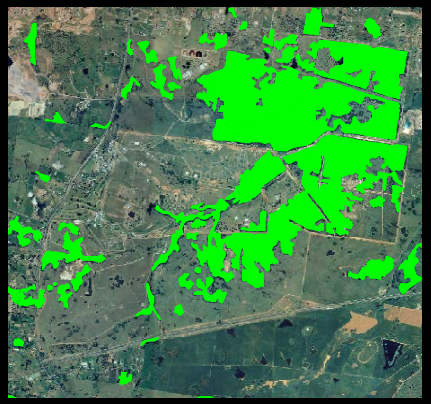


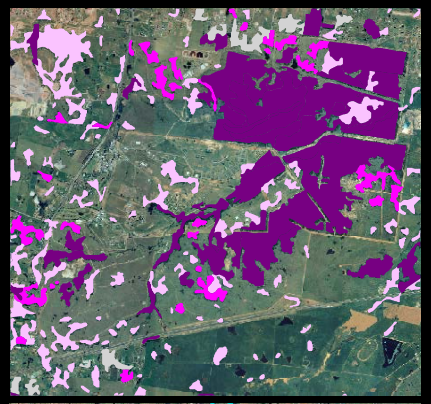
Applying landscape transformation models to Orchard Hills

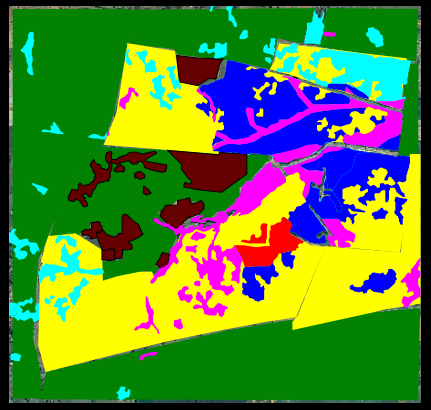
Remnant

Condition

Mosaic







Native Vegetation Cover
- Extant (remnant veg)
- Extinct (cleared land)

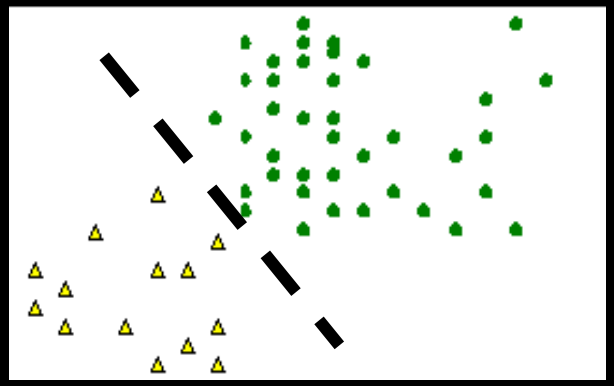
Tree Canopy Condition
- 3 (>10% cover)
- 2 (5-10% cover)
- 1 (scattered trees)
- 0 (cleared land)

Vegetation Patch Types
- SGW (Shale-Gravel WL)
- AW (Alluvial WL)
- SPW (Shale Plains WL)
- SHW (Shale Hills WL)
- UP (Unimproved pasture)
- IP (Improved Pasture)
- UD (Urban Devel't)

Species compositional relationships

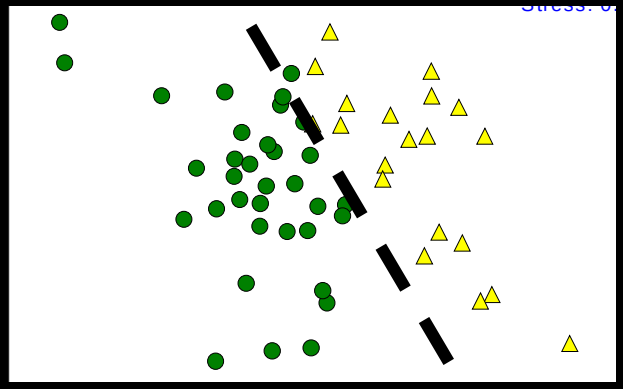
Expected

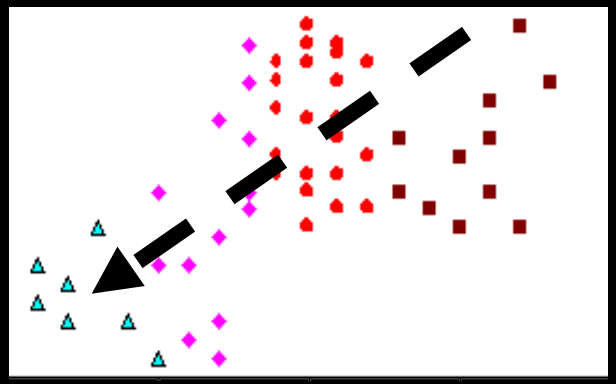
Observed



Remnant

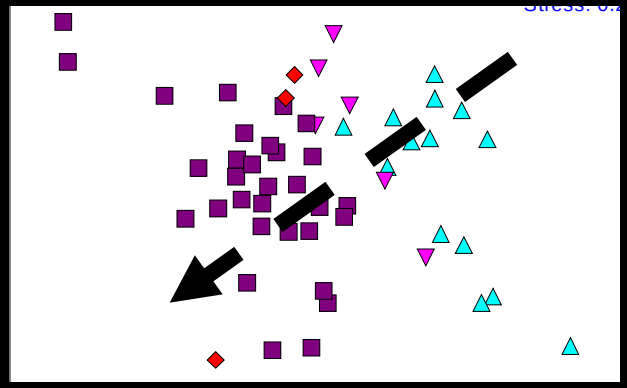
✓

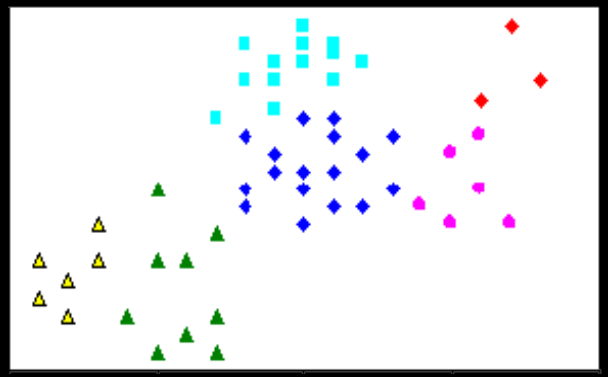




Condition

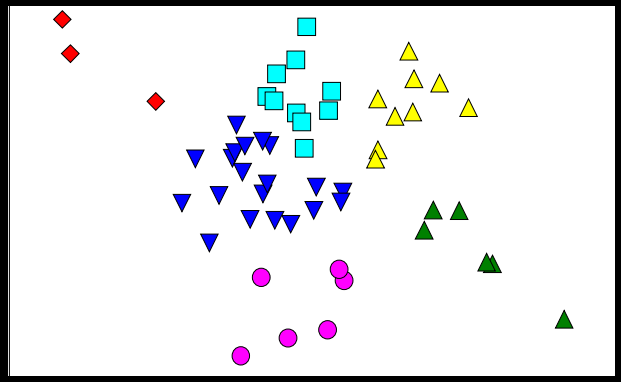
✓





Mosaic

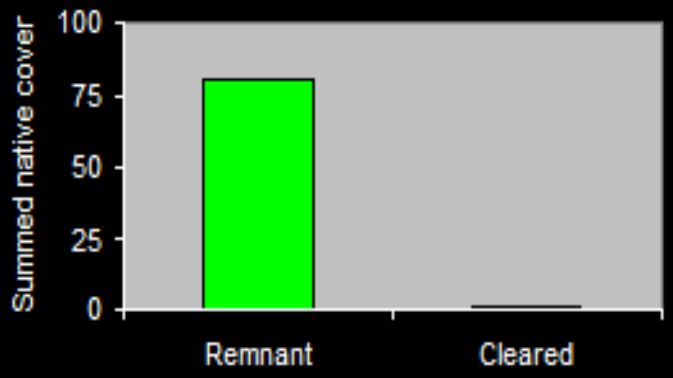
✓



Cover of native plant species

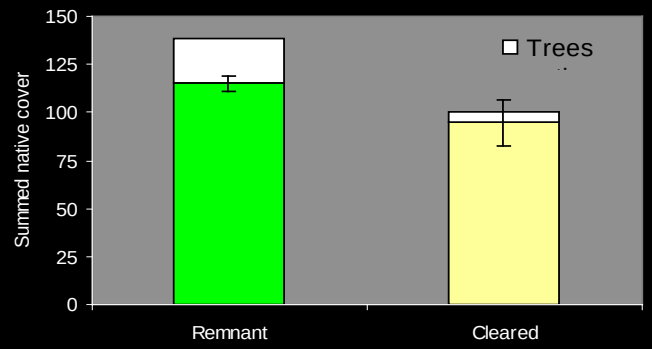
Expected

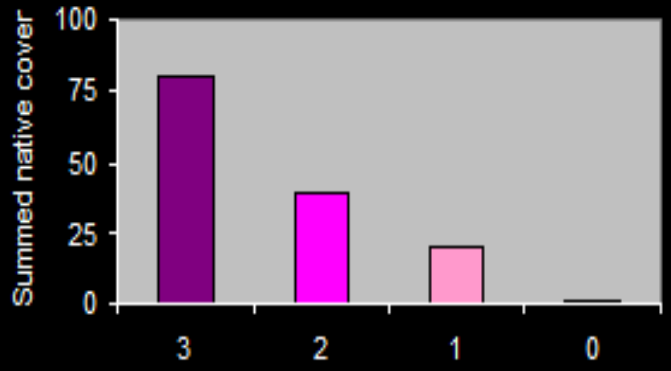
Observed



Remnant

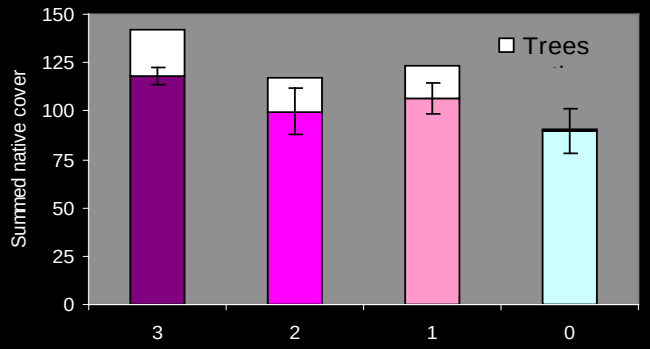
X

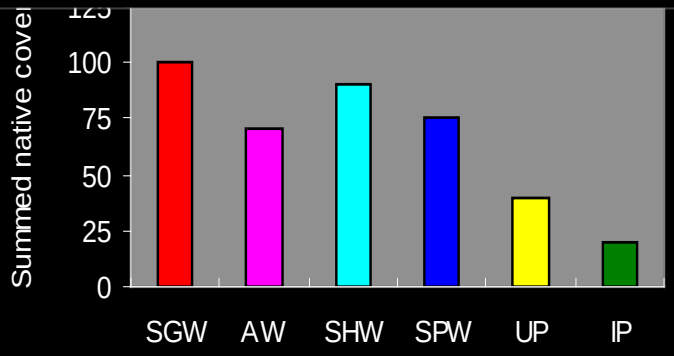




Condition

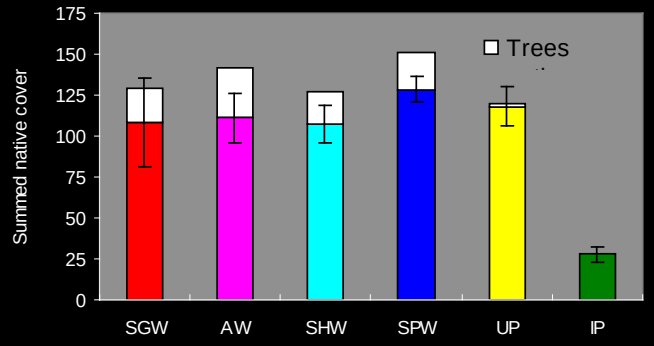
X /✓





Mosaic

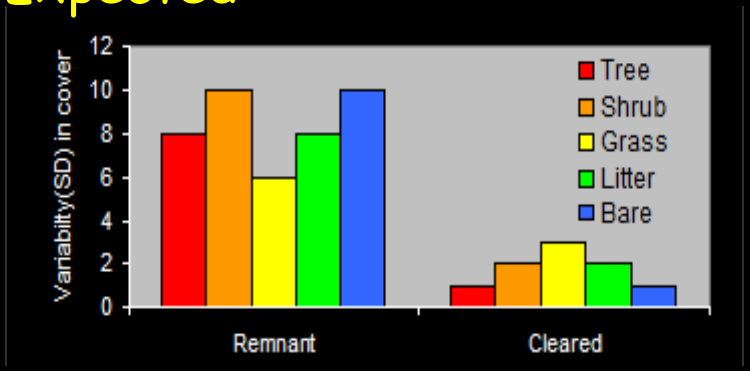
✓



Structural Complexity

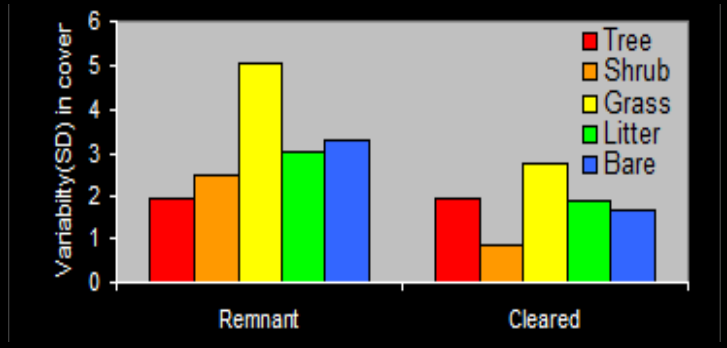
Expected

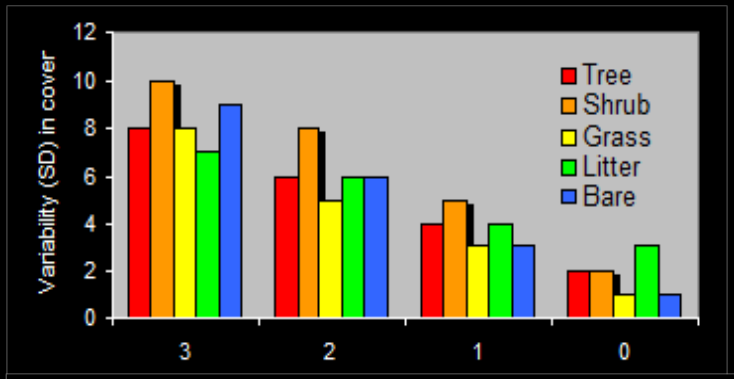
Observed



Remnant

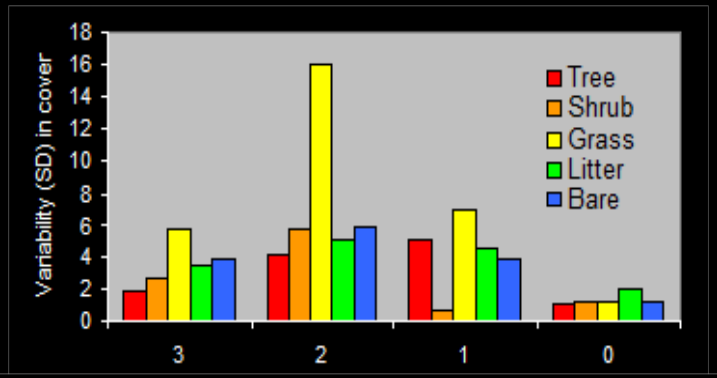
X /✓

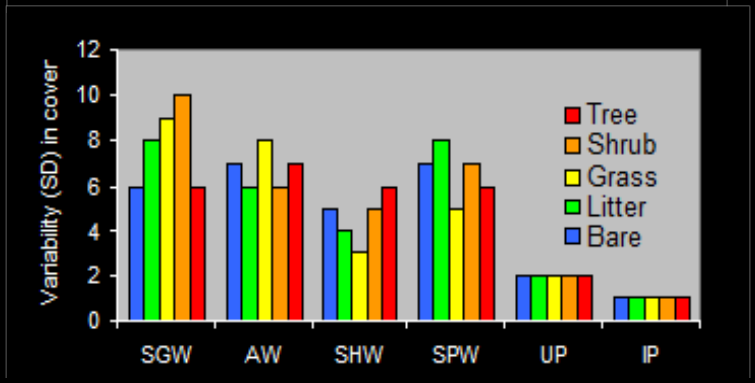




Condition

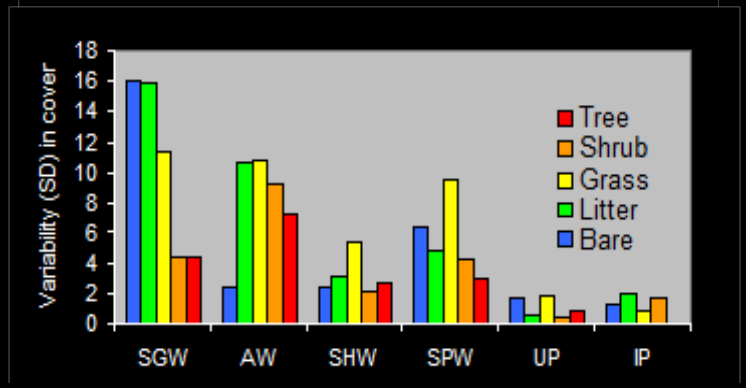
X





Mosaic

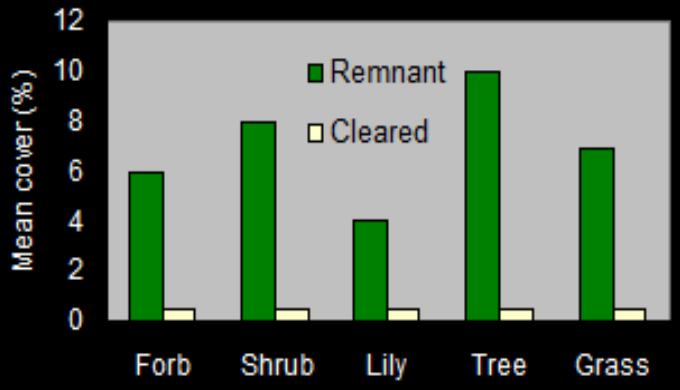
✓



Representation of Key Species

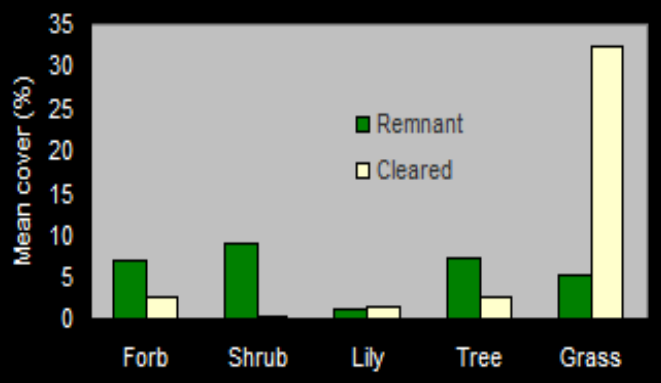
Expected

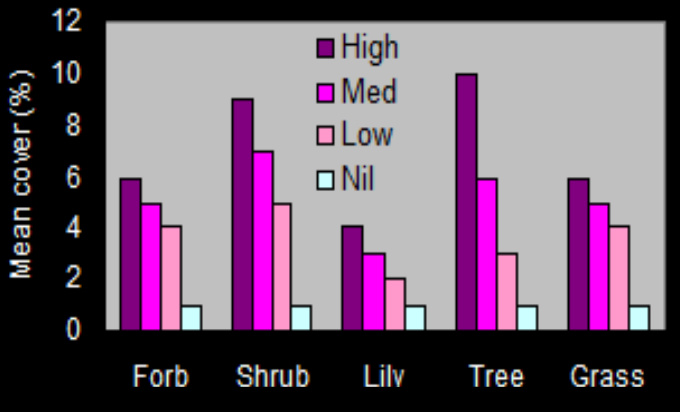
Observed



Remnant

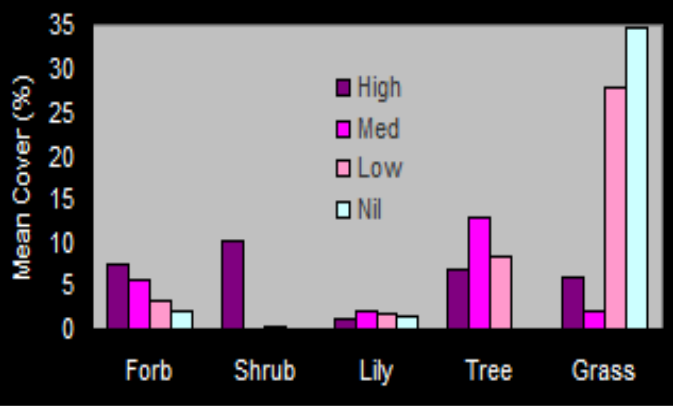
X / ✓

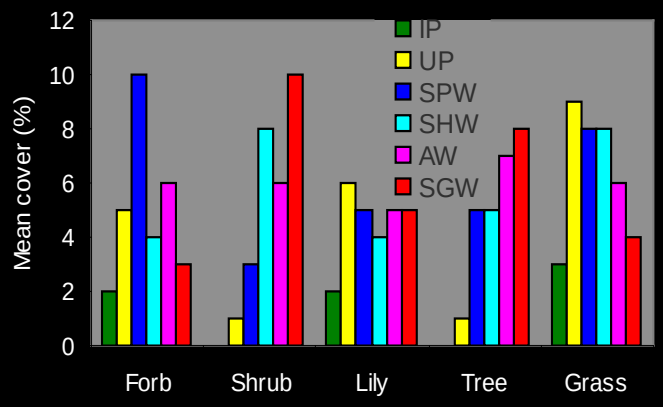




Condition

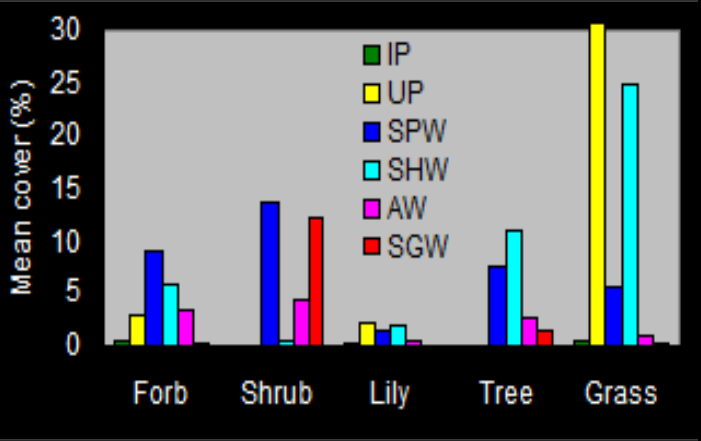
X /✓





Mosaic

✓



Overview

- There were biodiversity values on some types of "cleared land" (e.g. native species richness)
- Some values were unique to "cleared land" (e.g. representation of key spp)
- Some values were unique to "poor-condition" sites (e.g. high structural complexity, some key spp.)
- Some "poor-condition" sites had higher values than "good-" or "moderate-condition" sites for some types of values (e.g. weediness)
- Habitat patch types differed in representation of some values (spp composition) but were similar for others (native cover)
- Some habitat patch types had low value for all value types examined (e.g improved pasture)

Model scorecard

	Remnant	Condition	Mosaic
Composition	✓	✓	✓
Native cover	X	X /✓	✓
Native spp.	X	X /✓	✓
Rarity representation	X	✓	✓
Structural complexity	X /✓	X	✓
Key species	X /✓	X /✓	✓
Weediness	X	X /✓	✓

Model performance ~ f(model properties, application methods)
Treatment of "cleared land" is crucial

Applications methods for the models

Remnants identified by

- API/image classification to ID remnants
- Field inspection

Condition assessed by

- API of canopy cover classes
- Site-based indices (Hab Ha, biometric)

Mosaic patch types identified by

- Various methods of survey, analysis & inference

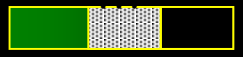
Better methods -> better model performance
(gains potentially greater for Condition & Mosaic than Remnant)

Some fundamental model properties

Remnant

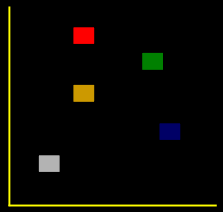
- assumes non-remnant sites have negligible biodiversity values
- best conservation outcomes from max. retention of remnant sites (no effect of non-remnant losses)

Condition



- assumes good condition sites always more/higher values than poor condition sites
- best conservation outcomes from max. retention of good condition sites (poor condition sites contribute little)

Mosaic

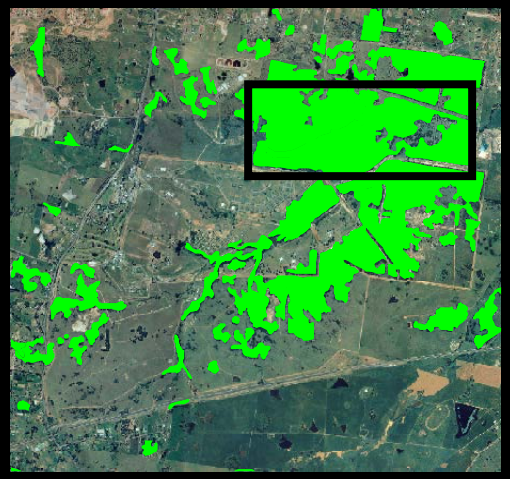


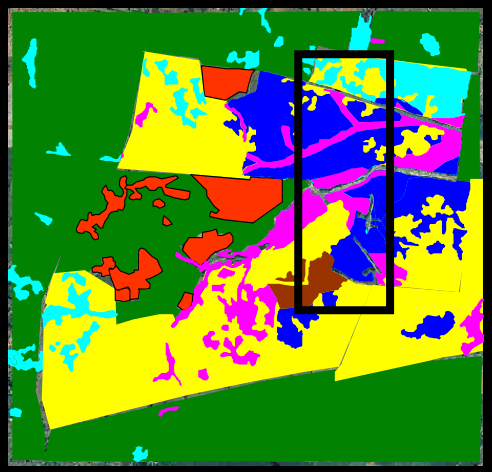
- assumes different patch types have different (complementary) values
- best conservation outcomes from retention of values in all patch types

Models differ in treatment of "cleared land"

Implications for planning and management

- Landscape models underpin all planning & management systems
- The choice of model influences how biodiversity is assessed & the outcomes of decisions





The choice of model matters!

	Which models are most commonly employed in planning & management?	Which models represent biodiversity most effectively?
Remnant	Usually	Fair
Condition	Sometimes	Limited
Mosaic	Rarely	Best

The best kind of landscape models are not commonly used in planning and management

Conclusions

- Better biodiversity outcomes by using better landscape models in planning & management – *explicit choices needed!*
- Choice of methods to implement a model also influences biodiversity outcomes
- Models differ crucially in their treatment of "cleared land", its heterogeneity & values - *tree cover ≠ biodiversity*
- Surveys & maps need to address all patch types in landscapes to enable more effective assessment of biodiversity values