Building capability in monitoring & evaluating the outcomes of NRM interventions by engaging Citizen Science

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Training courses

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<table>
<thead>
<tr>
<th>Activity</th>
<th>Volunteers (n)</th>
<th>Volunteer Field Days (person/days)</th>
<th>Monitoring Observation Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ornithology of the Gondwana Link training course</td>
<td>30</td>
<td>162</td>
<td></td>
</tr>
<tr>
<td>Study site set-up week</td>
<td>8</td>
<td>35</td>
<td></td>
</tr>
<tr>
<td>Ant identification assistance</td>
<td>1</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Monitoring of study sites using hybrid standard search method</td>
<td>43</td>
<td>166</td>
<td>173.3</td>
</tr>
</tbody>
</table>
Ecosystem development in Gondwana Link revegetation
Revegetation treatments

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Making sure the data is comparable and the results are repeatable.

In science we have:

**Type 1 Errors** – When something was recorded as present when it was absent eg. An identification error.

**Type 2 Errors** – When something was missed when it was actually present. eg. Inadequate sample area or sampling time.

**Modelling** – Where you can make both Type 1 and Type 2 errors at the same time and not give a shit!
Bush bird Census methods

- Transect Counts
- BirdLife ‘Atlas’ Counts
- Bird Minutes
- Standard Search Method
- Hybrid Standard Search Method
Using Bush-bird communities to monitor ecosystem development in Gondwana Link Revegetation

- Utilized a ‘hybrid standard search’ method to sample bush-birds.
- Involved managed teams of volunteer bird-observers.
- Sampled 14 Gondwana Link revegetation treatments established between 1985 and 2014 and 8 patches of remnant vegetation (reference sites) proximal to these areas.
- Sites were located in the fragmented forest to ranges, between the ranges and Fitz-Stirling segments of the Gondwana Link.
- Recorded 99 bird species (excluding water-birds) during the observation periods from late September to late November.
Location of monitoring sites
Available data on each revegetation treatment site has been requested from the land managers and collated including:

- site location / patch boundaries
- establishment / treatment dates
- treatment methods
- Seeding / planting mixes
- Subsequent seedling emergence data (where available)
- Vegetation monitoring data (where available)
- Fauna monitoring data (where available)

* Additional site profile data was collected during the current project including a 50m line intercept vegetation transect and ant community sampling at each site.
Sampling intensity required to monitor NRM outcomes

Mean percentage of bird species recorded at sites (n=22) vs. Accumulated Observation Time (hours)
Trends in bird community diversity in revegetation treatments

Bird Diversity Index


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Bird biodiversity & improvements in revegetation technology

![Graph showing the relationship between bird diversity index (d) and treatment year. The graph includes data points for CNV, CGV, PPGV, PYYV, TCV, NWV, and MN12, with a trend line indicating an increase in bird diversity index over time.]
Similarity analysis

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Similarity analysis – sites codes

[Diagram showing a dendrogram with sites codes such as MVR, WMV, TCR, TCV, CHV, PPR, PPyV, NWR, CGV, CNR, CNV, NWV, NMV, MNR, MNR2, CGR, MN12, PPGV, PPJV, MN13, MN14, YWV.]
Monitoring scales for functional groups analysis

1. Bio-regional
2. Sub regional meta-community
3. Local, landscape scale bird meta-community (appropriate for NRM monitoring based on proximal reference communities)
### Functional groups

| FG1: | resident, old growth, forest, woodland or mallee. |
| FG2: | resident understorey and or canopy insectivores. |
| FG3: | resident, ground foraging dense heath or thicket. |
| FG4: | Opportunist, forest, woodland, parkland or shrubland. |
| FG5: | Edges, grassland, sedgeland, samphire or open heath. |
| FG6: | Aerial foraging insectivores. |
| FG7: | Eucalypt leaf gleaners, lerp / insect exudate foragers. |
| FG8: | Partly (some individuals) resident honeyeaters with mobile flocks. |
| FG9: | Nectivorous resource nomads |
| FG10: | Cuckoos, nest parasite insectivores |
Bush bird functional groups – Mondjebup cluster

![Bar chart showing the percentage of species for different functional groups across different sites.](chart.png)

- FG1
- FG2
- FG3
- FG4
- FG5
- FG6
- FG7
- FG8
- FG9
- FG10

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Cranbrook cluster

Percentage of species

<table>
<thead>
<tr>
<th>FG1</th>
<th>FG2</th>
<th>FG3</th>
<th>FG4</th>
<th>FG5</th>
<th>FG6</th>
<th>FG7</th>
<th>FG8</th>
<th>FG9</th>
<th>FG10</th>
</tr>
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</tbody>
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Peniup cluster

Percentage of species

PPR  PPJV  PPGV  PPyV

FG1  FG2  FG3  FG4  FG5  FG6  FG7  FG8  FG9  FG10

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Cherininup cluster

Percentage of species

CNR

CNV

FG1
FG2
FG3
FG4
FG5
FG6
FG7
FG8
FG9
FG10

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A facility will be available on the Gondwana Link website to for observers to submit and access the bird community monitoring data set and related information.

The facility will provide:

- all available site data or meta-data,
- instructions on using the hybrid standard search method,
- an on-line submission form for bird and site data following the project methodology,
- Details of the results of previous surveys including time/effort plots and bird functional group profiles from previous surveys.
Can we use citizen-science based bird community monitoring to monitor NRM interventions?

Yes we can if:

1. We manage Type 1 errors by training observers and rotating individuals through study sites during surveys.
2. Manage Type 2 errors by ensuring observation effort is sufficient to get 95% of the species in a treatment patch over the survey period.
3. We use coordinated teams of observers in concentrated campaigns.
4. Develop and nurture a citizen-science base associated Gondwana Link.
Future monitoring in the Gondwana and vulture monitoring in the Gondwana Link

- Need to develop consistent indicators of patch development from revegetation treatments including measures of native plant species diversity, vertical structure (strata), spatial heterogeneity and accumulated biomass. Remote sensing methods (e.g., using drones) should be evaluated.

- Need to explore bush-bird community monitoring as an approach to assessing the effectiveness of other management treatments such as feral animal control and the targeted use of fire.

- Need to continue to build a dedicated citizen-science capacity for Gondwana Link by facilitating the development of attractive social network for volunteers (e.g., a club).
Acknowledgements

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- The work was only possible with the contribution of around 60 volunteer bird observers.

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