Grassy Woodland Restoration

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WHY NATIVE GRASSY RESTORATION IS COMPATIBLE WITH MINERAL SANDS EXTRACTION

➢ Presents the opportunity to clearly define vision and goals for returning complex native flora to parts of the post-mined landscape.
➢ Resource companies can develop budgets that properly support the planning and implementation of restoration works.
➢ Projects are conducted over timelines and within rehab footprints that provide realistic opportunities for careful and considered restoration action and adaptive management.
➢ Mineral sands extraction offers a unique potential to carefully manipulate the post-mined landform and soil characteristics so that the seeding/planting surface is appropriate for restoration success (i.e. nutrient characteristics, weed seed banks, water holding capacity).
➢ Mining operations have systems, land access (e.g. for SPAs), equipment, infrastructure and people required to undertake complex and long-term land rehabilitation.
➢ Mining operations are obliged to work in close association with regulators, local agencies and communities ensuring inclusion for the broader community and a common interest and commitment to outcomes.
## Rehab Zones

<table>
<thead>
<tr>
<th>Zone</th>
<th>% Total</th>
<th>Final land-use</th>
<th>Species composition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plateau grazing</td>
<td>52%</td>
<td>Grazing pasture</td>
<td>80-90% improved pasture, 10-20% native grasses</td>
</tr>
<tr>
<td>Plateau edges</td>
<td>9%</td>
<td>Limited grazing</td>
<td>exotic pasture and native grass plus native trees and shrubs</td>
</tr>
<tr>
<td>Valley slopes</td>
<td>15%</td>
<td>Grazing exclusion for stability</td>
<td>exotic pasture and native grass plus native trees and shrubs</td>
</tr>
<tr>
<td>Valley channels</td>
<td>2%</td>
<td>Riparian drainage lines. Grazing exclusion for stability</td>
<td>Native riparian trees, shrubs and ground layer species</td>
</tr>
<tr>
<td>Grassy Woodland</td>
<td>20%</td>
<td>Native conservation area</td>
<td>Composite native grassy woodland</td>
</tr>
<tr>
<td>Road verge</td>
<td>2%</td>
<td>Functional, low maintenance, high amenity native ground layer vegetation</td>
<td>Low growing native grasses and high amenity native wildflowers</td>
</tr>
</tbody>
</table>
Rehab Zones
TEMPERATE GRASSY COMMUNITIES

At the time of European settlement, native grasslands and grassy woodlands were widespread from southern Queensland to Victoria on a footprint now termed ‘the sheep-wheat belt.’ Because of their arable soils and open structure, they were prime targets for modified exotic pastures and cropping. They now exist as less than 5% of their original extent, occurring primarily on locations not utilized for agriculture.
NATIVE GRASSY WOODLANDS - STRUCTURE
MAIN COMPONENTS FOR GRASSY RESTORATION

- Proper planning, resourcing and timelines.
- Access to appropriate species diversity (primarily ground layer).
- Access to seed in appropriate quantities and quality (wild or SPA).
- Appropriate site preparation (weeds, soil nutrients, seed bed).
- Appropriate seeding technology.
- Appropriate timing of works.
- Appropriate maintenance regime.
GROWING NATIVE SEED: SEED PRODUCTION

• Seed Production utilizes well-established horticultural techniques to germinate and grow plants for seed.
• Many species produce large amounts of seed in production.
• Numerous genetic individuals can be grown in small areas.
• SPAs reduce the impact of repeated collections on wild populations.
• SPAs allows a high level of management control over variables that normally limit plant growth and seed production in the wild.
FIELD SCALE SEED PRODUCTION
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Example Restorations
CAMDEN – ELIZABETH MACARTHUR RESERVE

2016 AFRICAN LOVE GRASS DOMINATED
2016 POST-SCALP
CAMDEN – ELIZABETH MACARTHUR RESERVE

2018 Native Grassy Sward
2013
African Olive Dominated
NARELLAN – PARROTS FARM RESERVE

2016 Post-Olive Removal
NARELLAN – PARROTS FARM RESERVE

2016 Direct Seeding
NARELLAN – PARROTS FARM RESERVE

2017 Native Grassy Sward
POTENTIAL BENEFITS
RE-ESTABLISHING RARE AND BEAUTIFUL SPECIES
PROVIDING HABITAT FOR ANIMALS
WORKING WITH COMMUNITY
Thank you

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