

THE LANDSCAPE BENEFITS OF ECOLOGICAL MINE REHABILITATION

A Hunter Valley Experience

- The premise for the presentation
- The unique Hunter Valley setting
- Snapshot of key ecological rehabilitation – timeline with examples of key steps over the last 20-30 years
- The convergence of requirements, expectations and technology leads to opportunities that can be explored and realised
- The benefits are extensive
- The ‘take-away’ messages

Impact avoidance, mitigation and offsetting are critical steps to prevent or minimise impacts, and to counterbalance project impacts

The long-term viability of much of the Hunter's biodiversity requires continued and renewed focus on **co-ordinated, landscape-scale ecological rehabilitation**, aligned with regional land use and offset planning

Every reasonable effort should be made to align policy with community and environmental expectations, and to **appropriately incentivise and reward** mines to focus on implementing long-term ecological rehabilitation strategies because:

- The Hunter Valley environment is worth the effort of ecological restoration
- A unique situation is present in the Hunter to stimulate and support relevant research and investment
- The legislative, economic, social and environmental settings and expectations are right
- There is an appetite for long-term strategic planning, including improving certainty for mining proponents, government and the community

Ecological Mine Rehabilitation – this ain't what we're talkin' 'bout

Landscape Benefits of Ecological Mine Rehabilitation

The old approaches are no longer acceptable



Mono-specific stands



Introduced grasses dominating, not good for biodiversity or agriculture

Ecological Mine Rehabilitation – this is more like it

Landscape Benefits of
Ecological Mine Rehabilitation

New approaches focus on diversity, complexity, function, resilience and meeting threatened ecological community diagnostic features



Developing complexity from the outset



High diversity of species,
structures, surfaces, textures etc

- Improved focus on species diversity, structural diversity
- Translocation research and investment
- Research trials for growth media
- Improved landform design
- Focus on ecosystem function, recruitment and resilience
- Improved monitoring techniques, efficiencies
- Sharing knowledge and considering its application across the regional scale



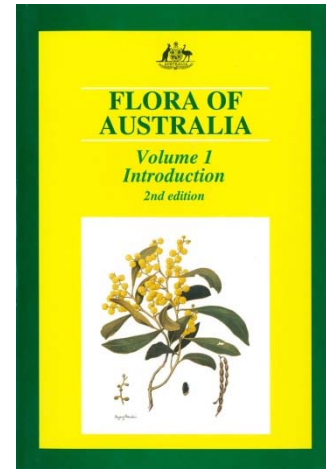
Why Should we Invest in a Landscape-scale Approach?

- History of practical trials/research/investment in Hunter mine rehabilitation
- The **unique setting** afforded by the Hunter
- Numerous threatened ecological communities present
- Assessments of older rehabilitation show that **achieving TEC requirements is more than possible**
- Convergence of policy/legislation, community perceptions and environmental expectations
- Increasingly savvy/adept mining industry and practitioners
- **Incentives are now available** to value ecological rehabilitation on the mining proponents' balance sheets, however there is **plenty of room for these to be ramped up**
- **An essential ingredient** to provide confident future for the Hunter's biodiversity

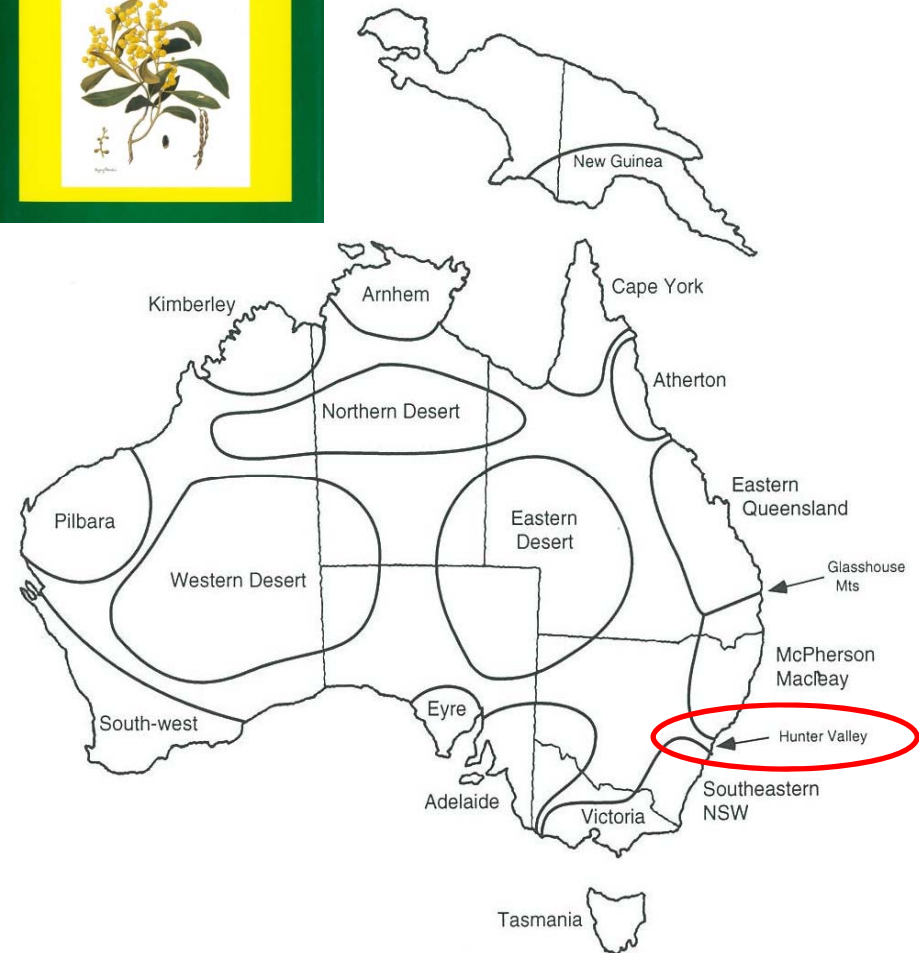
Hunter Valley Biogeography – Why it is Unique

Landscape Benefits of
Ecological Mine Rehabilitation

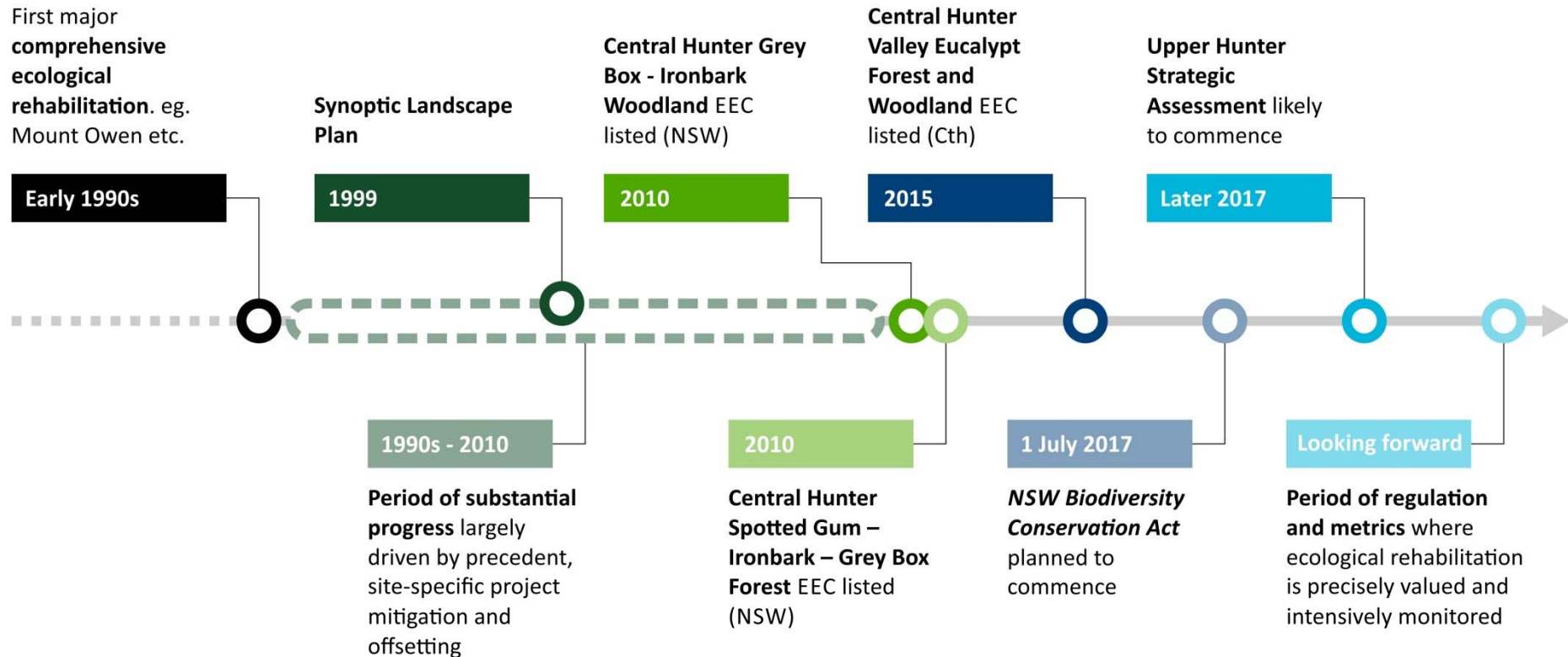
- Wide coastal valley composed of ancient, weathered rocks & coal measures
- **Represents distinct north-south barrier, but significant east-west corridor**
- Hunter supports very significant numbers of inland flora & fauna species; represents major break in N-S distribution for others
- Significant permeability across the corridor/barrier enabled genetic exchange across the major rivers
- Current situation limits such exchange
- Large number of threatened species & ecological communities



Source: Crisp, West and Linder 1999
Biogeography of the
Terrestrial Flora
p.337 in *Flora of
Australia* Vol. 1



Generalised Timeline



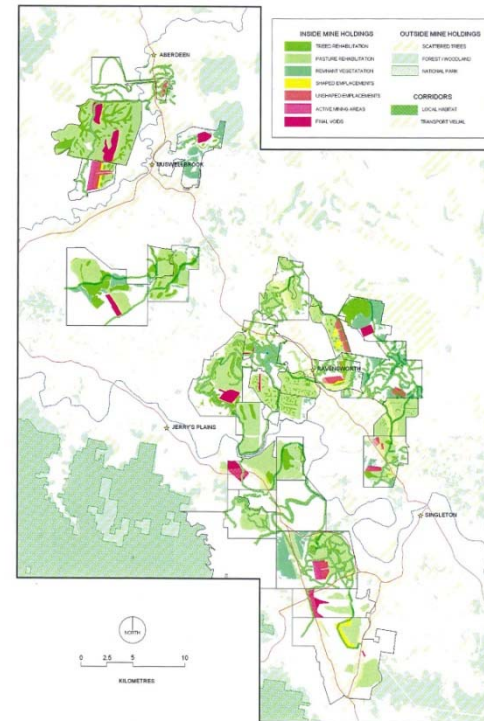
Simplified Chronology of

Key Aspects of Ecological Rehabilitation in the Hunter Valley

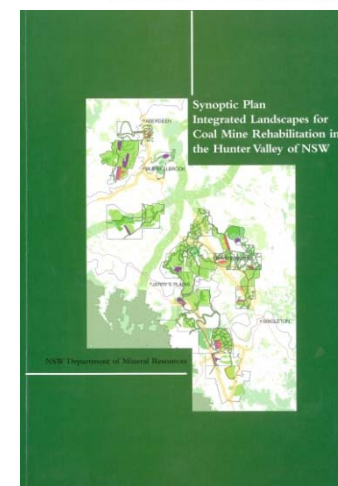
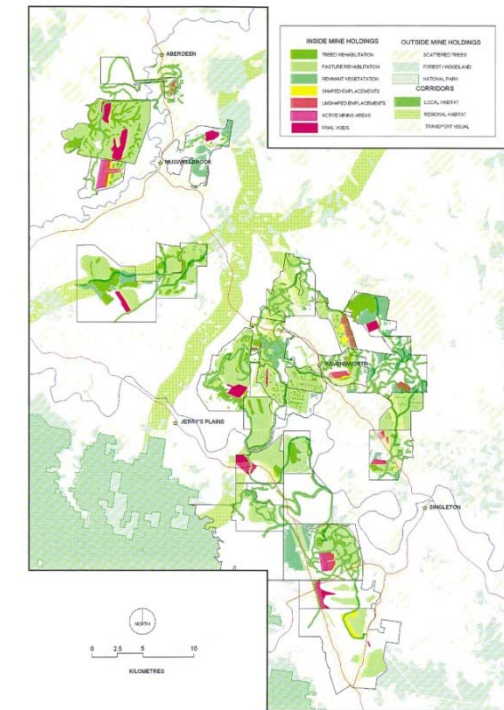
Mine Synoptic Plan

- Published in 1999
- **First comprehensive attempt to conceptualise the opportunity afforded by mine rehabilitation**
- Based on certain universal principles
- A good step towards regional planning of ecological rehabilitation corridors
- Drove greater focus on functional corridors, coordinated ecological rehab, and offsetting
- Uncertainty around incentives, benefits and requirements
- Provided a rudder for a decade or so, but progression of mining and rehab now beyond this plan

LINKING OF PROPOSED REHABILITATION AT 2020 WITH LOCAL CORRIDORS



REGIONAL LANDSCAPE INTEGRATION AT 2020

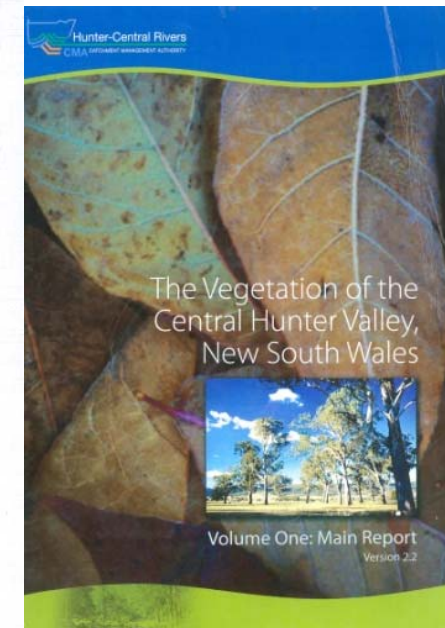
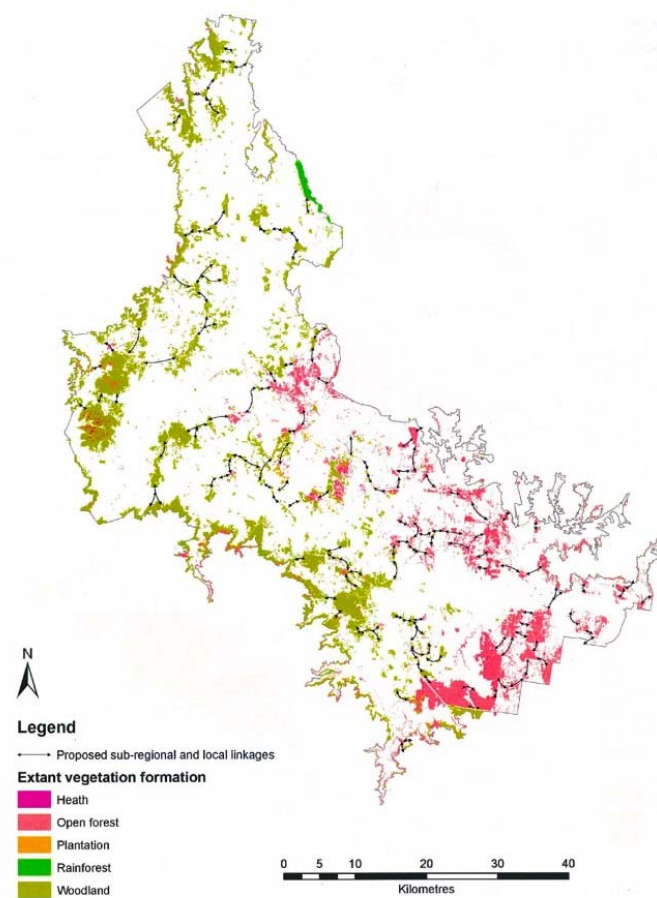
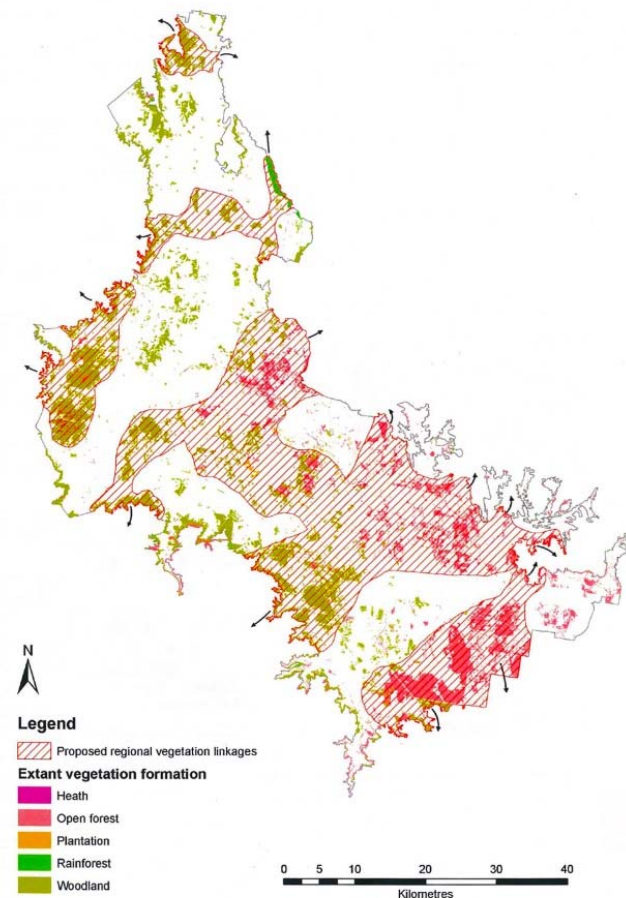


Source: NSW Department of
Mineral Resources 1999

The Vegetation of the Central Hunter Valley

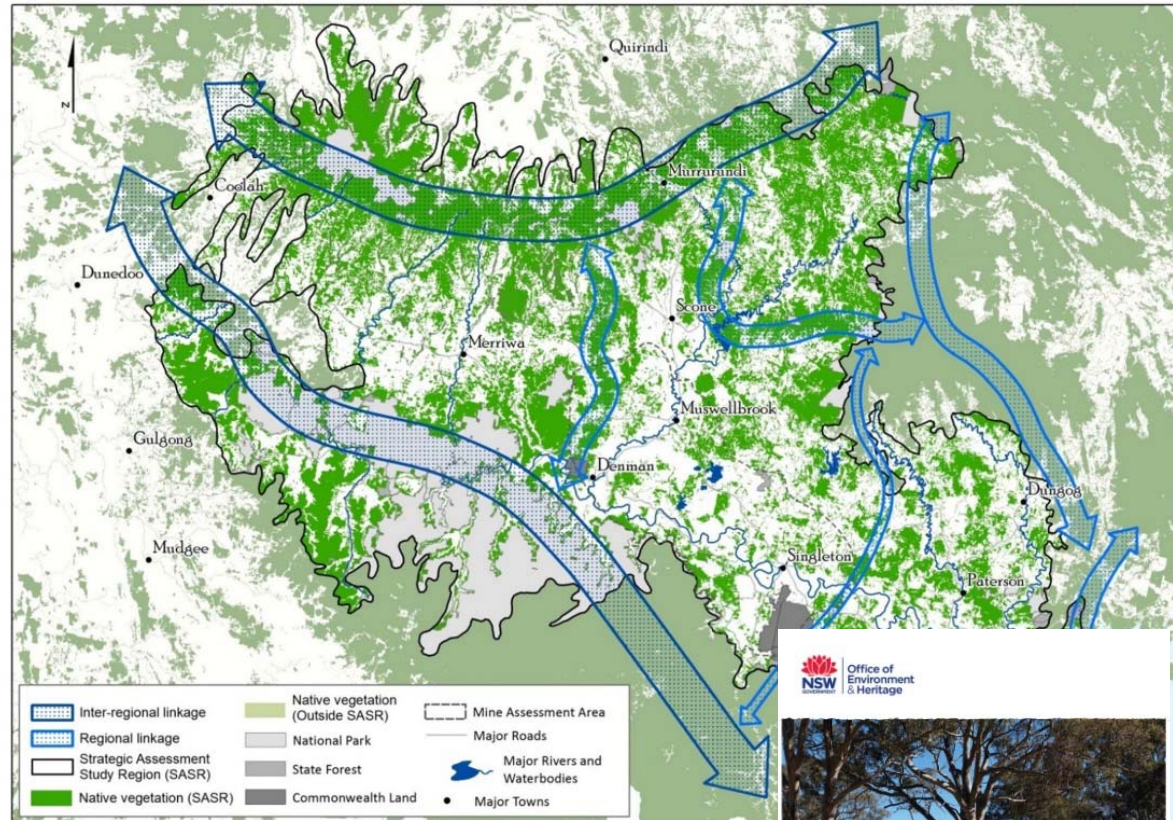
Landscape Benefits of
Ecological Mine Rehabilitation

- Survey, classification and mapping completed in 2002, published 2006
- Identified vegetation types, area cleared, areas under threat
- Proposed local and regional scale corridor linkages/opportunities



Source: Peake 2006 *The
Vegetation of the Central
Hunter Valley*

- New strategy and rule-set
- Hunter-specific
- Seeks strategic approach to offsetting
- Provides guidance on ecological rehabilitation requirements
- Credit-based value assessments – **some value afforded for landscape linkages**

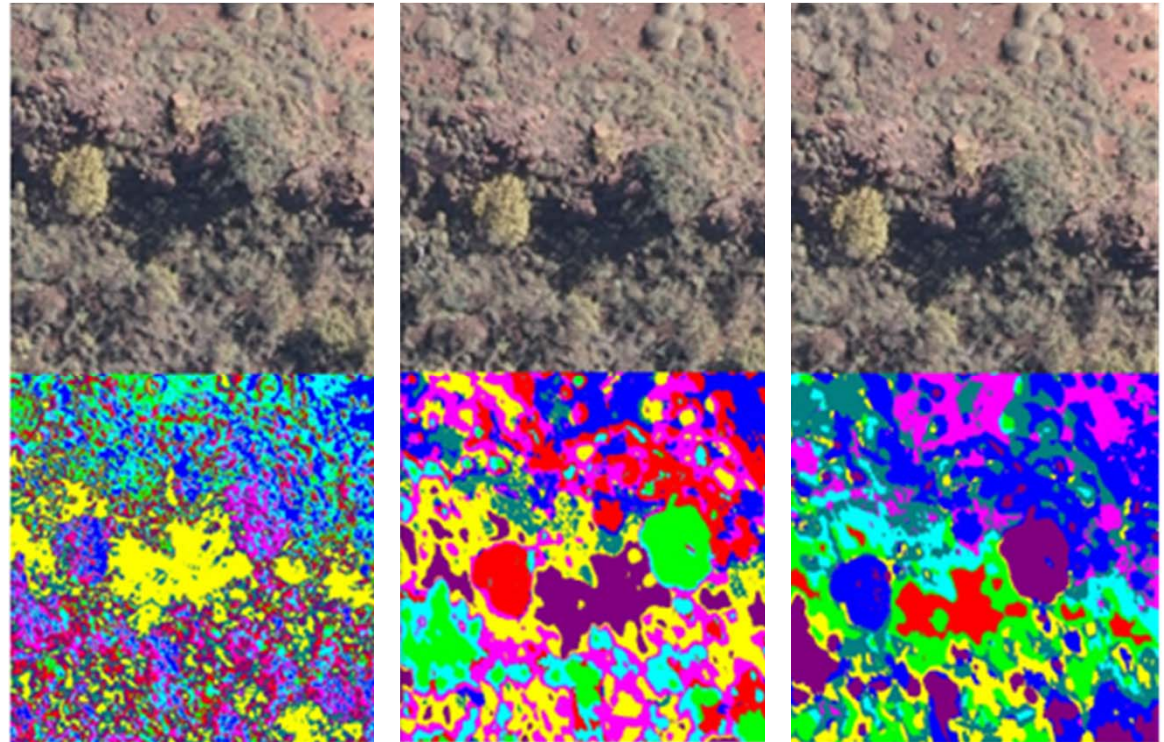


Conceptual habitat fragmentation and connectivity in the study region



Source: UHSA Draft Plan (2017) – reproduced with permission from OEH

- Determining diagnostic characteristics traditionally requires extensive on-ground surveys
- Using LiDAR with advanced processing techniques, the structure and basic composition of vegetation can be **assessed over large areas quickly and accurately**



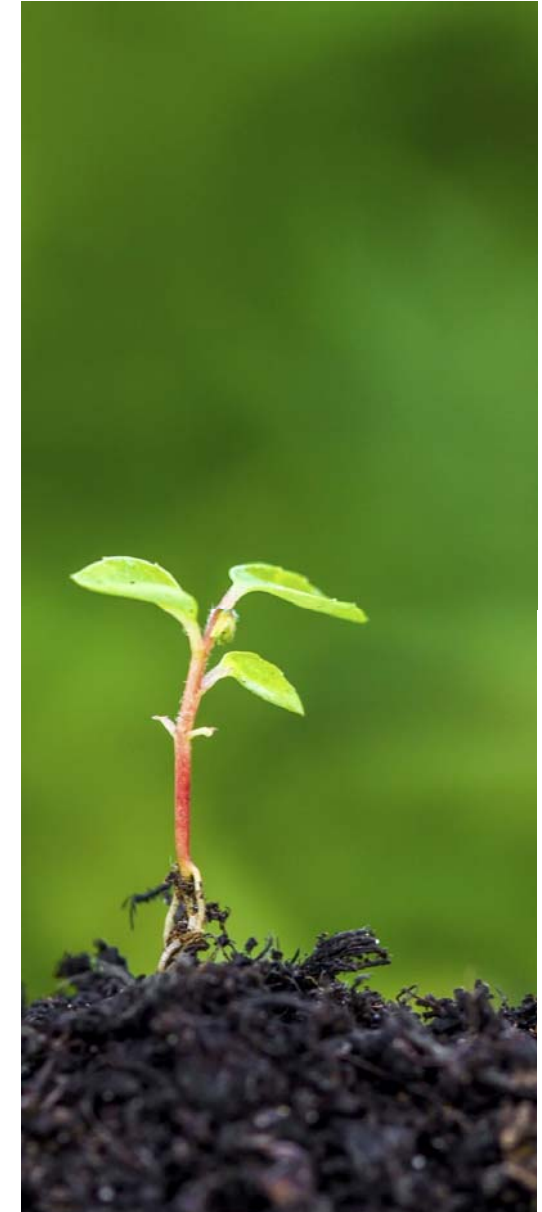
- This can allow for **more targeted on-ground surveys** reducing time spent in field and provide **more accurate delineation of community boundaries**
- New approaches, with advanced analytics, provides for improved data capture, community and structural classification, and emerging **species detection and classification capacity**

So, What Are the Benefits of Landscape-scale Planning?

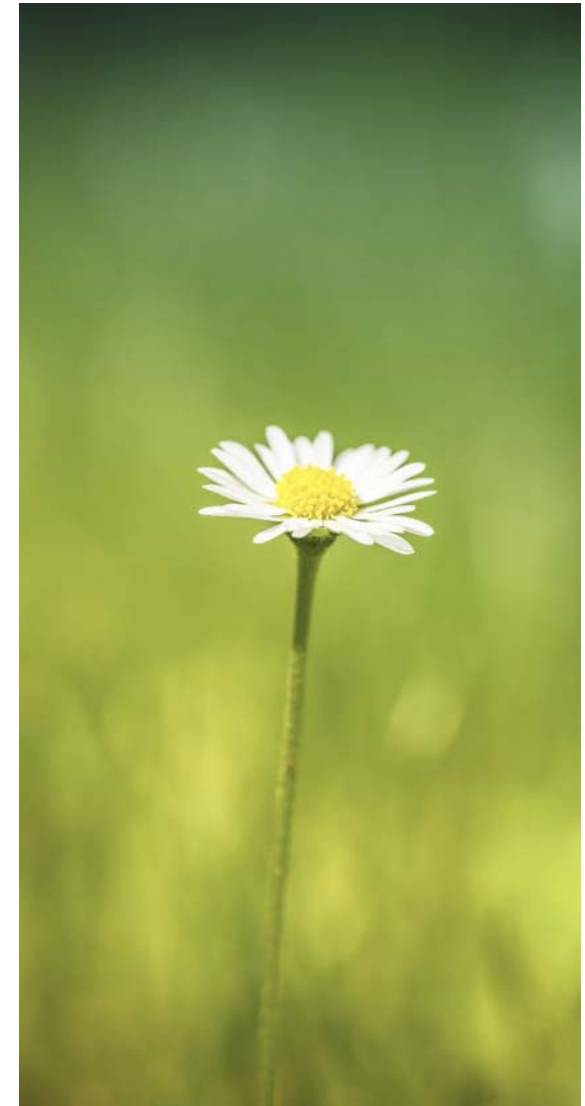
- Conservation – assist in halting decline, invest in recovery and restoration
- Aesthetic appeal & ‘liveability’
- Sustainability – aim for long-term self-sustainability of ecosystems
- Aim for integrated, diverse land uses, not just conservation or mining or agriculture
- **Become a model for others**
- Further stimulate innovation, research, investment – will **improve certainty**



- Strong **convergence** of expectations, perceptions, policy/legislation, incentives and technology creates the opportunity
- Large number of threatened species and communities drives the need
- Miners and restoration ecologists should **continue to improve techniques** and drive ecological benefits
- Strong Government incentives to encourage strategic outcomes, and novel, innovative approaches – could include a **multi-tier ecological rehabilitation credit system** to provide incentives for additional effort but in a manner that considers elevated risk and cost
- Long term regional strategy with input from conservation planners and mining industry is required
- Strategy and rules for **the Hunter could lead the way** for other regions with extensive-intensive resource development



- Create a plan within plan – a **multi-decadal strategy for ecological landscape rehabilitation linkages investment**
- Research & experimentation **centre of excellence**
- Create **threatened fauna release /breeding sites**
- Eco/conservation-tourism potential
- Mixed landuses, including agriculture in particular
- Market opportunity for offset site managers – **old rehab will become valuable offsets of the future**
- Application of innovative, cost effective techniques to monitor progress at a site, property and regional level
- A ‘training ground’ for remote sensing techniques



Thank You

Landscape Benefits of
Ecological Mine Rehabilitation

Thank you for your interest.

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