

Restoring Ravensworth State Forest – Glencore's Mt Owen Mine

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At Mt Owen Mine, Glencore is extracting valuable coal from beneath part of the Ravensworth State Forest. While disturbing part of the Forest is unavoidable, stringent conditions under which the mine was approved will ultimately contribute significantly to conservation of native flora and fauna in the Upper Hunter. By meeting, and in some cases exceeding, these conditions, Mt Owen has pioneered innovative rehabilitation techniques. And in partnership with the University of Newcastle, Mt Owen Mine is making a significant contribution to the field of ecosystem restoration.

Background

The Hunter Valley floor has been subject to extensive clearing of native vegetation for agriculture since European settlement. More recently, further development, including mining has resulted in additional clearing.

Ravensworth State Forest is considered to be a highly significant remnant on a local and regional scale. It is one of the largest remaining areas of remnant woodland on the central Hunter Valley floor. Threatened species, including the Green and Golden Bell Frog, Squirrel Glider, Spotted Tailed Quoll, and a number of bat and woodland bird species have been recorded in the Forest or surrounding areas.

Because of this, strict conditions of approval require Mt Owen to rehabilitate forest areas disturbed by mining, as well as securing and restoring considerable areas adjoining the Forest to a functional native ecosystem.

At the end of the mine's life, these strict conditions will deliver an area of native woodland approximately five times larger than the woodland community that existed prior to mining. This total area of woodland - 1774 hectares - will be comparable with the largest areas of existing remnant vegetation on the Hunter Valley floor.



Mined land that has been rehabilitated to woodland

Offsetting, rehabilitation and restoration

Given the significance of Ravensworth State Forest, Mt Owen Mine has put in place a program to enhance the conservation value of the area. This includes:

- **Offsets** - Securing areas of biodiversity value adjacent to the project as 'biodiversity offsets'.
- **Restoration** - Undertaking restoration of the native communities in the offset areas surrounding the mine.
- **Rehabilitation** - Rehabilitating disturbed areas to appropriate native vegetation communities.
- **Innovation** - Implementation of specialised flora and fauna management techniques.
- **Monitoring** - A comprehensive flora and fauna monitoring programme.
- **Funding research** - Ongoing program of native forest restoration research in conjunction with the University of Newcastle's [Centre for Sustainable Ecosystem Restoration](#).

The program is guided by a comprehensive Flora and Fauna Management Plan, which was developed by an Advisory Group consisting of representatives from State Government departments, the Hunter Environment Lobby, and Mt Owen. Implementation of the plan is overseen by the Advisory Group.

Flora and fauna monitoring is undertaken in both rehabilitation areas and surrounding biodiversity offset areas.

Rehabilitation of mined areas and restoration of conservation areas

Rehabilitation of disturbed areas is undertaken using local species. Mt Owen Mine uses forest topsoil collected prior to mining to rehabilitate disturbed areas earmarked for return to native communities. Forest topsoil contains an important reserve of indigenous plant seeds and soil micro flora, which assists with the preservation of local genetic material and the re-establishment of a similar range and mix of species to the original vegetation in rehabilitation areas.

Many of the same techniques are used in both mined land rehabilitation and ecosystem restoration in biodiversity offset areas, including:

- Exclusion of domestic stock.
- Placement of a range of fauna, nest/roost boxes designed for specific target species where nesting and diurnal roosting habitat has been cleared for mining or agriculture in the rehabilitation and conservation areas.
- Collection of large ground debris and standing dead timber to be redistributed on rehabilitation and in offset areas.
- To maximise the use of seed and propagation material from existing indigenous native grasses, herbs, shrubs and trees, viable seed is collected for use in revegetation programs at Mt Owen.

Mt Owen Mine – University of Newcastle monitoring and research program

Mt Owen Mine has partnered with the University of Newcastle's Centre for Sustainable Ecosystem Restoration in a native forest restoration research and monitoring program. The program aims to enhance knowledge about the establishment of diverse and sustainable native forest communities on rehabilitated mine land and degraded pasture areas within offsets.

Research projects¹ undertaken by the university include:

- Reconstructing functional topsoil.
- Reconstructing forest – woodland on pastureland.
- Frog conservation and habitat construction.



Taking measurements of mature tree rehabilitation

Biodiversity Offset Strategy

The Biodiversity Offset Strategy involves the rehabilitation and remediation of pasture and isolated woodland remnants adjacent to currently vegetated areas, which will enhance the long term viability of the Ravensworth State Forest. The current biodiversity offsets associated with Mt Owen Mine cover 415 hectares. This builds on more than 400 hectares of land previously restored by the mine and transferred to the government for incorporation into the forest reserve system.

A key part of the offset strategy is to expand and enhance offset areas surrounding the mine through proactive intervention and the restoration of scattered woodland remnants and pasture areas. This provides similar vegetation communities and opportunities for movement of flora and fauna into rehabilitation areas.

¹ Details of these projects are available on the University's website <http://www.newcastle.edu.au/research-centre/cser/>

The objectives of the Biodiversity Offset Strategy are:

- **Short term** – to conserve existing flora and fauna in conservation areas through effective management, while establishing new areas that will provide a self-sustaining system in the long term.
- **Long term** - to create a self-sustaining flora and fauna conservation reserve of sufficient size to provide the necessary diversity. It also aims to provide corridor linkages that support the larger vision for integrated landscapes in the Hunter Valley. This reserve will establish a core area that can be connected by corridors to other remnant vegetation on the floor of the Valley and adjacent foot slopes.



Flora and fauna monitoring is undertaken in both rehabilitation areas and surrounding mine buffer land

Results

Glencore is committed to a long term program of enhancing native flora and fauna communities at Mt Owen. Much of this work is best practice, and recognised internationally. Mt Owen Mine's work was recently highly commended by the [Global Restoration Network of The Society of Ecosystem Restoration, International](#).

Woodland Rehabilitation

Mt Owen Mine has focused on establishing sustainable plant nutrient acquisition in rehabilitation areas. Monitoring results indicate that nutrient acquisition is 70-80% higher in the rehabilitation areas when compared to 8% in the Ravensworth State Forest.

Importantly, on average monitoring is showing the 85% of species present in the mature rehabilitation are also present in the understory. In other words, the community is regenerating itself and showing

resilience. The native plant community's resilience has been tested over the past 10 years by both flooding rains and drought.

These results illustrate that if beneficial soil microbes are introduced to germinating plants a sustainable native plant community can thrive.

Fauna monitoring

During 2010, 95 bird species, 10 mammal species 13 bat species, 11 reptile species, and 6 frog species were recorded during monitoring of the Mt Owen complex.

Bird monitoring results indicate that species diversity and abundance are similar in both the rehabilitation areas and the Ravensworth State Forest. Four threatened bird species were recorded during 2010 with the threatened Speckled Warbler (*Chthonicola sagittata*) observed on a number of occasions foraging in the woodland rehabilitation areas.

Similar results have been recorded when comparing small mammal captures. The Common Dunnart (*Smithopsis murina*) has been captured using pitfall traps at similar rates in both the Ravensworth State Forest and the Mt Owen rehabilitation areas.

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