



## **IFA Statement on Bauxite Mining and Revegetation in the Northern Jarrah Forest**

### **Our aim**

Our aim is to inform the public and key decision-makers as to what is happening in the northern jarrah forest and of the urgent actions required.

### **Our Institute**

The Institute of Foresters Australia Inc. (IFA) is the professional body that represents the views of forest managers and scientists. It has a responsibility to comment on matters of importance to the health and management of forested ecosystems. The West Australian Division of the Institute wishes to draw attention to, and promote discussion on, the impacts of open-cut mining for bauxite in the northern jarrah forest and likely long-term outcomes.

### **The Agreement Act**

When bauxite mining was first proposed in the early 1960s, foresters were concerned at the likely impacts on high-quality jarrah forest but were assured by Parliament that the clearing rate would be only 10 ha each year (500 ha in 50 years) to feed a small refinery at Kwinana. However, the reality is different.

Mining commenced near Jarrahdale in 1965. Fast forward 53 years and we now have four large refineries and an annual clearing rate of 800 ha. More than 29,000 ha of jarrah forest have been cleared and 21,000 ha "revegetated". More recently, direct export of bauxite was approved and has commenced.

It is expected that the total area of jarrah forest directly impacted by bauxite mining will exceed 80,000 ha. However, as only about 25 percent of the landscape that comprises the mining envelope is mined, the overall impact is much greater (120,000 ha currently and over 300,000 ha in 50 years' time). Most of the forest between Collie and Armadale is expected to be fragmented by bauxite mining by the year 2060 (see Figs 1 and 2).



Fig 1. Aerial view of example of current bauxite mining operations in northern jarrah forest. (IFA photo)

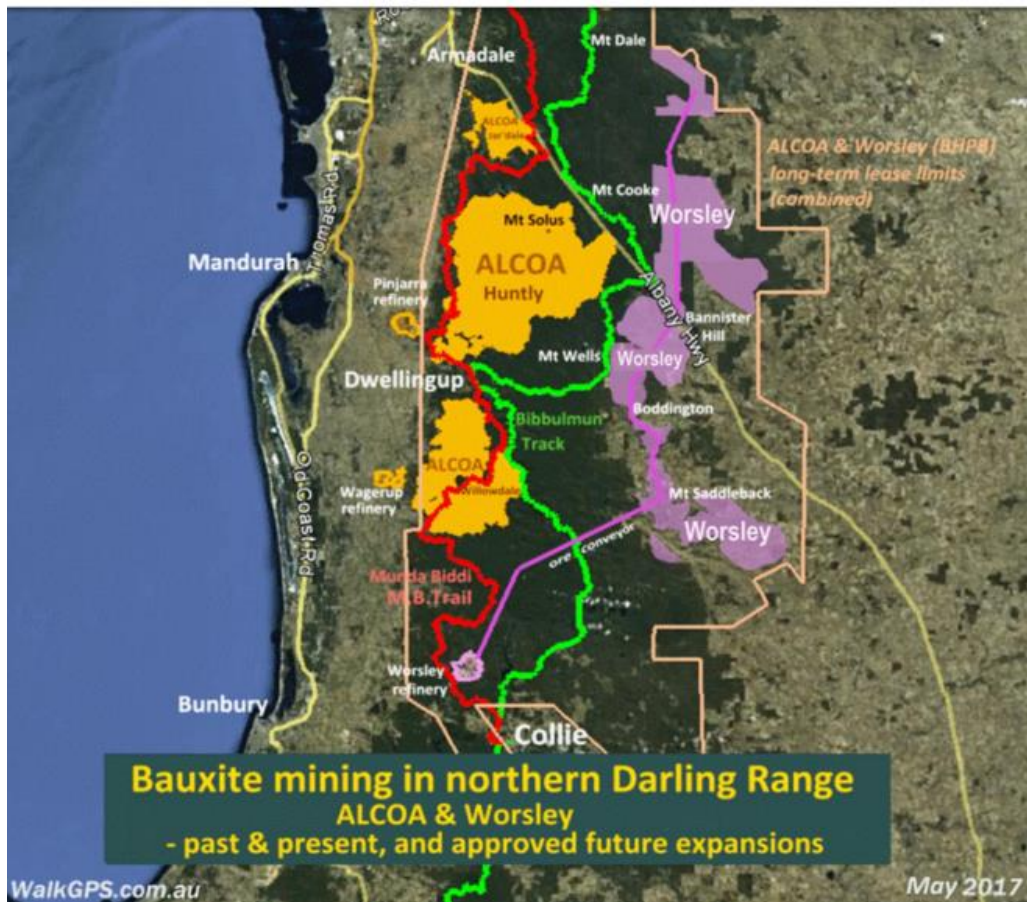


Fig 2. Extent of bauxite mining in northern jarrah forest between Perth and Collie. (Plan courtesy [www.walkgps.com.au](http://www.walkgps.com.au))

## Who are the miners and why have they focused on State forests?

Two companies are involved: Alcoa (formerly the Alumina Company of America) and S32 (formerly BHP/Worsley Alumina). State forests were the prime target for mining because the infrastructure was in place and the miners had access to a supply of cheap energy. Energy cost is significant because refining bauxite into alumina uses very large amounts of energy. Although deposits of bauxite in the tropics are of much higher quality, they are much more expensive to mine and process. As a result, WA has, for decades now, been the world's larger exporter of alumina.

Strangely, given its massive impact on State forests, bauxite mining and the subsequent "revegetation" of mined-over areas is conducted independently of the Forest Management Plan that controls every other aspect of forest use and management. The IFA acknowledges that mining is carried out under (now outdated) State Agreement Acts, but, as we will show, the environmental and financial consequences are a State responsibility. This anomaly must be urgently addressed.

There are few Comprehensive, Adequate and Representative (CAR) reserves in the high-rainfall, high-quality jarrah forests north of Collie, although they are well represented in the southern forests. An adequate representation of CAR reserves is a requirement under State/Federal agreements. The current lack of suitable reserves in the northern jarrah forests is due to opposition and successful political lobbying by bauxite companies. There are still areas of high-rainfall, high-quality jarrah forest in the north which would be very suitable as CAR reserves (see Fig 3), but action is required soon before these areas are also mined.



*Fig 3. Example of high-quality jarrah forest in north which warrants reservation before it is mined for bauxite. (IFA photo)*

## Impacts of mining and "revegetation"

Mining and revegetation greatly alter the hydrology of the mine-pits and adjacent forest. After the bauxite layer (3-5 m in depth) is removed, the pits are shaped to retain water, the clay subsoil is deep-ripped to enhance infiltration, the top-soil is returned to the site and the areas are fertilized. They are then seeded with a mixture of native eucalypt and understorey species. The result is a dense stand of fast -growing species with very high water use (see Fig 4).



*Fig 4. Rehabilitated bauxite pit showing dense jarrah and understorey vegetation in need of thinning. (IFA photo).*

Due to changes in the landscape, subsoil structure and the dense new vegetation, these areas no longer contribute significant water to adjacent forest or streams. This is exacerbated by recent reductions in rainfall. Based on research data published by Alcoa in 2007 the annual "water loss" has been calculated to be 500,000 litres for each hectare that has been impacted by mining, or 60 billion litres overall, which is larger than the annual production from the Kwinana desalination plant.

These dense stands of eucalypts with an equally dense understorey and an uneven soil surface are very unpleasant areas for bushwalking (see Fig 5). Mine safety and other requirements exclude access over large areas of forest in the proximity of Perth while mining is proceeding.



*Fig 5. Unattractive rehabilitated bauxite pit showing uneven surface and boulders. (Photo courtesy Bushwalkers WA)*

### **The economic loss**

Most mining is occurring on water-supply and irrigation catchments, so this is an economic loss to the State of about \$120 million annually. In addition, water retained in the mine pits is lost to the adjacent forest and to streams with negative consequences on forest health and vertebrate and stream biodiversity.

Following drought years in 2006 and 2010, deaths of trees were observed within both unmined jarrah forest and rehabilitated mine pits. As the trees continue to grow and require additional water, more frequent and extensive tree deaths are expected in the older revegetated areas. Thinning the trees will alleviate the water stress within pits and several successful trials have been established. Alcoa has thinned its Banksiadale catchment on two occasions to improve water flow. However, the company resists thinning of all other rehabilitated areas due to cost.

The cost of the first thinning is high (at least \$1500-2000/ha or \$45-60 million in total for the area mined to date) and neither mining companies nor the State have shown any intention to implement such a program on the scale required. A commercial program involving the use of these residues would defray some of these costs. The uneven soil surface after mining impedes machine operations and increases the cost of thinning.

## Mining prevents effective bushfire management

The rehabilitated bauxite pits pose a major logistical and cost problem in that they disrupt fuel reduction burning and fire suppression activities. The individual pits are small, scattered through the landscape, and separated by remnants of un-mined forest. The rehabilitation is of different ages and has varying fuel loads, structure and species. The deep-ripping of the pit floors leaves an uneven and unsafe surface which inhibits access and poses a hazard to fire-fighting equipment and firefighters (Fig 6).

These factors increase both the cost and the risk of bushfire management to staff and have contributed to a steep increase in the vulnerability of the northern jarrah forest to high intensity bushfires such as the recent Waroona/Yarloop wildfire. In his review of this wildfire, Commissioner Ferguson noted the difficulty of fire suppression in post-mining landscapes was a contributing factor to the burning of the town.



*Fig 6. Rehabilitated bauxite pit burnt during Waroona/Yarloop bushfire, January 2016. (IFA photo)*

## **Managing the bauxite mining industry**

Coordinating the development and overseeing the standards of bauxite mining rehabilitation in the jarrah forest is the responsibility of a "Mine Management Planning Liaison Group" (MMPLG). This group is chaired by the Department of State Development, with representatives from the Departments of DBCA, Mines, Water, the Water Corporation and, when required, the Forest Products Commission. The MMPLG periodically reviews the "Completion Criteria" for rehabilitation of bauxite mining and seeks public comment.

## **What we would like to achieve**

The key aims of this statement by the WA Division of the IFA are:

1. To inform politicians, departments and the public of the current and serious situation and the legacy issues and costs that the State will inherit resulting from large scale bauxite mining operations in the northern jarrah forest.
2. Recommend that management of the mined areas be covered in the Forest Management Plan so that the environmental and financial consequences of bauxite mining are identified as a State responsibility and addressed appropriately. Effectively managing the legacy of bauxite mining will require resourcing in perpetuity.
3. To present the case that the impacts of bauxite mining operations on forest ecosystems and the lack of large reserve areas in the high-rainfall, high-quality northern jarrah forest need to be addressed as part of the current 5-year review of the Forest Management Plan by the Conservation and Parks Commission.
4. To propose that the lack of adequate reserve areas in the high-rainfall, high-quality northern jarrah forest within the mining envelopes be addressed by the current review of the Regional Forest Agreement being conducted by State and Federal departments.
5. To present the case that Alcoa and S32 should be required to thin rehabilitated forests prior to their return to management by the State.
6. To propose that some high-quality areas of jarrah forest be left unmined to provide suitable access for bushwalking and similar activities.

Frank Batini  
Environmental spokesperson  
WA Division of the Institute of Foresters of Australia  
[ifawadivision@gmail.com](mailto:ifawadivision@gmail.com)

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References :

J T Croton and A J Reed (2007) Hydrology and Bauxite mining in the Darling Plateau. *J Soc Ecological Restoration International* 15 (4).

Ferguson E (2016) Reframing Rural Fire Management "Report of the Special Inquiry into the January 2016 Waroona Fire. Government of Western Australia.