

Large Scale Translocation of Two DRF Species



MGX

September 2018

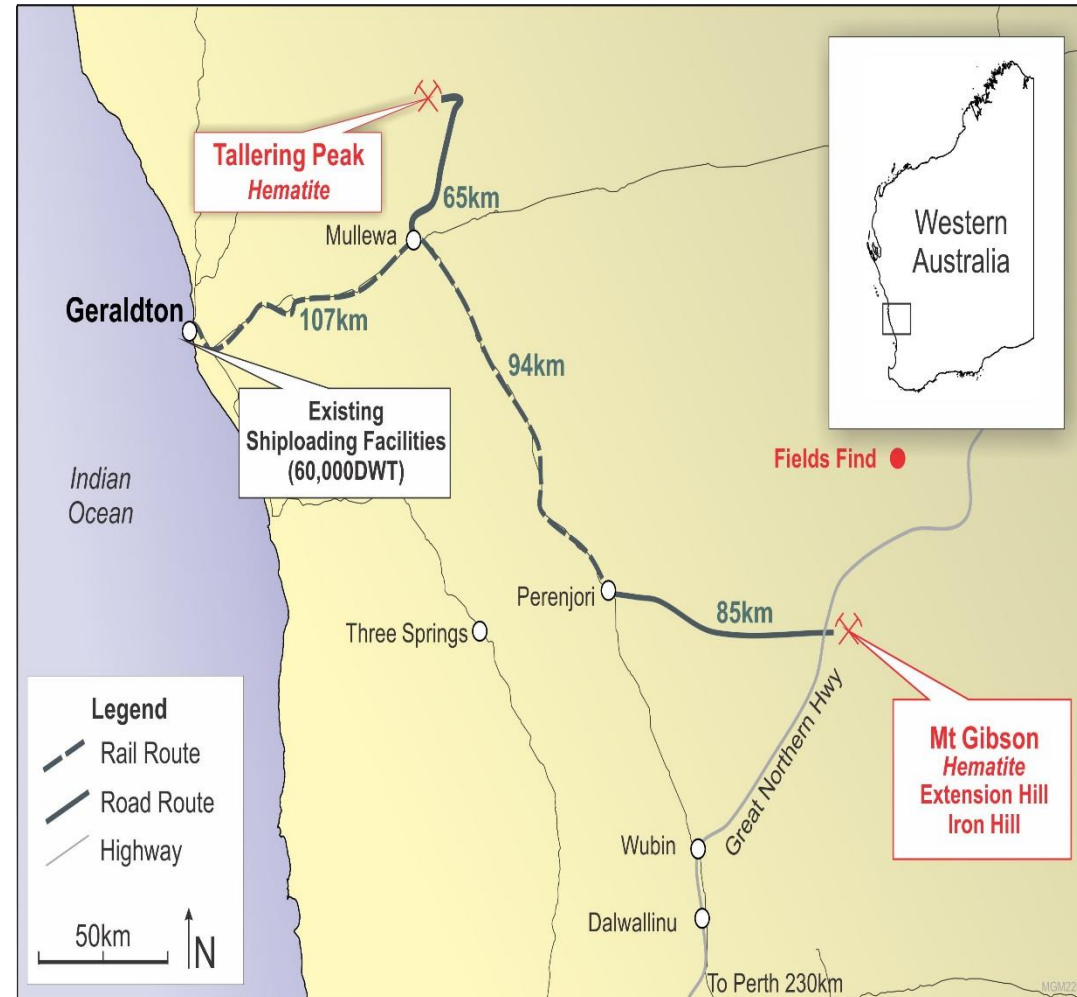


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Introduction

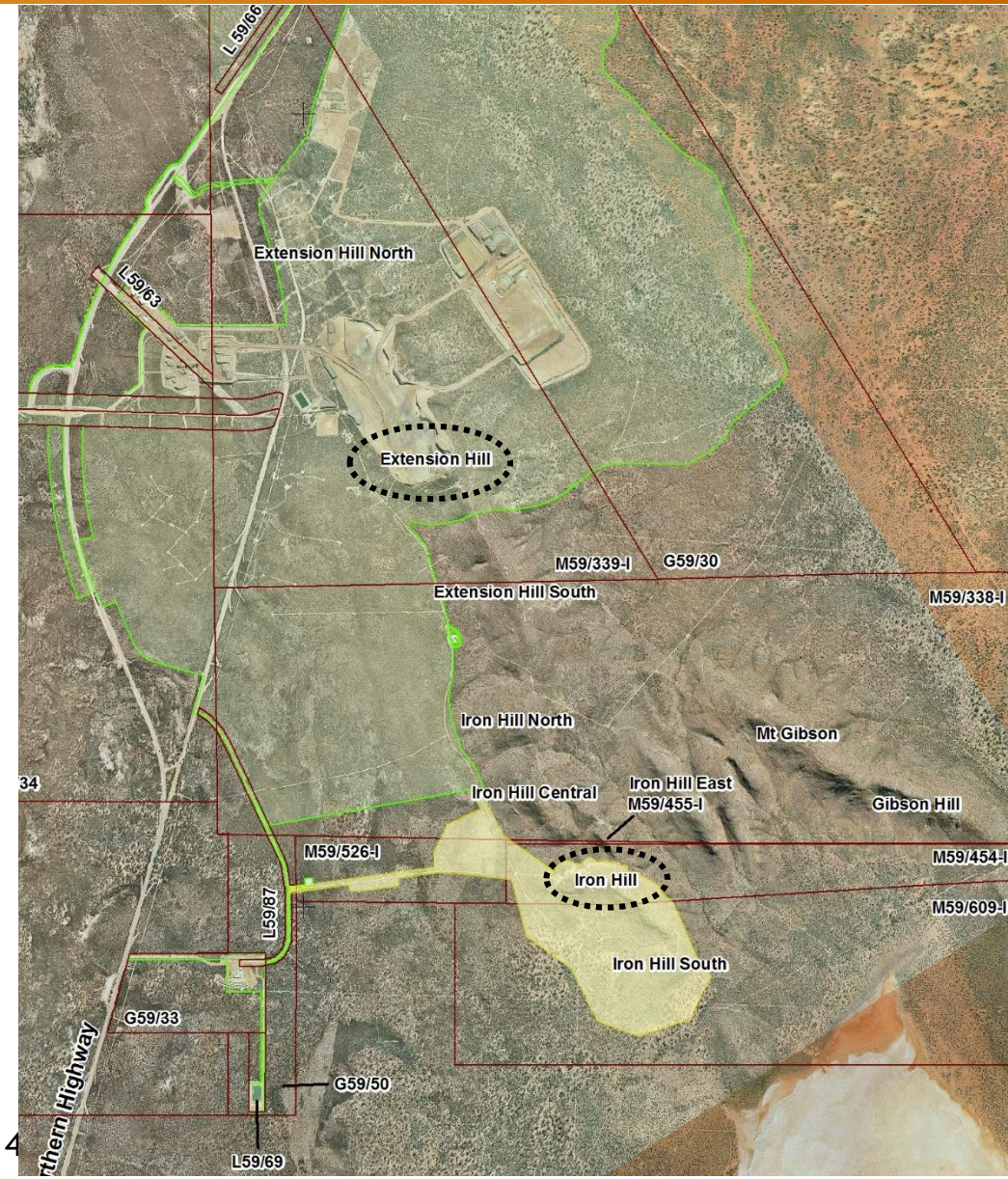


- Extension Hill and Iron Hill located at Mt Gibson Ranges, 350km NE of Perth adjacent to GNH
- Mount Gibson Mining (MGM) extract DSO hematite from Extension Hill and Iron Hill
- Road train haulage to Perenjori, railed to Geraldton Port
- Extension Hill from 2010 to 2016 and Iron Hill from 2017 to 2018



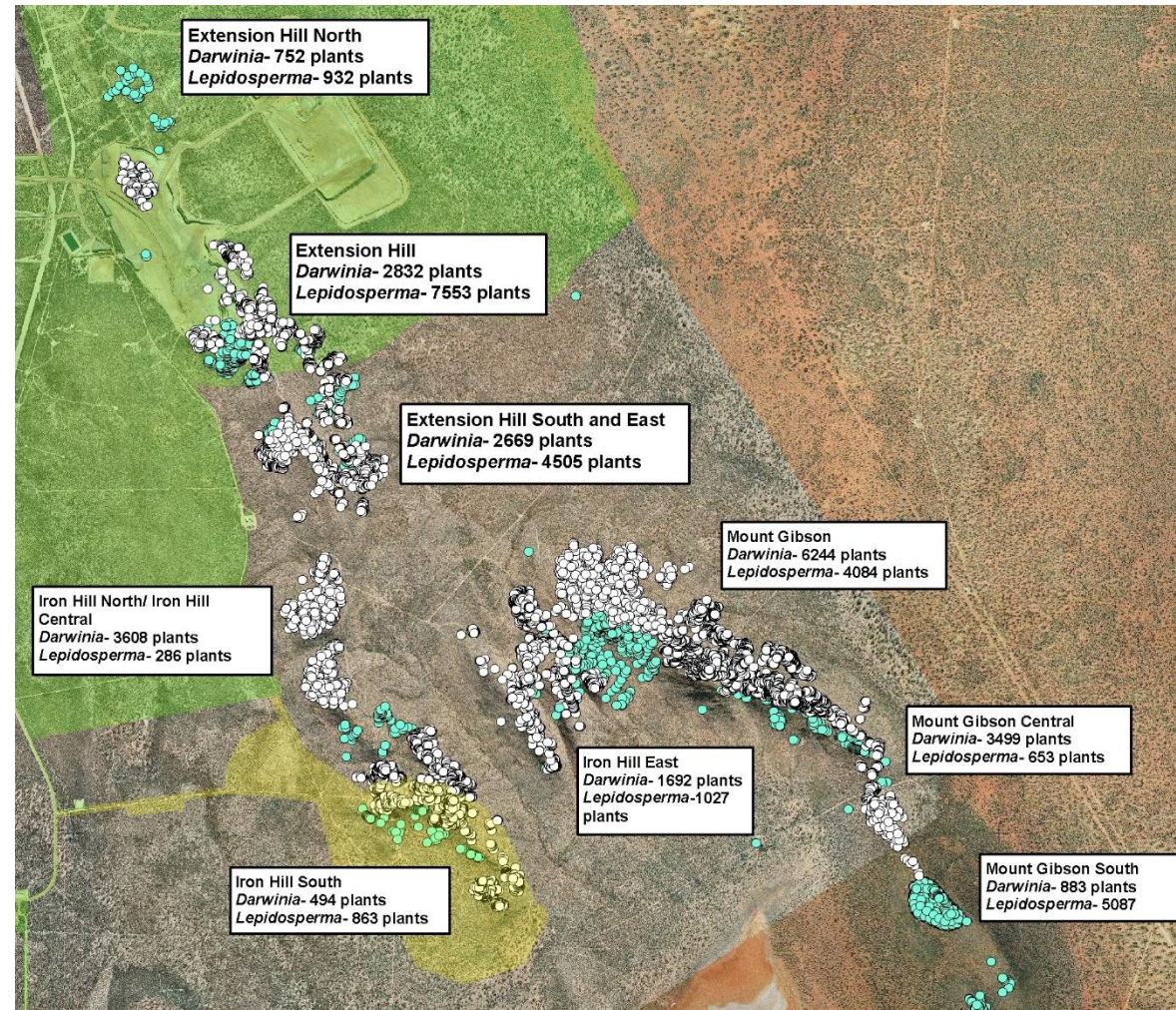
Context and Background

- Extension Hill Hematite and Magnetite
 - Approved by MS753 in 2007
 - 1179 ha within development envelope
 - Project life of 40 years (5 for hematite)
- Iron Hill Hematite
 - Approved by MS1045 in 2016
 - 87ha within development envelope of 112ha
 - Project life 2-3 years



Context and Background

| | <i>Darwinia masonii</i> | <i>Lepidosperma gibsonii</i> |
|--------------------|-------------------------|------------------------------|
| Ext Hill (MS753) | 3, 763 (17%) | 8, 071 (16%) |
| Iron Hill (MS1045) | 1, 327 (6%) | 863 (2%) |
| Across Ranges | 17, 577 (78%) | 40, 538 (82%) |
| Total Population | 22, 667 | 49, 472 |



Context and Background

- ***Darwinia masonii***
 - Medium sized erect shrub, up to 3m height
 - Found only on the Mt Gibson Ranges
 - Found above 330mAHD associated with Banded Ironstone Formations
 - WC Act = Critically Endangered (previously vulnerable)
 - EPBC Act = Vulnerable
- ***Lepidosperma gibsonii***
 - Fine leaved herb/sedge, up to 0.6m height
 - Recorded on Mt Gibson Range and surrounds (west of GNH)
 - Occupies ridges/gullies, granite slopes and loamy flats
 - WC Act = Endangered (previously vulnerable)



Context and Background



MS753 Offset Condition:

16-1 The proponent shall implement the offset package outlined by schedule 2....

*Support for a 3 plus year research program by BGPA leading to recovery plans for *Darwinia masonii* and *Lepidosperma gibsonii* – valued at \$1.326 Million*



Darwinia masonii and *Lepidosperma gibsonii* Conservation and Restoration Research

An integrated research program into the *ex situ* and *in situ* conservation, restoration and translocation requirements of *Darwinia masonii* and *Lepidosperma gibsonii* May 2007- June 2010

Report to Sponsors
October 2010

Key Outcomes:

- Large breadth of knowledge on both species covering population genetics, seed dispersal, reproduction, germination, habitat distribution, biotic and abiotic interactions, translocation methodology
- Proven concepts for translocation
 - *D. masonii* 80% survival after 10 years (irrigation first 2 years)
 - *D. masonii* EH WRL trial, 20 plants, 100% survival, 3 years old, 2 years without irrigation
 - *L. gibsonii* up to 63% survival after 20 months, 22% after 7 years (no irrigation)



Context and Background

MS1045 Offset Conditions:

7-1 The proponent shall undertake an offset, as outlined in conditions 7-2 and 7-8, with the objective to counterbalance the significant residual impact on:
(1) 1,327 plants of Darwinia masonii; and

(2) 863 plants of Lepidosperma gibsonii,

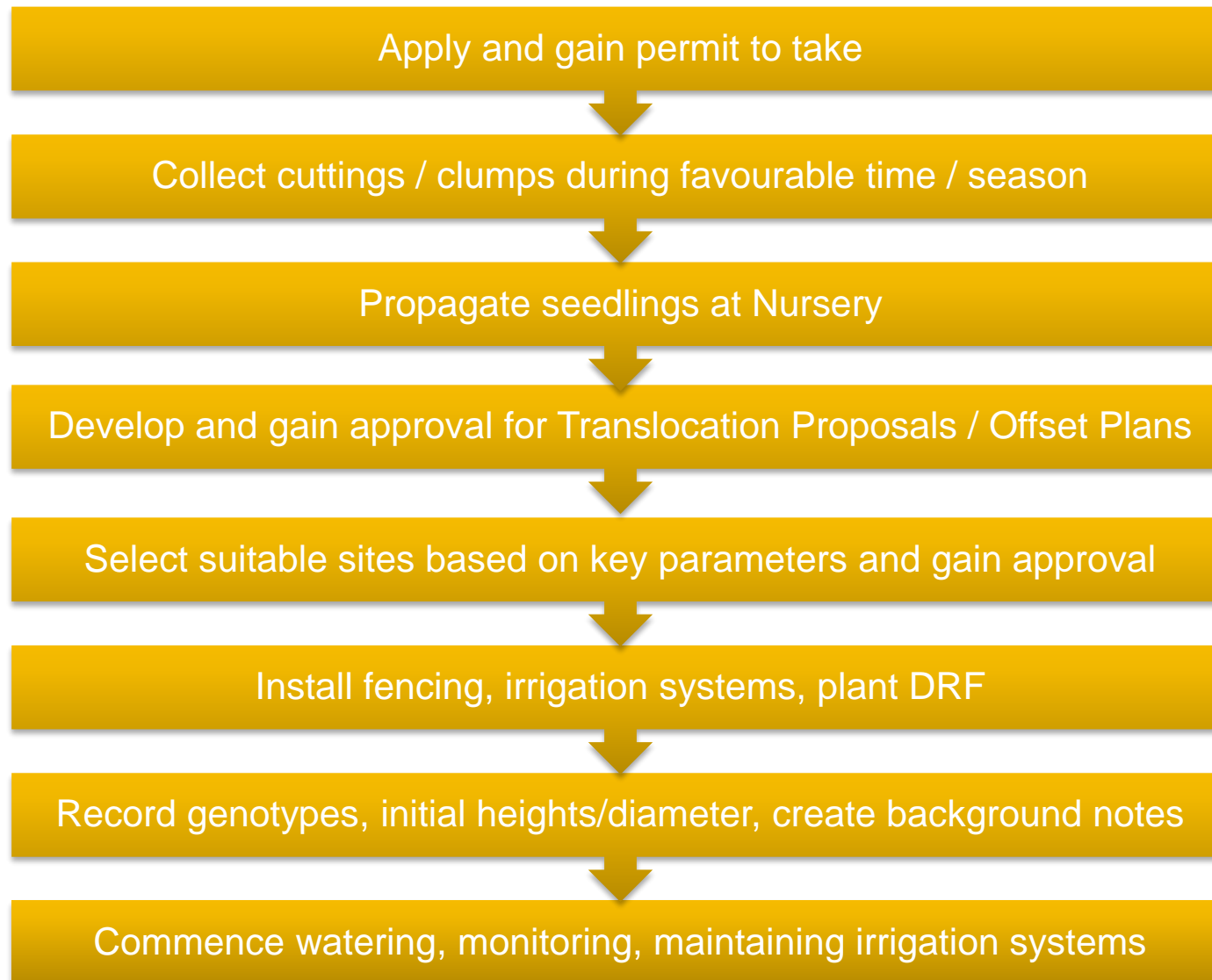
as a result of the implementation of the proposal.

*The objective of the Plan is to ensure a **self-sustaining** population of at least 1,327 mature individuals of Darwinia masonii.*

*The objectives of the Lepidosperma gibsonii Offset Plan are to ensure a **self-sustaining** population of at least 863 mature individuals of Lepidosperma gibsonii.*

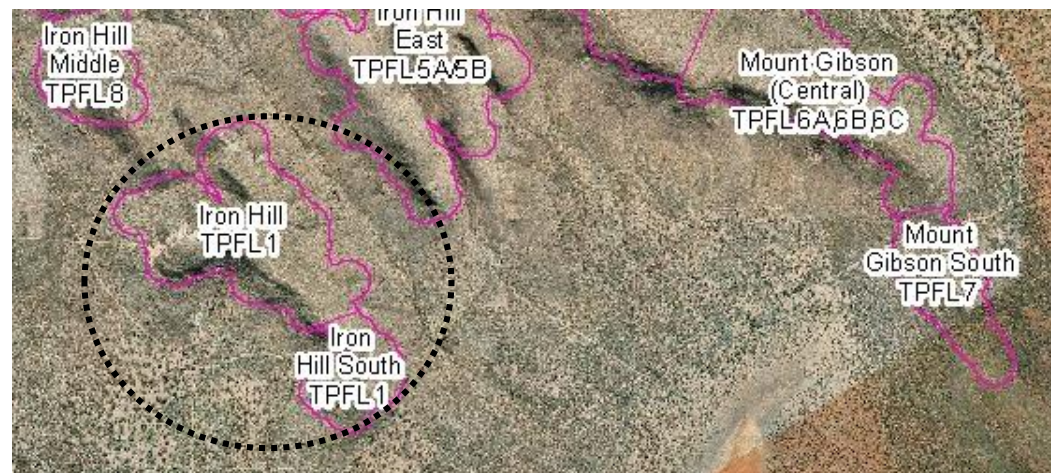


Establishing the Plots



Establishing the Plots

- *D. masonii* cuttings initially collected from Iron Hill spring 2015, 18 months prior to mining operations
- *D. masonii* cuttings and *L. gibsonii* clumps collected from Iron Hill spring 2016, 6 months prior to mining operations
- Cuttings and clumps propagated 2015 and 2016
- Continue to maintain stock / genotypes



| | D. Masonii | L. gibsonii |
|-----------|-------------------|--------------------|
| Produced | 5000 | 4500 |
| Planted | 3100 | 1300 (1500) |
| Remaining | 1900 | 1700 |

Establishing the Plots

Translocation Proposals and Offset Plans

- Translocation proposal approved by DBCA for each species approved prior to mining operations
- Offset plan approved by DoEE
- Offset plan for MS1045 currently under review by EPA services
- Covers details including:
 - Purpose
 - Biology
 - Population size and distribution
 - Research to date
 - Site selection considerations
 - Plant source and method
 - Success criteria / contingency
 - Maintenance / monitoring / reporting

MOUNT GIBSON MINING LIMITED

PROPOSAL FOR THE TRANSLOCATION OF DARWINIA MASONII

Version 4
Date of Revision: May 2016



EPBC 2015/7414 OFFSET MANAGEMENT PLAN

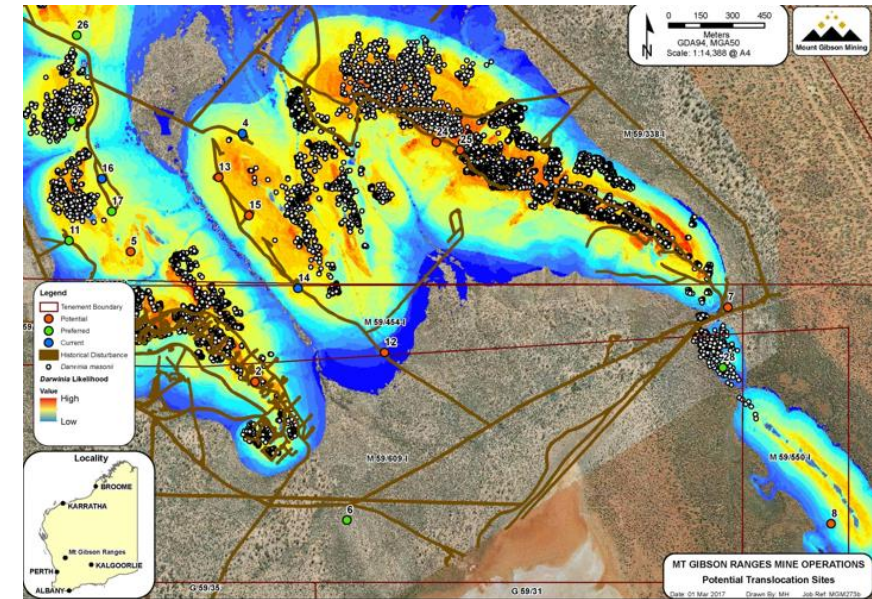
Version 1
Date of Revision: November 2016



Establishing the Plots

Site Selection

- Location within suitable habitat (BGPA 2010)
 - Slope
 - Elevation
 - Solar radiation
 - Geology
- Site selection matrix combines approval conditions, access requirements, site suitability:
 - Existing disturbance
 - Access for construction, maintenance
 - Future disturbance potential
 - Mt Gibson Ranges
 - Proximity to other populations (genetics)
 - Substrate
 - BGPA likelihood
 - Capacity
 - Rating
- Approval by DBCA



Darwinia Translocation Program – Site Selection Matrix – Iron Hill Offsets - 2017

| Site Number | Previous Disturbance | Access for construction, fencing, maintenance and monitoring | Future Disturbance Likelihood | Within Mt Gibson Ranges | Substrate | BGPA Likelihood | Capacity | Rating (1 – 5, 5 being the highest) |
|-------------|--|--|-------------------------------|-------------------------|--|---------------------|---|--|
| 2 | Yes | Yes (at closure Year 3) | Yes – Iron Hill Proposal | Yes | Suitable | Suitable | Approx 300 | 4 (Not being considered for 2017) |
| 4 | Yes | Yes | Nil | Yes | Suitable | Yes | Additional Approx 200 to existing 165 Alive | 5 |
| 5 | No | No | Near Iron Hill Proposal | Yes | Suitable | Suitable | - | 1 (Not being considered for 2017) |
| 6 | Yes – bare ground amongst existing vegetation and historical drilling | Access for everything except fencing – trialing individual plant tree guards | Nil | Close proximity | Suitable | Not mapped this far | Approx 300 | 4 |
| 7 | Yes | Yes | Unlikely | Yes | Suitable | Likely | - | 2 – (Not being considered for 2017) |
| 8 | No – NVCP required | Possibly not | Unlikely | Yes | Suitable | Likely | - | 1 (Not being considered for 2017) |
| 11 | Yes – some clearing in existing vegetation above historical track and evidence of historical fire. Evidence of dozer / track marks | Yes – area above track includes regrowth which plants could be placed among | Unlikely | Yes | Suitable – good mixture of BIF rocks and fines | Suitable | Approx 1200 | 5 (Not being considered for 2017 due to better parameters for <i>Lepidosperma gibsonii</i>) |
| 12 | Yes | Yes | Nil | Yes | Relatively suitable | Less likely | Approx 200 | 3 (Not being considered for 2017) |
| 13 | No – NVCP Required, high volume of regrowth on existing track and potential plot area | Yes | Nil | Yes | Suitable | Likely | Approx 300 – 600 | 3 (Not being considered for 2017) |
| 14 | Yes | Yes | Nil | Yes | Suitable | Likely | Additional Approx 600 – 350 to existing 173 Alive | 5 |
| 15 | No – NVCP Required, high volume of regrowth on existing track and potential plot area | Yes | Nil | Yes | Suitable | Likely | Approx 300 – 600 | 3 (Not being considered for 2017) |
| 16 | Yes | Yes | Nil | Yes | Suitable | Likely | Approx 300 | 5 (Not being considered for additional plantings in 2017) |
| 17 | Yes – drill pad access track. Evidence of disturbance at the Southern and Western area of access track | Yes | Nil | Yes | Suitable – Upper area at South West area of track is suitable. Some very hard BIF and numerous rocks. | Likely | Approx 800 | 4 |
| 25 | Yes | Yes – though the initial track is rough/steep and will be difficult for water truck to climb | Unlikely | Yes | Very rocky, surface soils stripped from historical disturbance. Too hard to dig and not enough suitable soil | Yes | 100 at most due to difficult digging | 3 (Not to be considered for 2017 plantings) |

KEY: – Priority Translocation Site

Establishing the Plots

Installation of Translocation Plots

- Fencing - 0.75m higher rabbit fence
- Irrigation lines and system – solar power, batteries, 12 volt, solenoid timers
- Dig holes – often into rock!
- Slow release native plant fertiliser tablet
- Plant, water in approx. 1 – 2L of water
- Dripper and drip tube 2L per hr
- Record genotype, height, diameter (*L. gibsonii*)
- Background notes covering
 - Layout
 - Initial photos
 - History of site
 - Date and method of planting
 - Weather conditions at time
 - Substrate and ground rating
 - Plant origin, planters, condition of plants



Monitoring and Maintenance

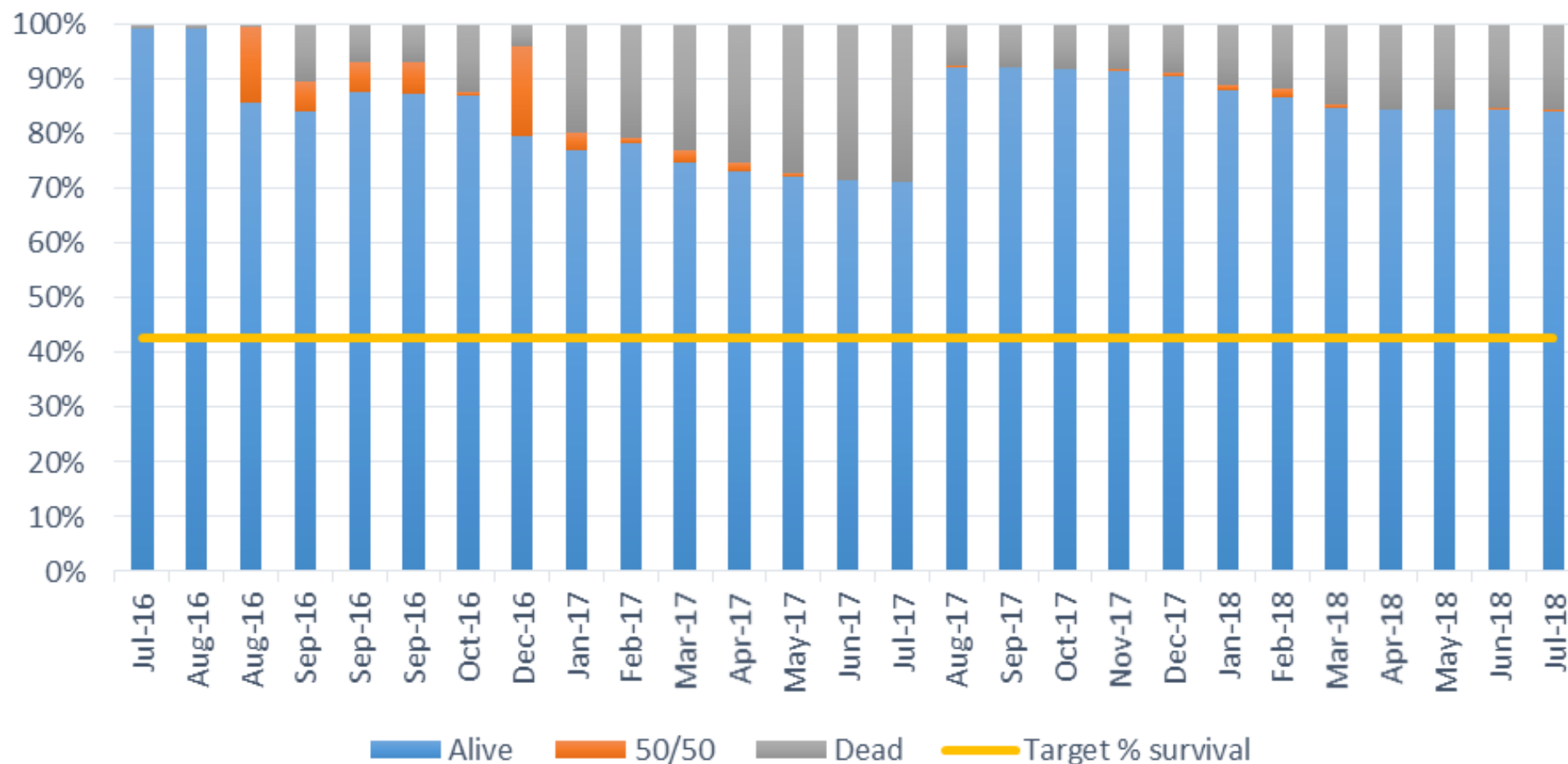


- Weekly checks initially first 8 weeks
- Fortnightly checks of irrigation system – always something to fix!
- Monthly checks for survival and condition first 2 – 3 years
- Annual heights / Diameter
- After 2 – 3 years concentrate on flower production
- Water supply is brackish ground water treated through RO plant
- One plot filled via pipelines from camp
- Others filled using 4WD truck, 3000L tank, dedicated staff member, fill weekly
- *D. masonii* watered once a week for one hour, *L. gibsonii* watered 3 times a week for one hour
- Water between 12am and 6am



Results – *Darwinia masonii*

Darwinia masonii Rate of Survival



Results – *Darwinia masonii*

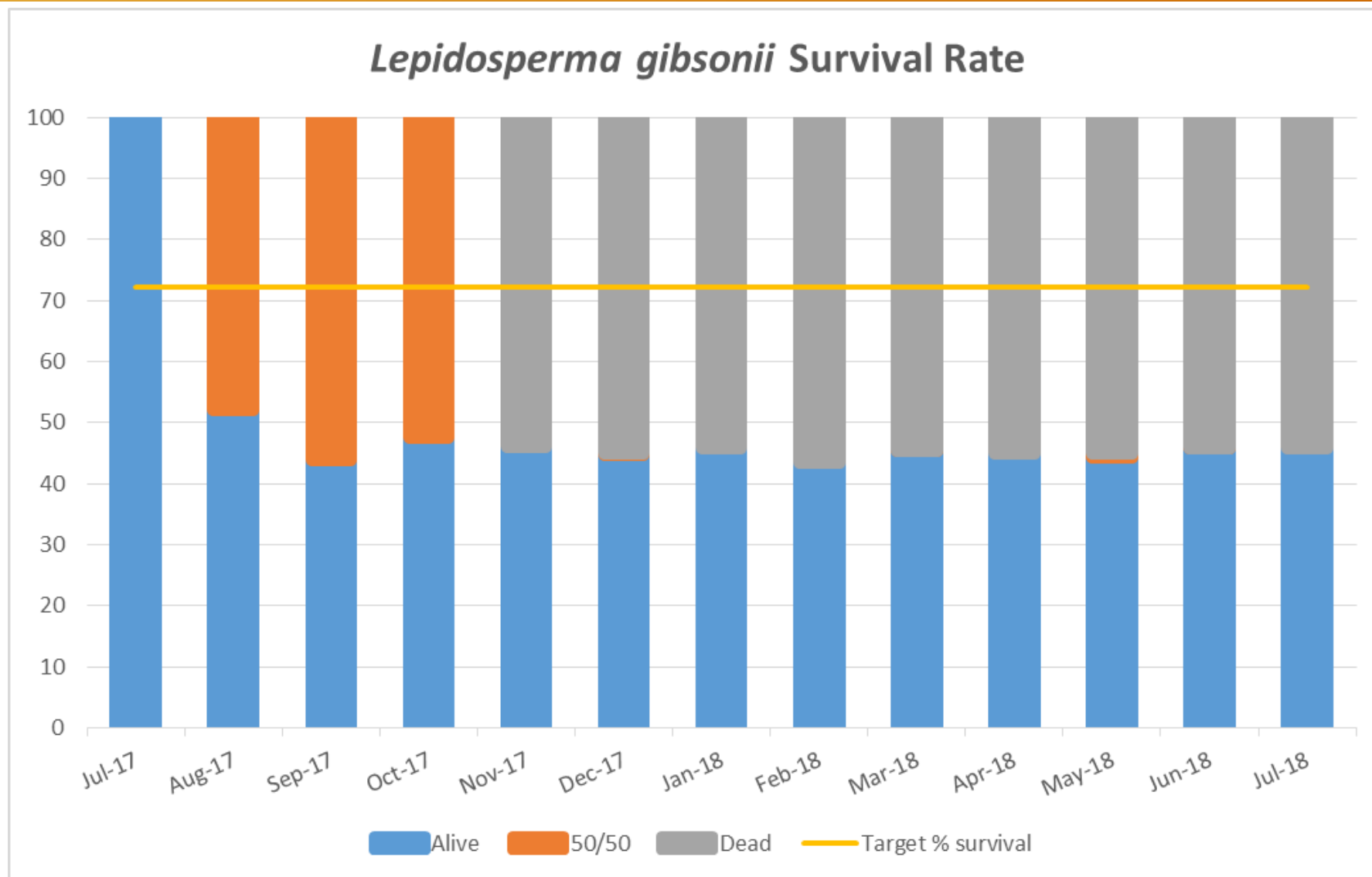
Key Learnings

- Method of planting and watering in is crucial
- High degree of variability within and between plots
- Plot 4 surviving but growth is lower
- Plot 14 and 16 lower survival but greater range of growth
- Plot 6 strong growth and survival
- Substrate and location is key
- Micro habitats may play a role
- Benefited from a range of different plots
- Learn along the way and try new techniques
- All opinions and inputs heard and considered, further developed program



Compare
the
two?

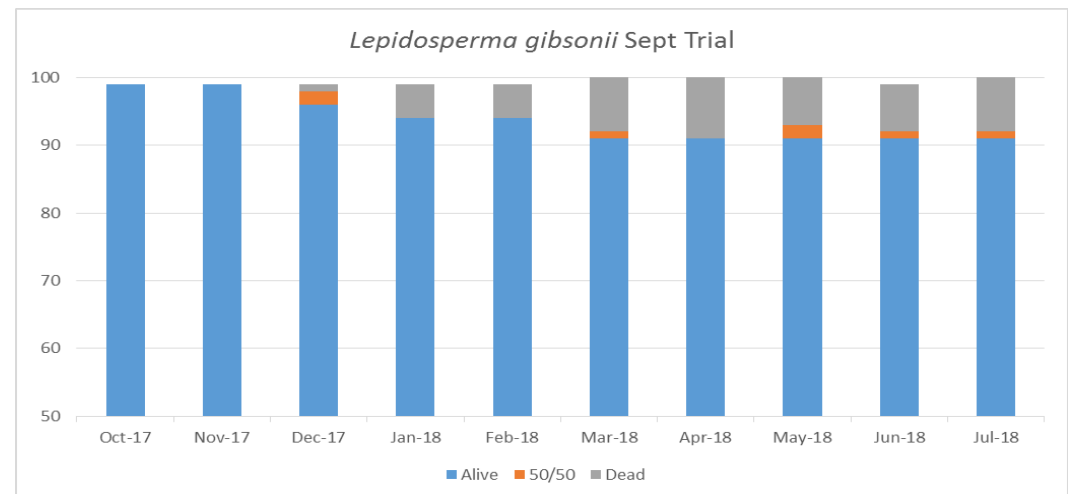
Results – *Lepidosperma gibsonii*



Results – *Lepidosperma gibsonii*

Key Learnings

- Less translocation research compared to *D. masonii*
- Very difficult to identify suitable sites, niche habitat compared to *D. masonii*
- Early losses possibly due to frost bite, inadequate watering in – at least 2L required
- Watering increased from 1 to 3 times a week, pipeline from camp to plot
- Water hungry, taper off as mature
- Variability within plot – microhabitats?
- 100 trial, planted in September, leaves trimmed to 10cm, almost 90% success
- Frost protection agent trial
- More trial sites being developed Aug / Sept 2018



Special Thanks and Questions

