

# Mining Management Exploration Activities

## Northern Territory of Australia – Mining Management Act 2001

It is recommended that the Mining Management Plan (MMP) is completed in conjunction with the user guide available on the [Northern Territory Government website](#).

### Section 1 – Project Details

<b>Project Name</b> Provide new or existing project name	Frewena Far East
<b>Authorisation Number</b> Insert existing authorisation number, where applicable	A1079-01
<b>Operator Name</b> Use ASIC-ABR registered name (if a company), or name of the applicant	Inca Minerals Limited
<b>Operator ABN and ACN numbers</b>	128 512 907
<b>Location and Access Details</b> Include brief description of the location, access details, and distance to nearest town or community	<p>The site (EL32293) is located approximately 27 Km north-east from the intersection of the Barkly Highway and the Tablelands Highway.</p> <p>Access to the site is via Barkly Hwy, Tablelands Hwy and existing Dalmore Downs station roads and tracks.</p> <p>The Barkly Homestead is the closest facility to the Project.</p>
<b>Target Commodity Details</b> Include target mineral commodities (i.e. gold, copper etc.)	Iron ore copper-gold (IOCG) mineralisation with potential for associated commodities including silver, bismuth, uranium, cobalt, tungsten, molybdenum, and rare earth elements,
<b>Mining Activities</b> Summarise the mining activities (exploration) to be the subject of the proposed Authorisation or Variation.  Drilling programs over a maximum of four years are supported and encouraged and can be staged. Please refer to the guidelines for further information.	<p>Early-stage exploration:</p> <p>Stage 1: construction of access tracks (c.50km length); geological mapping and sampling; ground geophysical surveying</p> <p>Stage 2: reconnaissance drill testing (reverse circulation) with additional drilling and exploration work as dictated by results.</p>

## Mining Management Exploration Activities

<b>Proposed Schedule</b> Include start and finish dates of ground disturbing work	Stage 1: 03/2022 to 06/2023 Stage 2: 06/2023 to 06/2024 (and ongoing as required)
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## Mining Interest and Land Ownership

List the mining interests (titles), the title holder name/s, the title expiry date and the Property name/Land holder (e.g. pastoralist or Aboriginal land trust) for each title.

Title Number	Title Holder	Expiry Date	Underlying Property Name or Land Holder
EL32293	Inca Minerals Limited – 90%. Jonathan West – 5%. MRG Resources Pty Ltd – 5%.	27/01/2027	NT Portion 0001 – Alexandria Station. NT Portion 0002 – West Ranken Station NT Portion 7497 – Alexandria Station NT Portion – 651 Alroy Downs Station NT Portion 773 – Dalmore Downs Station

## Organisational Structure

Position Title	Name
Managing Director	Ross Brown
Non-Executive Director	Jonathan West
Exploration Manager	Robert Heaslop
Radiation Safety Officer	

## **Section 2 – Operator Self-Assessment of the Environmental Risk**

The purpose of this self-assessment is to ensure Operators complete a project risk assessment of potential environmental impacts and are aware of other legislative obligations from various Agencies. As a result of this self-assessment, further information may be required in the form of a management plan to enable full assessment of the MMP. If you have any queries please contact a Mining Officer prior to submitting the MMP. Useful resources to assist with this self-assessment are provided in the User Guide.

## Environmental considerations

ASSESSMENT ASPECT	YES or NO	ACTIONS REQUIRED (if answered YES)	APPENDED INFORMATION (e.g. evidence of consultation with DEPWS and/or management plan where required).
<b>Step 1:</b> Are there any threatened flora and fauna species or habitats of significance that may occur in the proposed work area?	No	The Operator must assess the likelihood of threatened species or their habitats occurring at or near the site. If the likelihood is high, then a "Significant Impact Assessment" must be undertaken and appended to this document.	Threatened species maps, reports and data sheets are attached at Appendix 1 – Environmental Considerations.  Map of EL32293 downloaded from the NR Maps site indicates that the DEPWS does not report or record any threatened flora and fauna species within the site or the immediate area. The map records instances of the Grey Falcon and Plains Death Adder occurring within approximately 12km (Grey Falcon) and 18km (Plains Death Adder) from the Project.  EPBC Report lists 6 threatened fauna species, no flora species recorded within the search grid area however, no species are recorded within EL32293.  Reports, Maps and data sheets for site and adjacent areas listed threatened species are attached at Appendix 1 – Environmental Considerations as evidence of proponent awareness. If observed, the proponent shall record the occurrence and report it to the DITT and DEPWS.



## Mining Management Exploration Activities

<p><b>Step 2:</b> Are there any known declared weeds within the proposed work area?</p>	<p>Yes</p>	<p>Seek advice from DEPWS – Weed Management Branch to determine if weeds are present on site and ensure management measures are appropriate for the level of activity proposed and attach a Weed Management Plan (if required).</p>	<p>The NR Maps site shows reported occurrences of the following declared weeds within EL32293:</p> <ul style="list-style-type: none"> <li>• Mesquite Class A and C;</li> <li>• Parkinsonia Class B and C;</li> <li>• Prickly acacia Class A and C.</li> </ul> <p>The above listed weeds are all declared as Weeds of National Significance (WONS). Refer to map attached at Appendix 1.</p> <p>EPBC reported weed species that are or may potentially be present within the search area grid are listed in Appendix 1. The same weed species as those in the NR Maps are listed for the search area.</p> <p>Vehicle hygiene measures are detailed in the Project Weed Management information sheet. Given the NR Maps recorded infestations and concentrations (dense/very dense) of Weed within the site, the proponent shall pay particular attention to personnel and contractor observance of vehicle hygiene measures.</p> <p>The 2018 NT Weeds Branch Weed Management Handbook at Appendix 1 shall be the reference tool that the proponent will use to assist in identifying and managing site declared weeds. If observed, the proponent shall record the occurrence for pastoralist, DITT and DEPWS reference.</p>
<p><b>Step 3:</b> Will you be using water from bores</p>	<p>No</p>	<p>Water related matters on mineral titles are no longer exempt from the <i>Water Act 1992</i>. Please consult with DEPWS Water Resources</p>	<p>The proponent will consult with respective pastoralists for use of limited amounts of water for</p>

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ASSESSMENT ASPECT	YES or NO	ACTIONS REQUIRED (if answered YES)	APPENDED INFORMATION (e.g. evidence of consultation with DEPWS and/or management plan where required).
or other sources for the operation?		and/or familiarise yourself with the <i>Water Act</i> to ensure compliance under this Act when undertaking exploration activities.	drilling purposed if and when required.

## Environmental assessment and cultural considerations

ASSESSMENT ASPECT	YES or NO	MANAGEMENT REQUIREMENTS
<b>Step 4:</b> Is your project likely to have a significant impact on the environment?	No	Refer to the NTEPA Environmental Factors and Objectives Guideline.
<b>Step 5:</b> Are there Aboriginal sacred sites in the Project area?	No	<p>Sacred Sites are protected under the NT <i>Aboriginal Sacred Sites Act</i> and administered by the Aboriginal Areas Protection Authority (AAPA). It is recommended that advice be sought from AAPA in relation to sacred site protection.</p> <p>The proponent has consulted with the AAPA and received advice that no sacred sites are recorded or registered within the Project.</p> <p>The AAPA does not allow sacred site reports or information provided to be shared with third parties.</p>
<b>Step 6:</b> Are there archaeological and heritage sites in the Project area?	No	<p>Heritage and archaeology sites are protected in the NT. NT Heritage Branch of the Department of Environment, Parks and Water Supply (DEPWS) administers the <i>Heritage Act</i>. Seek advice in relation to protection of heritage and archaeological sites.</p> <p>The proponent has consulted with the NT Heritage Branch who confirmed no heritage or archaeological sites are present within the Project.</p> <p>A copy of the report is included in the Attachments folder.</p>

## Section 3 – Amendments

As per Section 41(3) of the *Mining Management Act*, an MMP reviewed and amended under Section 41(1)(a) is to have amendments made since the previous MMP submission clearly identified.

Section	Amendment
<b>1. Project Details – Proposed Schedule</b>	Stage 1: 03/2022 to 06/2023 Stage 2: 06/2023 to 06/2024 (and ongoing as required)
<b>4. Proposed Activities</b>	<ul style="list-style-type: none"> <li>• Drill pad size – 25m x 35m</li> <li>• Total area disturbed purpose – 27.19ha</li> </ul>

## Section 4 – Activities Proposed for this MMP only

Provide relevant EL numbers

Mining Interests (i.e. titles)	EL32293			
Number and type of proposed exploration drill holes	20 RC with diamond tails (Stage 2)			
Maximum depth of proposed holes (m)	1,000m			
Number and size of drill pads to be cleared (Length: m x Width: m)	25 pads @ 35m by 25m			
Total area of drill pads to be cleared (ha)	2.19ha			
Number of proposed water bores	nil			
Is drilling likely to encounter groundwater in multiple or confined aquifers? (Y, N, unsure) If answering yes, please provide the number of exploration holes where this is likely to occur	unsure			
Number of costeans	0			
Volume to backfill costeans (Length: m x Width: m x Depth: m)	0			
Number of bulk sample pits	0			
Volume to backfill bulk sample pits (Length: m x Width: m x Depth: m)	0			
Bulk sample pits approved under <i>Mineral Titles Act</i> ? (Y or N). If Yes provide approval	0			
Line/track clearing: (length m x width m)	50km by 5m			

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<b>Mining Interests (i.e. titles)</b>	<b>EL32293</b>			
Area of proposed line/track clearing (ha)	25ha			
Camp area to be cleared (ha)	n/a (a very large, naturally vegetation free area at Mount Lamb is considered suitable for a campsite without requiring clearing)			
Camp Infrastructure (i.e. demountable, tents) Please provide a complete list with measurements as required in the security calculation	Tents and/or caravans			
Other	n/a			
Total proposed area of disturbance (ha)	27.19ha			

Staging approach based on disturbance can be proposed and will be considered by the Department.

## Section 5 – Previous Disturbance (for existing Authorisations only)

The 'Disturbance Tracking' spreadsheet must be completed and attached to the MMP submission to complete this section. The spreadsheet is available on the departmental web page where this template is located.

## Section 6 – Environmental Management

By checking these shaded boxes, you are agreeing to implement the following minimum environmental management standards on the project area. Where boxes have been left unchecked, justification is required.

6.1		Blade-up approach for clearing will be used (i.e. no windrows, leave root stock and topsoil)
6.2	<b>X</b>	Significant vegetation will be avoided during clearing (i.e. large trees, specimens providing habitat or food sources, riparian vegetation, and threatened species)
6.3	<b>X</b>	Vegetation clearing during, and immediately after rainfall events, will be avoided
6.4	<b>X</b>	Vegetation clearing will be kept to the minimum required to safely traverse vehicles and drill rigs along tracks and drill pads
6.5	<b>X</b>	Where blade-up techniques cannot be employed, topsoil and vegetation will be stockpiled appropriately for rehabilitation purposes
6.6	<b>X</b>	All employees and contractors will be trained and inducted in relation to the management of environmental risks in the work area, including weeds, waterways, threatened species, soil erosion, sacred sites and heritage areas
6.7	<b>X</b>	Sumps will be lined or tanks of appropriate size to contain water, sediment and drilling fluids encountered during drilling, will be used
6.8	<b>X</b>	Sumps, drill holes, and fuel stores will be located away from environmentally significant areas and water courses
6.9	<b>X</b>	Excavations (sumps, costeans and pits) will be appropriately ramped to allow fauna egress
6.10	<b>X</b>	Drill holes will be securely capped immediately after drilling
6.11	<b>X</b>	Vehicle hygiene measures will be employed to prevent the introduction and spread of invasive species and pathogens when mobilising vehicles and equipment from one location to another
6.12	<b>X</b>	Hydrocarbon spills will be minimised using liners and drip trays under machinery, and appropriately sized spill-kits available in the event of a spill
6.13	<b>X</b>	Hazardous substances (including hydrocarbons) will be stored and handled in accordance with relevant Australian Standards
6.14	<b>X</b>	Hydrocarbons will be stored in lined and bunded areas
6.15	<b>X</b>	Waste will be stored securely while on-site to minimise windblown rubbish and access by feral animals
6.16	<b>X</b>	Waste will be removed off-site and disposed of at an appropriate waste management facility
6.17	<b>X</b>	All environmental incidents will be reported to the Department in accordance with Section 29 of the <i>Mining Management Act</i> .

### Mining Management Exploration Activities

6.18	<b>X</b>	Acid and Metalliferous Drainage (AMD) and Potentially Acid Forming (PAF) material derived from drilling cuts will be managed to avoid AMD and PAF related issues on site.
6.19	<b>X</b>	Radioactive/NORM drill cuttings will be managed to avoid radiation related issues on site.
6.20	<b>X</b>	Dust management will be implemented on site.

Justification and alternative management measures:

6.1 not checked to ensure main access track is properly constructed for duration of the Project but required rehabilitation as per 6.5 will be carried out. Where blade up approach is suitable (i.e. minor tracks) this will be undertaken

## Section 7 – Rehabilitation and Closure

By checking these shaded boxes, you are agreeing to implement the following minimum rehabilitation standards on the project area. Where boxes have been left unchecked, justification is required.

A refund of security related to completed rehabilitation on site requires the submission of a rehabilitation report including photographs, an updated security calculation and updated disturbance tracking spreadsheet to the Department.

7.1	<b>X</b>	Drill holes will be plugged below ground level at a minimum depth of 0.4 metres and soil mounded to prevent subsidence, within 6 months of completion of drilling.
7.2	<b>X</b>	Drill holes encountering multiple or confined aquifers will be grouted with concrete.
7.3	<b>X</b>	Drill samples/spoil will be returned down drill holes, buried in sumps, or removed from site.
7.4	<b>X</b>	All drill hole and access markers including flagging tape, wooden markers and star pickets will be removed from site.
7.5	<b>X</b>	Cut and fill drill pads will be re-contoured to be consistent with the surrounding terrain.
7.6	<b>X</b>	Drill pads and compacted areas along the contour (on sloping ground) will be ripped/scarified of and tracks will be cross-ripped (zig-zag).
7.7	<b>X</b>	Tracks will be rehabilitated, including pushing in all windrows, unless otherwise agreed in writing by the land holder or appropriate third party.
7.8	<b>X</b>	Appropriate erosion and sediment controls will be installed where erosion is evident or likely to occur.
7.10	<b>X</b>	Access through watercourses will be removed and banks restored.
7.11	<b>X</b>	All previously disturbed areas will be stable, with no evidence of active soil erosion.
7.12	<b>X</b>	All excavations will be backfilled within 6 months of their completion.
7.13	<b>X</b>	All water bores will be decommissioned unless otherwise agreed in writing by the land holder or appropriate third party.
7.14	<b>X</b>	All rubbish and infrastructure will be removed from site.
7.15	<b>X</b>	Topsoil will be replaced and vegetation re-established.
7.16	<b>X</b>	Contaminated soils (e.g. hydrocarbon or hazardous chemicals) will be rehabilitated or removed from site.
7.17	<b>X</b>	Monitoring will be undertaken following the wet season or a significant rainfall event.

Justification and alternative management measures:

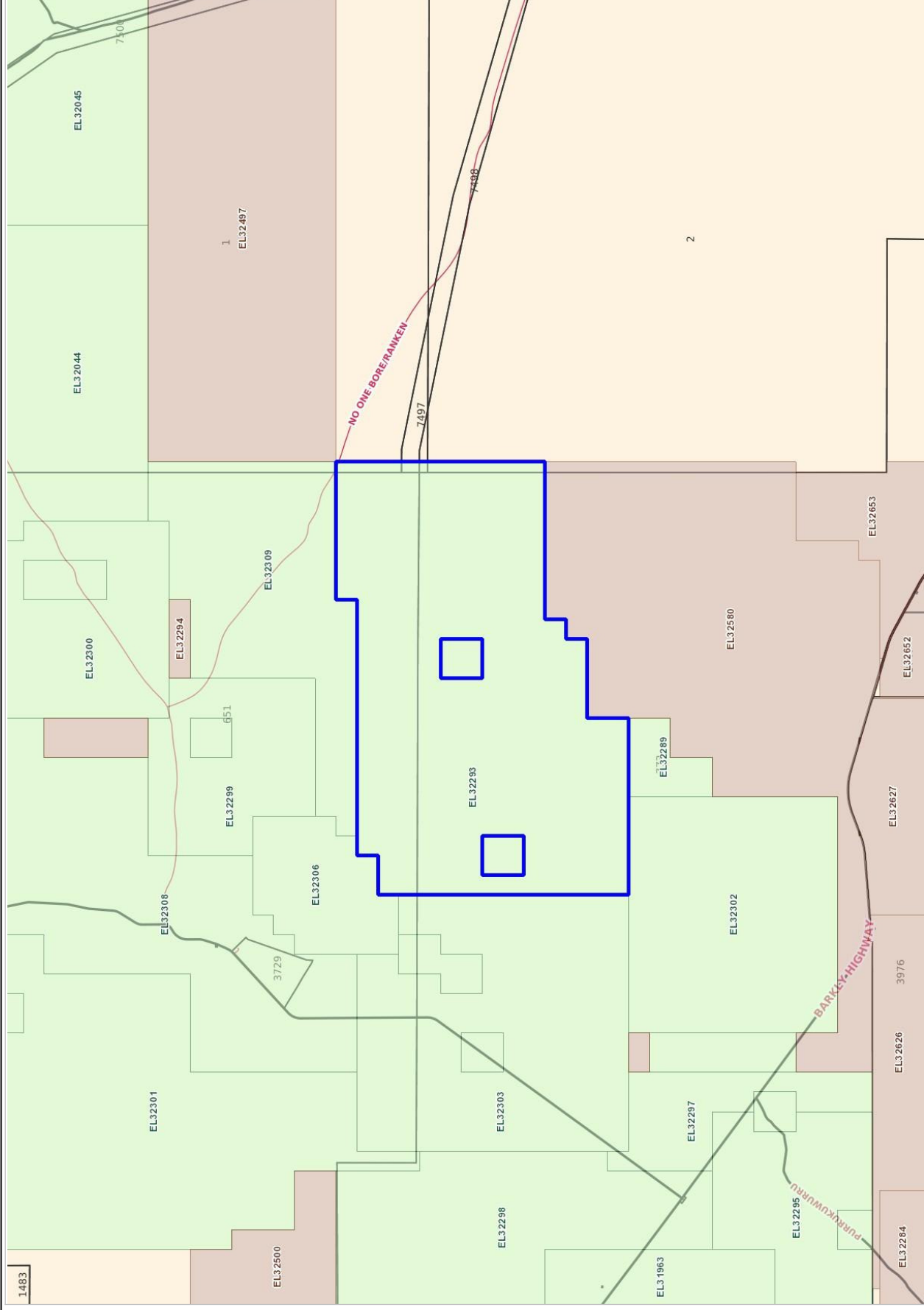


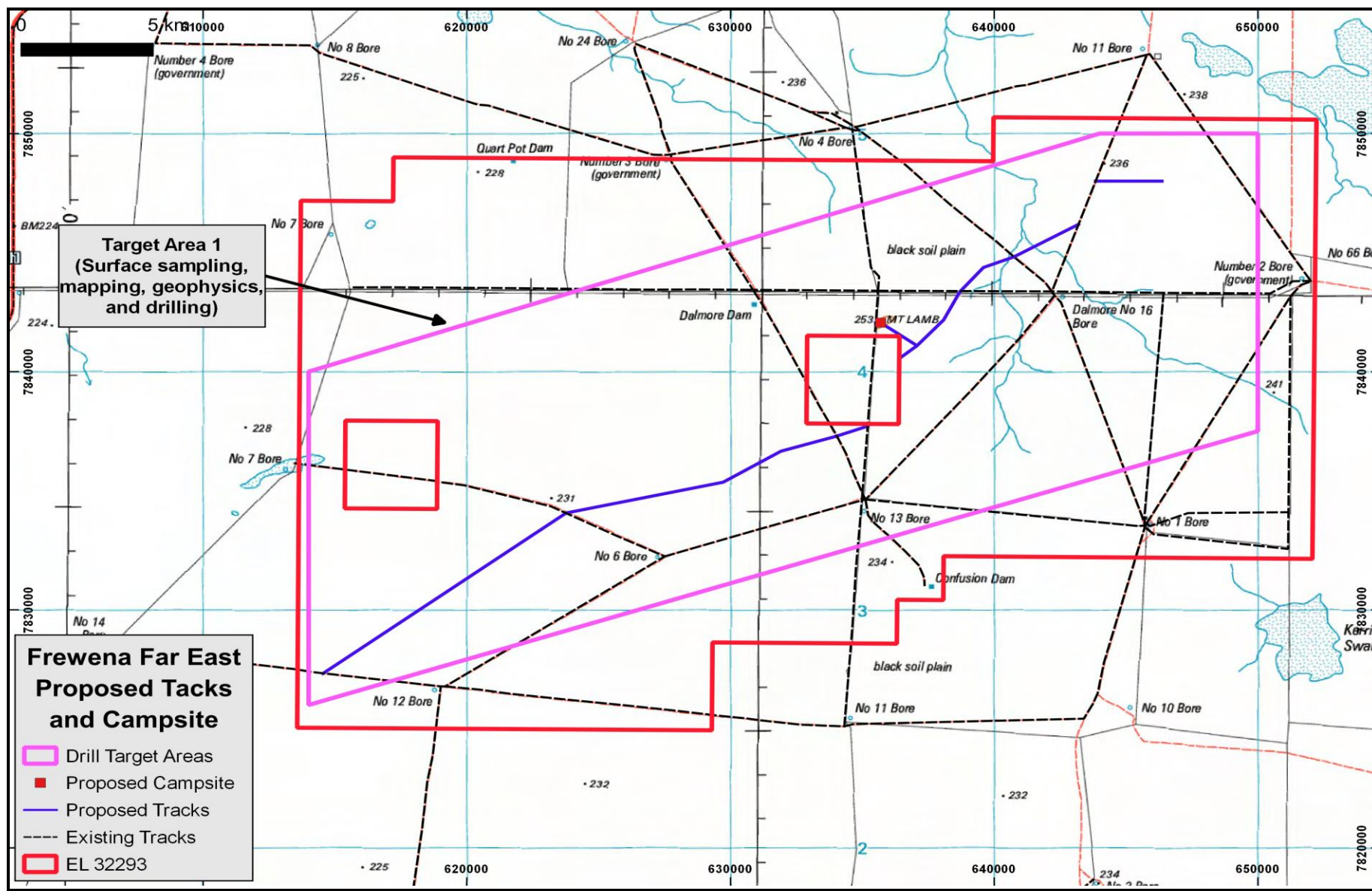
## Mining Management Exploration Activities

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## Section 8 – Required Attachments

8.1	<b>N/R</b>	Initial Application for Authorisation or variation of Authorisation (only if details on the form have subsequently changed).
8.2	<b>N/R</b>	Nomination of Operator Form, where required
8.3	<b>X</b>	Security Calculation Spreadsheet
8.4	<b>X</b>	Evidence of Land Access Agreement if operating on an Exploration Licence (EL) on Pastoral Lease (e.g. two-ways exchange of email) - <b>attached</b>
8.5	<b>N/R</b>	Disturbance tracking spreadsheet (for existing Authorisations) – <b>no disturbance to date</b>
8.6	<b>X</b>	Spreadsheet with coordinates of proposed drill holes or polygons of target areas
8.7	<b>X</b>	KML/shape files/track logs of proposed tracks, camp sites and proposed drill holes or polygons of target areas
8.8	<b>X</b>	Map(s) of the work area(s) showing: <ol style="list-style-type: none"> <li>1. title boundaries and title numbers</li> <li>2. current and proposed drill holes, or polygons of target areas</li> <li>3. current and proposed tracks</li> <li>4. rehabilitated areas – <b>no disturbance to date</b></li> <li>5. camp sites</li> <li>6. heritage sites or significant environmental areas</li> <li>7. environmental constraints</li> </ol>
8.10	<b>N/A</b>	Radiation Management Plan (if applicable)
8.12	<b>X</b>	Document(s) being appended in relation to Section 2 (if any): <ul style="list-style-type: none"> <li>- Appendix 1               <ul style="list-style-type: none"> <li>• EPBC Report,</li> <li>• NR Maps Threatened Species,</li> <li>• Threatened Species Data Sheets,</li> <li>• NR Maps Weeds,</li> <li>• Project Weed Management,</li> <li>• NT Weed Management Handbook,</li> <li>• NT Heritage Branch Report</li> </ul> </li> <li>- Appendix 2               <ul style="list-style-type: none"> <li>• EL32293 Location Map</li> <li>• EL32293 – Drill Hole Coordinates, Camp, Tracks</li> <li>• Shapefiles</li> </ul> </li> </ul>





**Drill hole coordinates – EL32293**

Target Area	Point Location	Easting_GDA94Z53	GDA94Z53_Northing
1	P1	614000	7840000
1	P2	614000	7826000
1	P3	650000	7837500
1	P4	650000	7850000
1	P5	644000	7850000

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## EL32293 – Frewena Far East Project Weeds and Weed Management

The following declared weeds were identified in 2021 DEPWS map and 2021 EPBC Report at Appendix 1 as occurring within or having the potential to be present within the Project.

Weed Species	Declared Weed Classification	Treatment
<b>Parkinsonia</b>	Class B and C – Weed of National Significance (WONS)	Chemical and non-chemical treatments are detailed in the 2018 Weeds Branch Weed Management Handbook at Appendix 1.
<b>Mesquite</b>	Class A and C – Weed of National Significance (WONS)	Chemical and non-chemical treatments are detailed in the 2018 Weeds Branch Weed Management Handbook at Appendix 1
<b>Prickly acacia</b>	Class A and C – Weed of National Significance (WONS)	Chemical and non-chemical treatments are detailed in the 2018 Weeds Branch Weed Management Handbook at Appendix 1

The proponent will consult with the respective pastoralist in the event that treatment of weeds by spraying is under consideration.

The proponent has a copy of the 2018 NT Weeds Branch Management Handbook is the reference tool that the proponent shall use to assist in managing site weeds in consultation with the owner and occupier of the site.

### Vehicle Hygiene Measures

- Proponent vehicles and equipment shall be inspected for the presence of weeds prior to gaining entry to the site. If present, weeds shall be removed and stored in a heavy-duty plastic storage bag or drum for disposal at Tennant Creek tip or buried in a pit of a minimum depth of 1 metre.
  - Proponent vehicles and plant shall be inspected before leaving the site. If present, weeds shall be removed and stored in a heavy-duty plastic storage bag or drum for disposal at Tennant Creek tip or buried in a pit of a minimum depth of 1 metre.
  - The proponent shall inspect all contractor vehicles, plant and equipment for the presence of weeds prior to entering and leaving the site.
  - Records and dates of vehicle, plant and equipment inspections and the results shall be recorded by the proponent or contractor. Records shall be retained by the proponent in the event that review by the DITT is requested.
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# EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected.

Information on the coverage of this report and qualifications on data supporting this report are contained in the caveat at the end of the report.

Information is available about [Environment Assessments](#) and the EPBC Act including significance guidelines, forms and application process details.

Report created: 04/03/21 14:01:02

[Summary](#)

[Details](#)

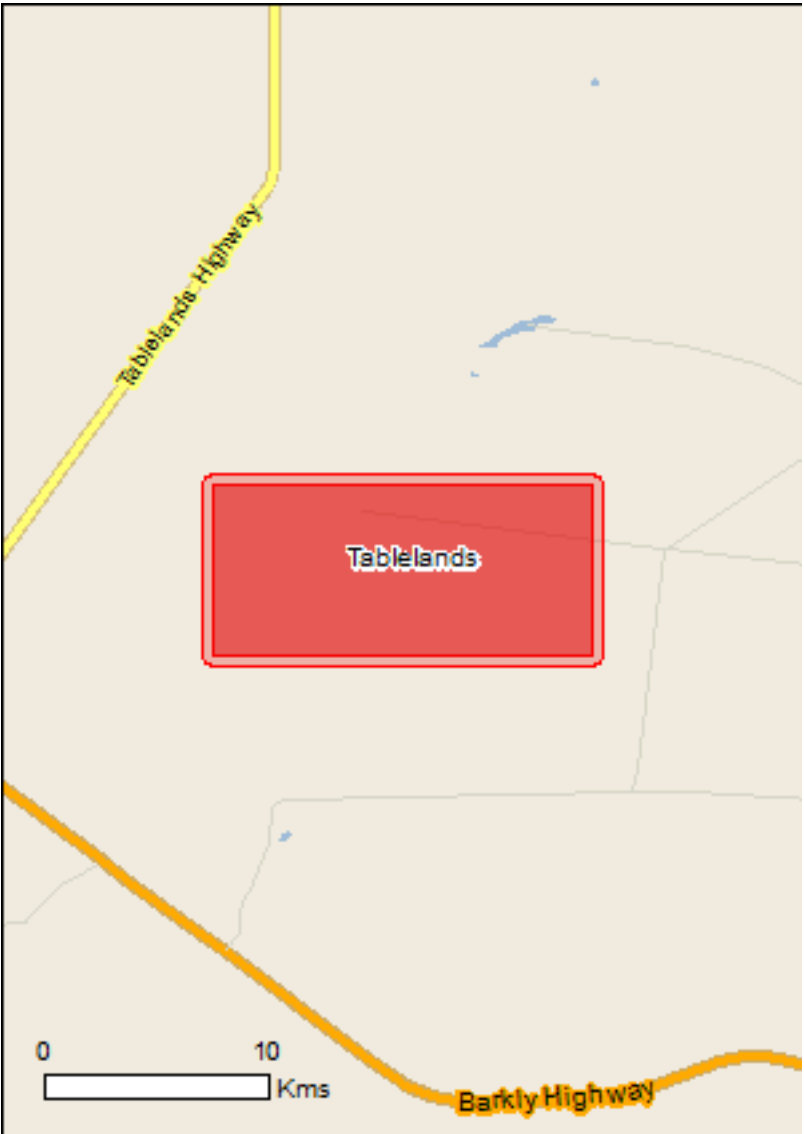
[Matters of NES](#)

[Other Matters Protected by the EPBC Act](#)

[Extra Information](#)

[Caveat](#)

[Acknowledgements](#)



This map may contain data which are  
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[Coordinates](#)

[Buffer: 0.5Km](#)



# Summary

## Matters of National Environmental Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the [Administrative Guidelines on Significance](#).

<a href="#">World Heritage Properties:</a>	None
<a href="#">National Heritage Places:</a>	None
<a href="#">Wetlands of International Importance:</a>	None
<a href="#">Great Barrier Reef Marine Park:</a>	None
<a href="#">Commonwealth Marine Area:</a>	None
<a href="#">Listed Threatened Ecological Communities:</a>	None
<a href="#">Listed Threatened Species:</a>	6
<a href="#">Listed Migratory Species:</a>	10

## Other Matters Protected by the EPBC Act

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As heritage values of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place. Information on the new heritage laws can be found at <http://www.environment.gov.au/heritage>

A [permit](#) may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species.

<a href="#">Commonwealth Land:</a>	None
<a href="#">Commonwealth Heritage Places:</a>	None
<a href="#">Listed Marine Species:</a>	15
<a href="#">Whales and Other Cetaceans:</a>	None
<a href="#">Critical Habitats:</a>	None
<a href="#">Commonwealth Reserves Terrestrial:</a>	None
<a href="#">Australian Marine Parks:</a>	None

## Extra Information

This part of the report provides information that may also be relevant to the area you have nominated.

<a href="#">State and Territory Reserves:</a>	None
<a href="#">Regional Forest Agreements:</a>	None
<a href="#">Invasive Species:</a>	10
<a href="#">Nationally Important Wetlands:</a>	None
<a href="#">Key Ecological Features (Marine)</a>	None



# Details

## Matters of National Environmental Significance

Listed Threatened Species		[ Resource Information ]
Name	Status	Type of Presence
Birds		
<a href="#">Calidris ferruginea</a> Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
<a href="#">Erythroriorchis radiatus</a> Red Goshawk [942]	Vulnerable	Species or species habitat may occur within area
<a href="#">Falco hypoleucos</a> Grey Falcon [929]	Vulnerable	Species or species habitat may occur within area
<a href="#">Pezoporus occidentalis</a> Night Parrot [59350]	Endangered	Species or species habitat may occur within area
<a href="#">Rostratula australis</a> Australian Painted Snipe [77037]	Endangered	Species or species habitat may occur within area
Mammals		
<a href="#">Macrotis lagotis</a> Greater Bilby [282]	Vulnerable	Species or species habitat may occur within area
Listed Migratory Species		[ Resource Information ]
* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.		
Name	Threatened	Type of Presence
Migratory Marine Birds		
<a href="#">Apus pacificus</a> Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Migratory Terrestrial Species		
<a href="#">Hirundo rustica</a> Barn Swallow [662]		Species or species habitat may occur within area
<a href="#">Motacilla cinerea</a> Grey Wagtail [642]		Species or species habitat may occur within area
<a href="#">Motacilla flava</a> Yellow Wagtail [644]		Species or species habitat may occur within area
Migratory Wetlands Species		

Name	Threatened	Type of Presence
<a href="#">Actitis hypoleucos</a> Common Sandpiper [59309]	Critically Endangered	Species or species habitat may occur within area
<a href="#">Calidris acuminata</a> Sharp-tailed Sandpiper [874]		Species or species habitat may occur within area
<a href="#">Calidris ferruginea</a> Curlew Sandpiper [856]		Species or species habitat may occur within area
<a href="#">Calidris melanotos</a> Pectoral Sandpiper [858]		Species or species habitat may occur within area
<a href="#">Charadrius veredus</a> Oriental Plover, Oriental Dotterel [882]		Species or species habitat may occur within area
<a href="#">Glareola maldivarum</a> Oriental Pratincole [840]		Species or species habitat may occur within area

Other Matters Protected by the EPBC Act

Listed Marine Species		[ Resource Information ]
* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.		
Name	Threatened	Type of Presence
Birds		
<a href="#">Actitis hypoleucos</a> Common Sandpiper [59309]		Species or species habitat may occur within area
<a href="#">Apus pacificus</a> Fork-tailed Swift [678]		Species or species habitat likely to occur within area
<a href="#">Ardea alba</a> Great Egret, White Egret [59541]		Species or species habitat likely to occur within area
<a href="#">Ardea ibis</a> Cattle Egret [59542]		Species or species habitat may occur within area
<a href="#">Calidris acuminata</a> Sharp-tailed Sandpiper [874]		Species or species habitat may occur within area
<a href="#">Calidris ferruginea</a> Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
<a href="#">Calidris melanotos</a> Pectoral Sandpiper [858]		Species or species habitat may occur within area
<a href="#">Charadrius veredus</a> Oriental Plover, Oriental Dotterel [882]		Species or species habitat may occur within area
<a href="#">Chrysococcyx osculans</a> Black-eared Cuckoo [705]		Species or species habitat may occur within area

Name	Threatened	Type of Presence
<a href="#">Glareola maldivarum</a> Oriental Pratincole [840]		Species or species habitat may occur within area
<a href="#">Hirundo rustica</a> Barn Swallow [662]		Species or species habitat may occur within area
<a href="#">Merops ornatus</a> Rainbow Bee-eater [670]		Species or species habitat may occur within area
<a href="#">Motacilla cinerea</a> Grey Wagtail [642]		Species or species habitat may occur within area
<a href="#">Motacilla flava</a> Yellow Wagtail [644]		Species or species habitat may occur within area
<a href="#">Rostratula benghalensis (sensu lato)</a> Painted Snipe [889]	Endangered*	Species or species habitat may occur within area

## Extra Information

Invasive Species

[ [Resource Information](#) ]

Weeds reported here are the 20 species of national significance (WoNS), along with other introduced plants that are considered by the States and Territories to pose a particularly significant threat to biodiversity. The following feral animals are reported: Goat, Red Fox, Cat, Rabbit, Pig, Water Buffalo and Cane Toad. Maps from Landscape Health Project, National Land and Water Resouces Audit, 2001.

Name	Status	Type of Presence
Birds		
Passer domesticus House Sparrow [405]		Species or species habitat likely to occur within area
Mammals		
Bos taurus Domestic Cattle [16]		Species or species habitat likely to occur within area
Canis lupus familiaris Domestic Dog [82654]		Species or species habitat likely to occur within area
Felis catus Cat, House Cat, Domestic Cat [19]		Species or species habitat likely to occur within area
Sus scrofa Pig [6]		Species or species habitat likely to occur within area
Plants		
Cenchrus ciliaris Buffel-grass, Black Buffel-grass [20213]		Species or species

Name	Status	Type of Presence
Parkinsonia aculeata Parkinsonia, Jerusalem Thorn, Jelly Bean Tree, Horse Bean [12301]  Prosopis spp. Mesquite, Algaroba [68407]  Vachellia nilotica Prickly Acacia, Blackthorn, Prickly Mimosa, Black Piquant, Babul [84351]		habitat may occur within area
		Species or species habitat likely to occur within area
		Species or species habitat likely to occur within area
Reptiles		Species or species habitat likely to occur within area
		Species or species habitat likely to occur within area

# Caveat

The information presented in this report has been provided by a range of data sources as acknowledged at the end of the report.

This report is designed to assist in identifying the locations of places which may be relevant in determining obligations under the Environment Protection and Biodiversity Conservation Act 1999. It holds mapped locations of World and National Heritage properties, Wetlands of International and National Importance, Commonwealth and State/Territory reserves, listed threatened, migratory and marine species and listed threatened ecological communities. Mapping of Commonwealth land is not complete at this stage. Maps have been collated from a range of sources at various resolutions.

Not all species listed under the EPBC Act have been mapped (see below) and therefore a report is a general guide only. Where available data supports mapping, the type of presence that can be determined from the data is indicated in general terms. People using this information in making a referral may need to consider the qualifications below and may need to seek and consider other information sources.

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Threatened, migratory and marine species distributions have been derived through a variety of methods. Where distributions are well known and if time permits, maps are derived using either thematic spatial data (i.e. vegetation, soils, geology, elevation, aspect, terrain, etc) together with point locations and described habitat; or environmental modelling (MAXENT or BIOCLIM habitat modelling) using point locations and environmental data layers.

Where very little information is available for species or large number of maps are required in a short time-frame, maps are derived either from 0.04 or 0.02 decimal degree cells; by an automated process using polygon capture techniques (static two kilometre grid cells, alpha-hull and convex hull); or captured manually or by using topographic features (national park boundaries, islands, etc). In the early stages of the distribution mapping process (1999-early 2000s) distributions were defined by degree blocks, 100K or 250K map sheets to rapidly create distribution maps. More reliable distribution mapping methods are used to update these distributions as time permits.

Only selected species covered by the following provisions of the EPBC Act have been mapped:

- migratory and
- marine

The following species and ecological communities have not been mapped and do not appear in reports produced from this database:

- threatened species listed as extinct or considered as vagrants
- some species and ecological communities that have only recently been listed
- some terrestrial species that overfly the Commonwealth marine area
- migratory species that are very widespread, vagrant, or only occur in small numbers

The following groups have been mapped, but may not cover the complete distribution of the species:

- non-threatened seabirds which have only been mapped for recorded breeding sites
- seals which have only been mapped for breeding sites near the Australian continent

Such breeding sites may be important for the protection of the Commonwealth Marine environment.

## Coordinates

-19.627 135.95544,-19.627 136.1065,-19.69037 136.1065,-19.69037 135.95544,-19.627 135.95544

# Acknowledgements

This database has been compiled from a range of data sources. The department acknowledges the following custodians who have contributed valuable data and advice:

- [-Office of Environment and Heritage, New South Wales](#)
- [-Department of Environment and Primary Industries, Victoria](#)
- [-Department of Primary Industries, Parks, Water and Environment, Tasmania](#)
- [-Department of Environment, Water and Natural Resources, South Australia](#)
- [-Department of Land and Resource Management, Northern Territory](#)
- [-Department of Environmental and Heritage Protection, Queensland](#)
- [-Department of Parks and Wildlife, Western Australia](#)
- [-Environment and Planning Directorate, ACT](#)
- [-Birdlife Australia](#)
- [-Australian Bird and Bat Banding Scheme](#)
- [-Australian National Wildlife Collection](#)
- Natural history museums of Australia
- [-Museum Victoria](#)
- [-Australian Museum](#)
- [-South Australian Museum](#)
- [-Queensland Museum](#)
- [-Online Zoological Collections of Australian Museums](#)
- [-Queensland Herbarium](#)
- [-National Herbarium of NSW](#)
- [-Royal Botanic Gardens and National Herbarium of Victoria](#)
- [-Tasmanian Herbarium](#)
- [-State Herbarium of South Australia](#)
- [-Northern Territory Herbarium](#)
- [-Western Australian Herbarium](#)
- [-Australian National Herbarium, Canberra](#)
- [-University of New England](#)
- [-Ocean Biogeographic Information System](#)
- [-Australian Government, Department of Defence](#)
- [Forestry Corporation, NSW](#)
- [-Geoscience Australia](#)
- [-CSIRO](#)
- [-Australian Tropical Herbarium, Cairns](#)
- [-eBird Australia](#)
- [-Australian Government – Australian Antarctic Data Centre](#)
- [-Museum and Art Gallery of the Northern Territory](#)
- [-Australian Government National Environmental Science Program](#)
- [-Australian Institute of Marine Science](#)
- [-Reef Life Survey Australia](#)
- [-American Museum of Natural History](#)
- [-Queen Victoria Museum and Art Gallery, Inveresk, Tasmania](#)
- [-Tasmanian Museum and Art Gallery, Hobart, Tasmania](#)
- Other groups and individuals

The Department is extremely grateful to the many organisations and individuals who provided expert advice and information on numerous draft distributions.

Please feel free to provide feedback via the [Contact Us](#) page.

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[Department of Agriculture Water and the Environment](#)

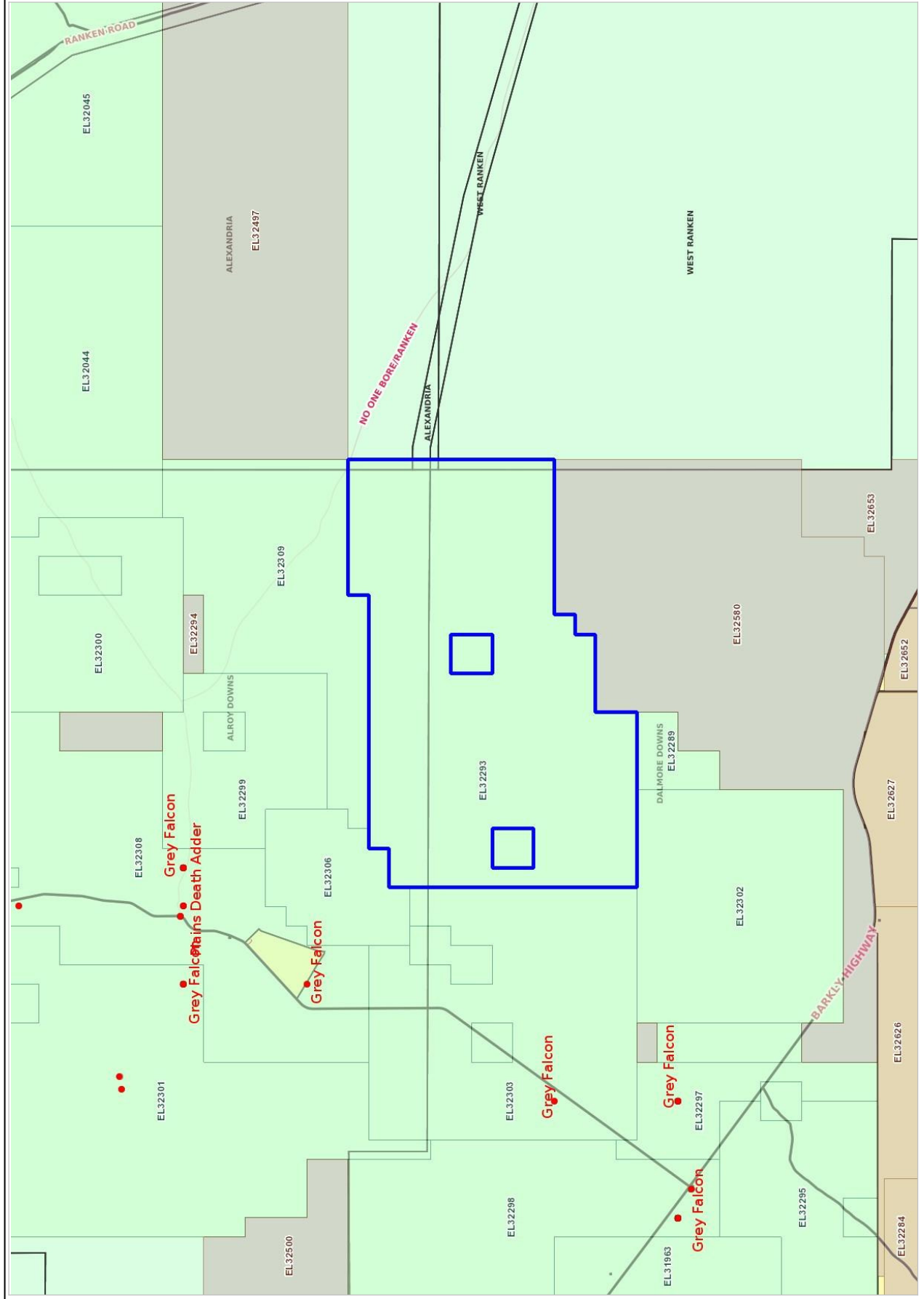
GPO Box 858

Canberra City ACT 2601 Australia

+61 2 6274 1111

# NR MAPS

## EL32293 - Recorded Threatened Species

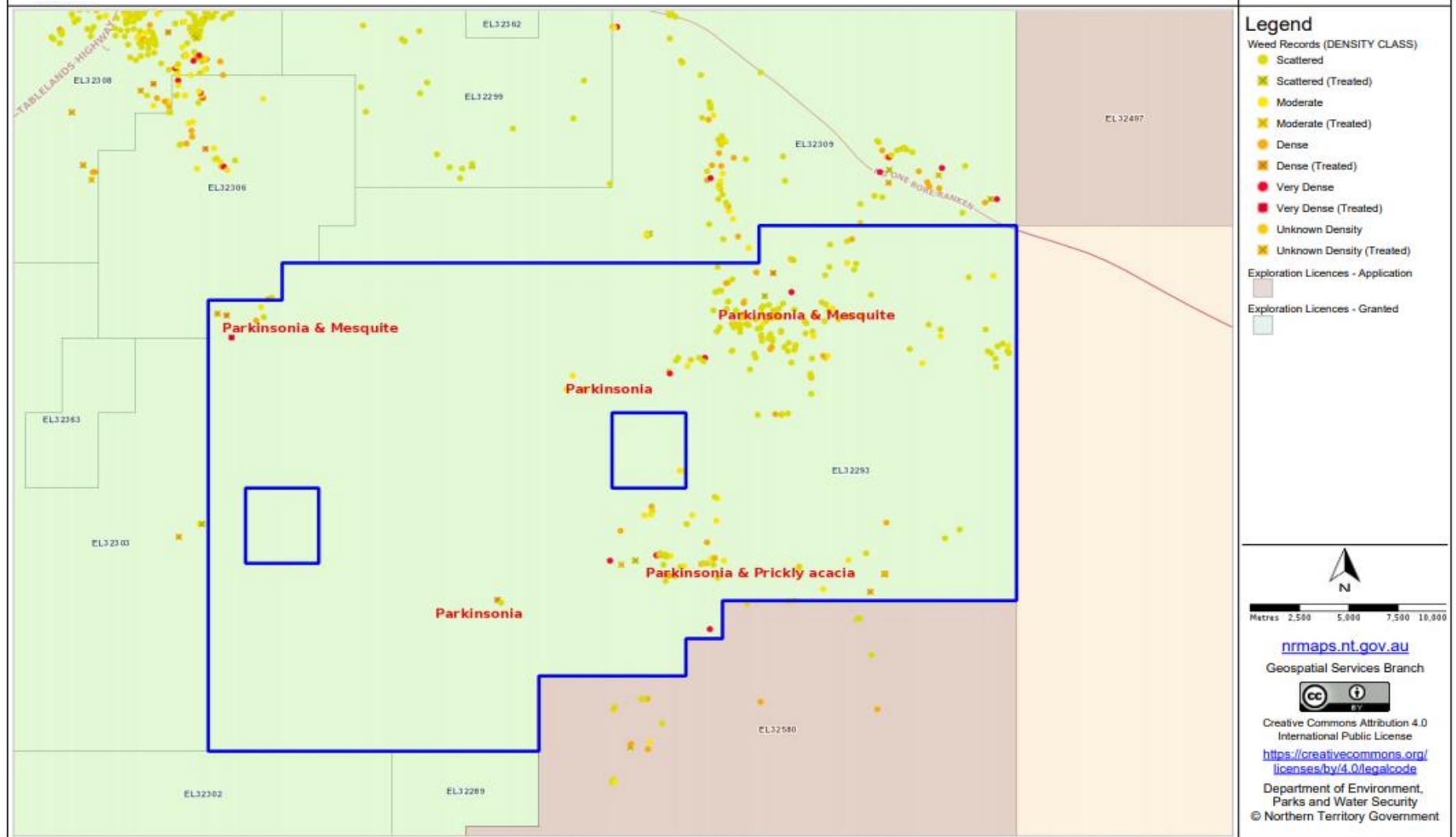




# NR MAPS

## EL32293 NR Maps-Weed Species

Parkinsonia. Mesquite & Prickly acacia



Created by anonymous, 03 Mar 2021



Northern Territory

# Weed Management Handbook



[www.nt.gov.au/weeds](http://www.nt.gov.au/weeds)





## About this Manual

This manual has been developed to provide detailed information about weed control in the Northern Territory.

**Weed Control Option Tables** are available that detail herbicide recommendations and optimum treatment times for most problem weeds. Other control methods, which can assist in weed management, have also been described.

It should be noted that this document has been designed to provide information for the control of weeds in non-crop situations.

## Disclaimer

While care has been taken to ensure that the information provided was true and correct at the time of publication, changes in circumstance after the time of publication may impact on the accuracy of this information. The Northern Territory of Australia gives no warranty or assurance and makes no representation as to the accuracy of any information or advice contained, or that it is suitable for your intended use.

The Northern Territory of Australia accepts no liability for any losses or damages, including incidental or consequential damages, resulting from use of the material.

Users of agricultural (or veterinary) chemical products must always read the approved label and any APVMA Permit, before using any product and strictly comply with the directions on the label and any conditions on the Permit. Users are not absolved from compliance with the directions on the label or conditions of the Permit by reason of any statement made in or omission from this publication.

## Weed Management Branch

Phone: 08 8999 4567

Fax: 08 8999 4445

Email: [weedinfo@nt.gov.au](mailto:weedinfo@nt.gov.au)

Web: [www.nt.gov.au/weeds](http://www.nt.gov.au/weeds)

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Department of Environment and Natural Resources  
PO Box 496  
Palmerston NT 0831

ISBN 978-1-74350-052-1

**If you suspect poisoning, please contact the Poisons Information Centre Emergency on 13 11 26 (24-hour) and/or call an ambulance.**

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## Weeds in the Northern Territory

Weeds severely impact the Northern Territory's (NT) environmental, economic, social and cultural values.

Environmental values such as biodiversity and ecological function are impacted, through the invasion and replacement of native plant communities and wildlife habitat. Weed infestations can also harbour feral animals, and hinder their control.

Weed infestations can reduce the availability of traditional foods and other resources used by Indigenous people by displacing native plants and animals. Weeds can influence the social well being of Indigenous landowners by disrupting their spiritual and physical connections to country.

Weed populations can also result in restricted access to and recreational use of natural landscapes.

Hunting, fishing, camping and bushwalking can all be affected by weeds. Weed monocultures, such as those created by mimosa, significantly diminish the aesthetic values of the natural landscape.

Weeds in the NT cost land managers millions of dollars per year, through costs of control and lost production. The following information has been taken from the *2010 Pastoral Industry Survey Northern Territory Wide*. It shows the spending, per property, in each of the major cattle producing regions of the NT.

**Table 1 – Amount spent annually on weed control per property and per square kilometre**

Region	Average \$/property	Median \$/property	Maximum \$/km <sup>2</sup>
Alice Springs	1 332	0	0.00
Barkly	38 384	15 000	2.40
Katherine	11 938	6 500	4.80
Top End	52 947	30 000	45.50
NT Wide	20 884	5 000	3.90

## Legislative Responsibilities

The NT *Weeds Management Act* (The Act) applies to all owners, managers and occupiers of land, and all other land users in the NT. To view the complete Act and the Weeds Management Regulations please go to: [www.nt.gov.au/dcm/legislation](http://www.nt.gov.au/dcm/legislation)

Once a weed is declared in accordance with section 7 of the Act there is a requirement for all land holders, land managers and land users to comply with the declaration classification. There are three classification types in the NT, these being:

- Class A: To be eradicated.
- Class B: Growth and spread to be controlled.
- Class C: Introduction into the Territory is to be prevented.

All Class A and Class B weeds are also considered Class C. For information on the classification of individual species please refer to the Weed Control Options Tables or visit [www.nt.gov.au/weeds](http://www.nt.gov.au/weeds)

## Weed Prevention

Both owners and occupiers of land are required to take all reasonable measures to prevent their land being infested with a declared weed.

## Spread Prevention

All land users are required to prevent the spread of a declared or potential weed. This requirement applies on and off your own property.

## Advising of Outbreaks

Where a declared weed is identified on land where it has not previously been, or known to have been present, the person responsible for the land must notify the Weed Management Branch (WMB) of its presence within 14 days – see contact details on the inside cover of this document.

## Weed Disposal

It is illegal to transport declared weeds. You should dispose of any weed material on site. Burning will destroy vegetative plant material and also render most seeds unviable. As some hard coated seeds may survive, on-site deep burial may also be required. On site burial of seeds, and/or plant material, is an effective option if material is placed at a depth sufficient to prevent emergence of vegetative shoots or seedlings.

## Compliance with a Weed Management Plan

The owner and occupier of land on which a declared weed or potential weed is present must comply with any relevant weed management plan approved by the Minister in accordance with section 10 of the Act.

At the time of printing Weed Management Plans were in force for gamba grass, mimosa, bellyache bush, cabomba, prickly acacia, chinee apple, mesquite, neem, grader grass and athel pine.

## Monitoring by Government Officials

The Minister may appoint a Weed Management Officer or authorised person ('Officer'), who is empowered to investigate suspected breaches of the Act. Officers have a number of powers under the Act, including entering and searching properties, documenting findings and, if necessary, ordering the owner or occupier of the land to control or eradicate declared or potential weeds. They are also able to order the owner or person in control of vehicle, boat or animal to remove or destroy any weed material.

## Can I be Fined?

Penalties of between 77 and 770 penalty units (\$11 858 and \$118 580) for individuals and between 385 and 3850 penalty units (\$59 290 and \$592 900) for a body corporate apply for failure to comply with this plan\*.

\* Penalty units are determined by the Penalty Units Act. As at 1 July 2017 the Penalty Units Regulations prescribed the monetary value of a penalty unit as \$154.

## Strategic and Planned Approaches to Weed Management

Different levels, types and locations of weed infestation require different levels of investment, in terms of financial input, human resources and time. This document aims to assist landholders to determine the most appropriate course of action for their property. Effective management should involve:

- preventing introduction;
- preventing or suppressing reproduction, including prevention of seed production and vegetative expansion;
- preventing spread through dispersal of propagules, including seeds and viable vegetative sections;
- eradicating new/isolated outbreaks, particularly those high in the catchment and close to water sources; and
- where eradication is not possible, containing established populations.

These can be achieved by:

- developing/implementing a property management plan which complements other plans within the catchment;
- developing a budget for your weed management control;
- planning to exploit any known weakness in the weed's life-cycle or ecology;
- integrating all appropriate control methods e.g. biological, chemical, and mechanical;
- integrate weed control with other management actions e.g. managing grazing regimes, fire and feral animals;
- implementing a rehabilitation program e.g. revegetation; and
- implementing a monitoring and evaluation program.

## Property Management Planning

Developing a property management plan for your property is about identifying and prioritising what needs to be achieved, within a set time frame.

A plan should aim to systematically contain, reduce and in some instances, eradicate weed infestations, while protecting unaffected country. Ideally property management plans should take into consideration the weed's current distribution, the potential for spread (consider mechanisms for spread with respect to topography, proximity to water courses, proximity to access tracks/roads) and potential impacts on land use and other values such as biodiversity.

Property management plan templates are available from the Weed Management Branch (see contact details on the inside cover of this document). Weed Management Officers from the Branch, can provide assistance with the development of property management plans and can provide advice on all facets of weed management, including control techniques, biological control, legislative responsibilities, monitoring, reporting and regional planning.

## Mapping

Any plan will need to address how big the problem is and where the problem is. Good plans should also take into consideration weed infestations in neighbouring areas.

The Weed Management Branch has produced the *Northern Territory Weed Data Collection Manual*. This manual describes what information to collect when mapping, controlling and monitoring weed infestations in the NT. The manual can be downloaded from [www.nt.gov.au/weeds](http://www.nt.gov.au/weeds). The manual is based on the national guidelines published in *A Field Manual for Surveying and Mapping Nationally Significant Weeds*.

The supply of weed data to the Weed Management Branch by individuals and groups using the manual is important to increase our knowledge of weeds within the NT. The collection of data in accordance with the *Northern Territory Weed Data Collection Manual* will result in improved and consistent data quality. Increased quality and quantity of weed infestation data across all parts of the NT is fundamental in planning and delivering strategic and coordinated weed management to protect the Territory's assets.

## Coordinated Management

As weeds do not recognise property, tenure or state boundaries, it is imperative that land owners work together to coordinate a systematic management approach across catchments to contain weed spread. The responsibilities of individual land owners should be determined and clearly communicated. Complementary property management plans should be developed, administered and evaluated.

## Monitoring and Evaluation

A property management plan should include realistic time frames and goals, recognising that achievements, particularly with regards to established populations, may only become evident in the long term. It is important to document weed occurrences and the control methods used so that success, or failure, can be critically analysed. Accurate records can enable a management program to be reworked or fine tuned depending on the need. Above all, continual maintenance is imperative otherwise reinfestation may only be one growing season away.

## Weed Management Plans

Section 10 of the NT *Weeds Management Act* determines that the Minister may approve species specific Weed Management Plans for a range of purposes including:

- preventing entry of a species to the NT;
- managing a species within the NT; and/or
- managing a species within an area of the NT.

Weed Management Plans have been developed for a number of high priority species in the NT. Management requirements identified are consistent with those identified at the catchment, regional, NT and national levels. Information contained within this guide will assist in meeting requirements identified in statutory Weed Management Plans. Further information regarding the availability of these plans is available from Weed Management Branch.

## Further Information and Resources

Detailed information regarding the management and identification of individual weed species are available from the Weed Management Branch. Examples of resources include Weed Notes, Weed Identification Tables and Best Practice Management Guides. Please visit the website [www.nt.gov.au/weeds](http://www.nt.gov.au/weeds) or email the Branch directly [weedinfo@nt.gov.au](mailto:weedinfo@nt.gov.au) for information.

## Prevention

The easiest and cheapest form of weed control is prevention. Weeds can invade through a number of mechanisms and pathways, but invasion can be combated by applying a few basic principles:

- know what weeds are in your region and ensure they are not inadvertently brought in via items contaminated with seed (e.g. vehicles, machinery, hand tools, soil, feed, mulch and livestock);
- be able to recognise existing and potential weeds which threaten the NT. Early identification of an outbreak could save millions of dollars;
- use established roads and tracks and avoid weed-infested sites;
- if areas containing weeds are encountered, clean all equipment, vehicles and machinery prior to leaving;
- check boats, propellers and trailers before entering and leaving waterways;
- contact landowners before entering properties to see if they have any preventative measures in place;
- dispose of weed plant material and seeds by burning and/or burying at an appropriate depth;
- check the weed status of commercially available garden plants before planting on your property;
- never dispose of aquarium contents into drains or waterways; and
- control any weed infestations before they spread.

*See Appendix A for information on the prevention of weed seed spread, including vehicle hygiene requirements.*



## Weed Control Methods

### Physical Removal

Hand-pulling, although laborious, is effective for recent outbreaks prior to seed set. All root material should be removed from the soil and the plant destroyed to prevent re-sprouting. Grubbing is similar to hand-pulling but employs tools such as mattocks and spades.

Slashing by hand with a brush-cutter or using a tractor and blade can be an effective means of controlling weed growth and suppressing flower and seed development.

Chaining woody weeds can remove the roots and provide efficient rows for burning. This option is best implemented at the end of the wet season when soil moisture is sufficient to allow efficient root removal. Blade-ploughing can be used to push over some woody shrubs and sever their roots underground. The cultivation method is designed to expose the roots and then bury the plant deep enough that it cannot re-sprout.

*Note:* Disturbance of soil can facilitate weed growth, for this reason follow-up and regeneration work should form part of a management program. Physical removal should not be undertaken when a weed is actively producing seeds, as seeds are likely to spread and subsequently set in disturbed ground.

### Control Using Fire

Fire is most effective as part of an integrated management plan.

In areas with a high fuel-load capable of sustaining a slow, concentrated fire, burning may be used to remove woody weed debris, destroy emergent seedlings and kill seeds. However it should be noted that cooler fires may actually scarify seed inducing germination.

Controlled fire can be used as part of an integrated weed control program to control grasses and non-woody species. When used as a management tool fire can kill seedlings, reduce seed production and encourage new foliage growth prior to herbicide control. Burning (or slashing) dense infestations prior to herbicide application can reduce herbicide costs, improve herbicide uptake and reduce application time. Burning can also improve access for other control methods.

Generally following an initial burn, fire should be excluded to provide other desirable plants with optimal conditions to establish and compete with any emerging weed seedlings.

Poorly managed or unmanaged fires can increase weed establishment by burning hot and fast. These fires cause minimal damage to the soil-stored weed seed bank, but can significantly damage native vegetation, hence stimulating prolific post-fire weed regeneration.

*Note:* Any management incorporating burning must be in accordance with the *Bushfires Act* and the *Fire and Emergency Act*. Please contact your local fire station for permits to burn if you live within a Northern Territory Fire and Rescue Service Emergency Response Area (NTFRS ERA). If you live outside a NTFRS ERA, contact your local Volunteer Fire Brigade Captain or local area Fire Warden through the Bushfires Council on Darwin 8922 0844 or Batchelor 8976 0098.

### Biological Control (Biocontrol)

When an exotic weed is introduced, it arrives without the enemies and natural plant competitors that are present in its native range. Biocontrol is a method of weed management that attempts to regain the ecological balance that a weed would have in its native range. Release of biological control agents, such as insects or plant diseases, can decrease weed infestations to manageable levels, enabling other forms of control to be implemented. Biocontrol is a long-term approach and agents are only released after rigorous scientific trial and research to ensure that they will not damage native plants.

See Appendix B for additional information on specific biological control research and developments in the NT.

### Chemical Control

Herbicides are commonly used for controlling weeds in both agricultural and non-agricultural situations. Numerous forms of application techniques and equipment are available to apply herbicides. The options chosen should be determined by the size of the infestation, the available resources, access and personal preferences. Detailed information on herbicide control options and correct usage procedures is included in this document.

*Note:* Users of agricultural (or veterinary) chemical products must always read the label and any Permit, before using the product and strictly comply with the directions on the label and any conditions of any Permit.



## Integrated Weed Control

Integrated weed management combines the use of complementary weed control methods resulting in more effective, long term weed management outcomes. Integrated control requires planning, as often the timing of one control method can enhance the effect of another. An example of integrated weed management is the

- release of biological control agents to reduce vigour in a dense weed infestation **plus**
- use of herbicides to control satellite infestations of the weed elsewhere on the property **plus**
- management of a buffer zone around the dense infestation using physical/chemical control techniques **plus**
- reduction of grazing pressure in areas where weed eradication has been successful **plus**
- exclusion of grazing from areas with severe weed problems **plus**
- the implementation of preventative weed management strategies for the remainder of the property.

## Land Management

Degraded or disturbed land is known to be far more susceptible to weed invasion. For this reason weed control cannot be viewed in isolation from other land management practices.

- Large feral animals, such as buffalos and pigs, can facilitate weed seed spread and germination through behaviours, such as roaming, wallowing and rooting. An effective weed management program should incorporate a feral animal control or exclusion program.
- Fire can be used as an efficient management tool for weed control or, conversely, uncontrolled fire can reduce land condition and facilitate weed establishment and spread.
- The management of clean buffer zones around affected areas can assist in managing outbreaks and containing large infestations.
- Continued maintenance of fire breaks, fence lines and roads can decrease the probability of seed spread and the development of new weed infestations.
- Appropriate stocking rates on suitable native and introduced pastures will allow maximum pasture growth to compete with weed seedlings. Weeds will flourish on over-grazed country.
- Hygiene practices are vital in order to maximise the effort of control methods. Land managers should use weed-free seed and hay, clean machinery, maintain quarantine areas for cattle which may be carrying seed and, where possible, eradicate or isolate infestation sources on the property.

**Table 2 – Control Options**

Infestation level	Biological	Chemical	Mechanical	Physical
Low (Canopy cover between 1% - 10%)	Not suitable.	Spot spraying by hand with a registered herbicide.	Not suitable.	Hand grubbing (remove roots and burn plant).
Medium (Canopy cover between 11% - 50%)	Release of biological control agents.	Spot spraying by hand with a registered herbicide.	Chaining, rolling, raking or back-ploughing, then burning.	Follow up control of seedlings – could include physical removal.
High (Over 50% canopy cover)	Inspect infestation to see if and what biocontrol agents are already present. If necessary, release biological control agents and monitor their progress.	Aerial spraying with a registered herbicide (provided there are no constraints against aerial spraying).	Attack with chaining, rolling or raking. Use fire to kill any regrowth and break seed dormancy.	Follow up control of seedlings – could include physical removal.

## Using Herbicides Correctly

A person who uses a chemical product has a duty of care to ensure the use does not result in harm to the health of the general public, animals, the environment or domestic or export trade in agricultural produce.

The Australian Pesticides and Veterinary Medicines Authority (APVMA) register pesticides and herbicides for use in Australian States and Territories according to the provisions of the *Agvet Code Act*. In addition,

the use of agricultural chemical products in the NT is controlled under the *Agricultural and Veterinary Chemical (Control of Use) Act* and regulations, including *Schedule 7 (Dangerous Poisons)* and *Restricted Chemical Products*. Herbicides must be used according to the directions for use on the APVMA registered label.

The following demonstrates a typical product label format. **It is illegal not to follow the label's instructions.**

### MAIN PANEL

SIGNAL HEADING (*poisons schedule*)  
TRADE NAME/DISTINGUISHING NAME  
ACTIVE CONSTITUENT(S)  
(*chemical ingredient, concentration and formulation*)  
MODE OF ACTION  
(*eg: Group C Herbicide – see Appendix E*)  
STATEMENT OF CLAIMS FOR USE  
(*purpose for which product is registered*)  
PROHIBITION AND RESTRICTION STATEMENTS (*eg: do not apply by air*)  
NET CONTENTS (*volume of container*)

### ANCILLARY PANEL/S

#### DIRECTIONS FOR USE:

Restraints

Crop Pest State Rate Comments

NOT TO BE USED FOR ANY PURPOSE OR IN ANY MANNER CONTRARY TO THIS LABEL UNLESS AUTHORISED UNDER AN APPROPRIATE LEGISLATION.

OTHER LIMITATIONS (*eg: where the herbicide can be used, who the herbicide can be used by*)

WITHHOLDING PERIOD (*minimum interval that should elapse between herbicide application and harvesting, grazing, cutting, slaughtering or the collection of milk and eggs for human consumption*)

#### GENERAL INSTRUCTIONS

Mixing and application – (*eg: mix only with clean water, pre-dissolve and agitate*)

COMPATIBILITY (*may provide examples of chemicals which should not be mixed together*)

PROTECTION OF WILDLIFE, FISH, CRUSTACEAN AND THE ENVIRONMENT (*eg: some chemicals may not be registered for use in specific areas, such as watercourses*)

STORAGE AND DISPOSAL (*see appendix F for information on drumMUSTER and ChemClear*)

SAFETY DIRECTIONS (*this will include necessary personal protective equipment – PPE*)

FIRST AID (*appropriate actions and contact details will be provided*)

EMERGENCY INFORMATION (*will include contact number*)

REFERENCE TO MSDS (*material safety data sheet, this supplements information on the label*)

#### COMPANY WARRANTY STATEMENT

COMPANY NAME, ADDRESS AND AUSTRALIAN COMPANY NUMBER

Batch No: Date of manufacture: Expiry date (*for veterinary and some agricultural products*)

Dangerous good symbol (*if required*).

A permit allows a person or organisation to use an agricultural chemical product in a way that is not in accordance to label direction and would otherwise be in contravention of the *Agricultural and Veterinary Chemical (Control of Use) Act*. Applications can be made to the APVMA for permits to use a registered

product in another situation, different species, higher rates of application or an application method that is not allowed. See the APVMA website for application forms and further details on minor use, emergency use and research permits, and for current minor use permits [www.apvma.gov.au/index.asp](http://www.apvma.gov.au/index.asp)

## Herbicide Toxicity

A herbicide can be defined as a chemical substance used to destroy or inhibit the growth of plants, especially weeds. Herbicides need to be biologically active or toxic, to be effective against the plants that they are intended to kill. In addition to the active ingredient, herbicide formulations may contain other chemicals, such as surfactants and carriers, which may also be toxic. Herbicides can have both immediate (acute) effects and chronic (long-term) effects on the health of people who are exposed to them. Correct administration procedures must be implemented to avoid adverse health effects.

### Acute Toxicity

Poisonings resulting from acute exposure to herbicides can result in a symptoms varying from fatigue, headache, sweating and dizziness to numbness, changes in heart rate, difficulty in breathing and excessive salivation. Advanced poisoning cases may result in convulsions and coma which could lead to death.

### Chronic Toxicity

The effect of long-term exposure to a chemical/s is referred to as chronic toxicity. Effects of chronic toxicity due to long term herbicide exposure include:

- neurotoxic effects (toxic effects on the brain and central nervous system);
- reproductive system effects - The Australian College of Occupational Medicine recommends that women who are pregnant, or likely to become pregnant, protect themselves against chemical exposures that may have adverse reproductive effects. Pregnant women should check herbicide label advice before spraying or using any chemicals.
- carcinogenicity (causing cancer); and
- endocrine (hormone) disruption.

**Table 3 – Poisons Schedule**

Poison schedule	Toxicity	Signal Heading
Unscheduled	Very low toxicity	No heading required
Schedule 5	Slightly toxic	Caution
Schedule 6	Moderately toxic	Poison
Schedule 7	Dangerous	Highly toxic poison

## Routes of Exposure

Chemicals can enter the human body through the skin, lungs, mouth and eyes. Extreme care should be taken to prevent exposure to herbicides, the following should be considered:

- The exposure risk is highest when handling the concentrated version of a product. The most hazardous phase of application is mixing and loading the concentrated product.
- A respirator may be required when mixing/loading or applying herbicides in an enclosed space (such as a shed), if the herbicide is highly volatile and liable to be breathed as a vapour (such as 2,4-D ester) and if application carries the risk of inhaling the spray mist. The herbicide label should be checked for any personal protection requirements.
- Ingestion or swallowing is a risk to users who don't wash their hands after handling chemicals, particularly before eating and drinking. Smoking during chemical preparation and application is not recommended for this reason.

The acute or immediate toxicity of herbicide is required by law to be communicated in the Poisons Schedule (or poison warnings) which appear on the label of a product. Herbicides are classified into four categories on the basis of their potential toxicity to the user. Each schedule has a corresponding signal heading, which appears in large contrasting lettering on the label of the herbicide product. The Poison Schedule will largely determine the safety directions and first aid instructions that appear on the label. **If you suspect poisoning, contact the Poisons Information Centre, emergency phone 13 11 26 (24-hour) and/or call an ambulance.**

## Re-entry Intervals

Once applied, herbicides can remain on sprayed plants in the form of foliar aerosol particles. These residues can readily be dislodged and absorbed through the skin. The re-entry interval is the time that must lapse between applying the herbicide and re-entry into the sprayed area in order to avoid post application exposure. Re-entry intervals appear on the labels of products that have been subject to a technical review by the APVMA. If a re-entry period is not specified on the label, the general rule is to wait 24 hours after application or until the plants are dry, whichever is the longer. Re-entry in the prescribed timeframe should always be avoided if possible, and if re-entry is necessary, personal protective equipment should be worn. Sprayed areas should never be re-entered when the plants are wet i.e. from dew or light rain, irrespective of the time elapsed, unless appropriate personal protective equipment is worn.

## Withholding Periods

The withholding period is the minimum mandated interval that should elapse between the last application of herbicide to any crop, pasture or animal and the harvesting, grazing, cutting, slaughtering or the collection of milk and eggs for human consumption. Observance of the withholding period stated on the registered label is a legal requirement and is part of the direction of use.

## Modes of Action

Modes of action refer to how different groups of herbicides kill plants.

Plants are complex organisms with defined structures in which many vital processes occur in well ordered sequences. Plants are made up of organs (roots, leaves etc), which consist of tissues (photosynthetic, meristematic and structural tissue etc), that in turn are made up of cells. Within these cells metabolic processes such as photosynthesis, protein synthesis and respiration occur. Other processes include cell growth and differentiation, seed formation, translocation of molecules and transpiration. Herbicides are designed so that they disrupt one or more of these processes and kill the plant.

In simple terms, the following describe the various modes of action:

- growth regulators;
- amino acid synthesis inhibitors;
- lipid synthesis inhibitors;
- seedling growth inhibitors;
- photosynthetic inhibitors;
- cell membrane disrupters; and
- pigment inhibitors.

For further information see Appendix E.

## Herbicide Resistance

Herbicide resistance is the ability of a plant to survive, grow and reproduce after exposure to a dose of a particular herbicide that would normally be lethal. In certain plant populations herbicide resistance may occur naturally or may be a result of genetic engineering.

Herbicide resistance may emerge as a problem due to the continual use of a particular herbicide, or group of herbicides with the same mode of action, on a population of plants. When resistant individuals within a population survive and reproduce, the population may become dominated by individuals able to survive the particular herbicide, or group of herbicides with the same mode of action.

The development of herbicide resistance can be reduced by minimising use of “high resistance risk” herbicides (e.g. group A and B herbicides), see Appendix E, and ensuring that herbicides with the same mode of action are not used repeatedly on the same population of weeds.



# Herbicide Control Techniques

## Foliar Spraying

Foliar spraying is the use of herbicide diluted with water, at a specific rate, and sprayed over the foliage to the point of runoff (until every leaf is wet but not dripping). Spraying should be undertaken when a plant is actively growing to maximise the effectiveness of the herbicide. Foliar spraying can be efficient and cost effective; however there may be the potential for spray drift and off-target damage. Foliar spraying can be done a number of ways, depending on the size of the weed plant and/or the infestation.



**Plate 1 - Foliar spraying of gamba grass**

Blanket spraying using a boom spray from a tractor or 4-wheel drive vehicle can be used to treat large areas completely infested with weeds, especially with selective herbicides. For large infestations that need targeted applications of herbicide, a hose and handgun can be used to spray solution from a herbicide tank and pump carried by a tractor or vehicle. Smaller infestations can be sprayed using a backpack spray unit. Spot spraying is used to treat individual weed plants or areas that have only small clumps of weed infestations.

### Reducing herbicide spray drift

When applying herbicides the aim is to maximise the amount reaching the target and to minimise the amount reaching off-target areas. Sprayed herbicides can drift as droplets, as vapours or as particles.

- **Droplet drift** is the easiest to control because under good spraying conditions, droplets are carried down by air turbulence and gravity, to collect on plant surfaces.

- **Particle drift** occurs when water and other herbicide carriers evaporate quickly from the droplet leaving tiny particles of concentrated herbicide.
- **Vapour drift** is confined to volatile herbicides such as 2,4-D ester. Vapours may arise directly from the spray or evaporation of herbicide from sprayed surfaces.

Any herbicide can drift. The drift hazard, or off-target potential of herbicide, in particular situations depends on the following factors:

- **Volatility of the formulation applied:** volatility refers to the likelihood that the herbicide will evaporate and become a gas. Esters volatilise (evaporate) more readily than amine formulations.
- **Formulation of the product:** formulations such as emulsifiable concentrates have a tendency to produce small droplets.
- **Type of adjuvant:** non-ionic surfactants and penetrants added to the spray solution will produce smaller droplets than oils.

In areas where there is a range of land uses, there is potential for conflicts to arise. People using herbicides have a moral and legal responsibility to prevent drift and/or contamination which may impact on health, the environment or neighbouring crops.

### Before Spraying

- determine the most appropriate method of application and equipment for the situation;
- always check for sensitive areas in the vicinity, such as houses, schools, crops and riparian areas;
- check for predicted weather conditions, only proceed if these are favourable;
- notify neighbours of your spraying intentions; and
- prepare to record all necessary details of the herbicide usage.

## During Spraying

- always monitor weather conditions carefully and understand their effect on 'drift hazard';
- don't spray if conditions are not suitable, and stop spraying if conditions change and become unsuitable;
- record weather conditions, herbicide and water rates, and operating details;
- supervise all spraying, even when a contractor is employed. Provide a map marking the areas to be sprayed, buffers to be observed, sensitive crops and areas;
- spray when temperatures are at their coolest;
- minimise spray release height (lowest possible boom height);
- use the largest droplets which will give adequate spray coverage;
- always use the least-volatile formulation of herbicide available;
- maintain a down-wind buffer e.g. keep a boom width from the downwind edge of the sprayed area; and
- if sensitive crops are in the area, use herbicide which is the least damaging.

## Unfavourable Weather Conditions

Unfavourable weather conditions include:

- midday turbulence: up-drafts cause rapidly shifting wind directions (spraying should stop by 11 am);
- high temperatures, particularly when using herbicides which are highly volatile or susceptible to drift;
- low humidity;
- high humidity – this extends droplet life and can greatly increase the drift hazard of fine droplets;
- still (stable) conditions;
- high winds; ideal safe wind speeds are 7–10 km/h; and
- periods during, before or immediately after rain; excess water will reduce the effectiveness of your application.

*For information on spray equipment calibration refer to Appendix C.*

## Rope or Wick Applicators

This method of applying herbicide consists of a wick (or rope) soaked in herbicide from a reservoir (usually attached to handle). Herbicide is pumped to the wick with 12-volt equipment. The saturated wick is used to wipe or brush herbicide over the weed. Commercially available equipment such as Weed Wand and Weed Wiper can be used to kill weeds in this way. It is sometimes necessary to provide some resistance for the wiper when the weed leaf or stem is soft. Stem swiping involves using a knife to provide resistance down the back of the stem or leaf, while wiping herbicide down the front.

## Basal Bark Application

This method involves mixing an oil soluble herbicide in diesel and spraying the full circumference of the trunk or stem of the plant. Diesel helps the herbicide move through the bark. Basal bark spraying is suitable for thin-barked woody weeds and undesirable trees. Basal bark spraying is also an effective way to treat saplings, regrowth and multi-stemmed shrubs and trees. This method works by allowing the herbicide to enter underground storage organs and slowly kill the targeted weed.

The whole circumference of the stem or trunk should be sprayed or painted with herbicide solution from ground level to a height of 30 cm. It is important to saturate the full circumference of the trunk, and to treat every stem or trunk arising from the ground. It may be necessary to go higher on bigger trees.



**Plate 2 - Basal bark herbicide application to young mimosa**

Basal bark spraying is a very effective control method, and a good way to tackle inaccessible areas such as steep banks. It is a well targeted form of spraying, having little or no drift. This method will usually destroy difficult-to-kill weeds at any time of the year, as long as the bark is not wet or too thick for the diesel to penetrate.

Refer to the product label for further details on application. As a general rule, the larger the plant, the greater the area of bark that needs treating. The basal bark technique can become less effective in a few species once the basal diameter is greater than 5-10 cm.

## ThinLine Method

This method is a form of basal barking using higher concentrations of herbicide but only for use on stems up to 5cm in diameter. Spray involves mixing an oil soluble herbicide in diesel and spraying the full circumference of the trunk or stem of the plant. The whole circumference of the stem or trunk should be sprayed or painted with herbicide solution from ground level to a height of 5 cm. It is important to saturate the full circumference of the trunk, and to treat every stem.

## Stem Injection Methods

These methods involve drilling or cutting through the bark into the sapwood tissue in the trunks of woody weeds and trees. Herbicide is immediately placed into the hole or cut. The aim is to reach the sapwood layer just under the bark (the cambium growth layer), which will transport the chemical throughout the plant. It is essential to apply the herbicide immediately (within 15 seconds of drilling the hole or cutting the trunk), as stem injection relies on the active uptake by the plant to move the chemical through its tissues.

## Drill and Fill Method

This stem injection method is used for trees and woody weeds with stems or trunks greater than 5 cm in circumference. This method uses a battery-powered drill to make downward-angled holes into the sapwood approximately 5 cm apart. The placement of herbicide into the hole is usually made using a backpack reservoir and syringe that can deliver measured doses of herbicide solution. Stem injection methods kill the tree or shrub where it stands, therefore only trees and shrubs that can be safely left to die and rot should be treated this way. If the tree or shrub is to be felled, allow it to die completely before felling.

## Axe Cut Method

This method involves cutting through the bark into the sapwood tissue in the trunk, and immediately placing herbicide into the cut. As with the drill and fill method, the aim is also to reach the tissue layer

just under the bark (the cambium layer), which will transport the chemical throughout the plant. The axe cut method can be used for trees and woody weeds with stems or trunks greater than 5 cm in circumference. Using an axe or tomahawk, horizontal cuts are made into the sapwood around the circumference of the trunk at waist height. While still in the cut, the axe or tomahawk is leaned out to make a downward angled pocket, which will allow herbicide to pool. The herbicide is then immediately injected into the pocket. Cuts should be made no farther than 3 cm apart.

This method – using an axe to make the cut – is often referred to as frilling or chipping. It is important not to entirely ringbark the trunk, as this will decrease the uptake of the herbicide into the plant.

## Cut Stump

Here the plant is cut off completely at the base (no higher than 15 cm from the ground) using a chainsaw, axe, brush-cutter or machete (depending on the thickness of the stem or trunk). The herbicide solution is then sprayed or painted on to the exposed surface of the cut stump emerging from the ground, with the objective of killing the stump and the root system. It is imperative that the herbicide solutions are applied as soon as the trunk or stem is cut. A delay of more than 10 seconds for water-based herbicides and 1 minute for diesel soluble herbicides between cutting and applying the chemical will give poor results. For this reason two operators working as a team can use this method effectively. The herbicide can be applied from a backpack, or with a paintbrush, drench gun or a hand spray bottle. It is a good idea to use a brightly coloured dye in the solution to mark the stumps that have been treated. This method has the appeal of removing the weed immediately, and is used mainly for trees and woody weeds. Many species will sucker if not treated using this method.



**Plate 3 – Cut stump technique – herbicide application to mimosa**



## Using Adjuvants, Surfactants and Oils with Herbicides

Some herbicides need assistance to spread across and penetrate the leaf surface of target weeds. An adjuvant is an additive to herbicide, intended to improve its effectiveness. Adjuvants can be classified as surfactants, crop oils, penetrants and acidifying buffering agents.

### 'Wetting Agents' or Surfactants

These are products that increase the spread of droplets, aiding the wetting of waxy or hairy leaf surfaces. The most commonly used surfactants are non-ionic, these remain on the leaf once dry and allow 'rewetting' after rain, permitting additional herbicide uptake.

### Crop Oils

Most crop oils contain emulsifiers which allow them to mix with water. Some contain various levels of surfactants. Some claims regarding oil adjuvants include reduced rain-fast periods, more uniform droplet size (drift reduction), less spray evaporation and better penetration of herbicide into waxy leaves.

Mineral oils are usually a blend of mineral oil and non-ionic surfactant. Products such as Ad-Here® have low levels of surfactant, whilst Uptake® and Supercharge® have higher levels.

Vegetable oils contain a wide range of products. Products containing esterified vegetable oil and surfactants are the most commonly used. They have claims for superior wax-modifying characteristics and penetrating ability. They should be used strictly according to the label with selective herbicides. Hasten® is an example of this product type.

### Penetrants

These are compounds that help dissolve waxy cuticles.

### Acidifying Buffering Agents

These help lower the pH of the spray solution, making solutions more acidic. Most herbicides are most stable when the pH of the solution is between 6 and 7 (neutral or slightly acidic).

### Compatibility Agents

Compatibility agents are materials that reduce the likelihood of antagonism from other agents in the spray solution. The most commonly used compatibility agent is ammonium sulfate. It is also used to neutralise the effect of hard water on amine formulations such as glyphosate. An example of this product is Liquid Boost®. Some products combine a number of the above roles, for instance Hot-up® contains a surfactant, a compatibility agent and oil.

There is also a range of other adjuvants that are added to herbicides during formulation to improve efficacy, increase crop safety, or improve the ease of herbicide use. These include thickeners, spreaders, stickers, anti-foamers and safeners.

## Factors Affecting Adjuvant Use

Adjuvants are usually added to increase the effectiveness of herbicides. However, use of the wrong type or rate can reduce effectiveness. It should also be noted that the addition of an adjuvant can reduce herbicide selectivity. This is not an issue for fallow and pre-emergent herbicides. Hard water can lead to poor mixing of the chemical with water. This particularly occurs with emulsifiable concentrates. High levels of calcium and magnesium ions bind with amine formulations, causing them to be less soluble and therefore less effective.



## Records of Use

Some users of agricultural chemical products in the NT are required to keep detailed records of use for a minimum of two years and include:

- name and address of person who used the product;
- name of the product;
- rate and amount used;
- method of application;
- expiry date of the product;
- date and time the product was used;
- exact location of where the product was used;
- date and time of when the product was used;
- type of crops, pastures or plants in the area;
- temperature and wind speed/direction;
- name of target pest or disease; and
- withholding period.

It is the land manager's responsibility to determine recording requirements.

Go to [www.nt.gov.au/d/](http://www.nt.gov.au/d/) for more information.

## Disposal of Excess Chemicals and Used Chemical Containers

Empty chemical containers and any unused chemicals must be disposed of in an environmentally responsible manner. For information on how to responsibly dispose of chemicals please refer to Appendix F.

## Chemical Handling Training

It is strongly recommended that all persons using herbicides complete a chemical safety training course. Chemical handling training is a legislative requirement for schedule 7 chemicals. Training in the safe and effective use of chemicals is provided by various registered training organisations. Please refer to Appendix D for information on courses relevant to chemical application in the NT. The APVMA website has further details at [www.apvma.gov.au/index.asp](http://www.apvma.gov.au/index.asp)

## Weed Control Option Tables

This publication is presented only as a guide to assist in planning weed control. The following must be taken into consideration when planning your weed management program.

Users of Agricultural (or veterinary) chemical products must always read the label and any Permit, before using the product and strictly comply with the directions on the label and any conditions of any Permit. Users are not absolved from compliance with the directions on the label or conditions of the Permit by reason of any statement made in or omission from this publication.

The product trade names in this publication are supplied on the understanding that no preference between equivalent products is intended and

that the inclusion of a product does not imply endorsement by the NT Government's Department of Environment and Natural Resources, over any other equivalent product from another manufacturer.

Any management incorporating burning must be in accordance with the *Bushfires Act* and the *Fire and Emergency Act*. Please contact your local fire station for permits to burn if you live within a Northern Territory Fire and Rescue Service Emergency Response Area (NTFRS ERA). If you live outside a NTFRS ERA, contact your local Volunteer Fire Brigade Captain or local area Fire Warden through the Bushfires Council on Darwin 8922 0844 or Batchelor 8976 0098.

**Table 4 – Abbreviations and Terms**

Abbreviations and terms	Definitions
/ha	per hectare (10 000m <sup>2</sup> )
mL / l	millilitres per litre
m <sup>2</sup>	metres squared
g / kg	grams per kilogram
g / l	grams per litre
WMB	Weed Management Branch
Various trade names	A number of products can be purchased that contain this active ingredient for control of this weed.
Various trade names and formulations	A number of products can be purchased that contain this active ingredient, some with different concentration formulations, registered for control of this weed.

*Note: Rates are given for water unless otherwise stated*

### Athel pine – *Tamarix aphylla* (Class A, Class B and Class C - refer to [www.nt.gov.au/weeds](http://www.nt.gov.au/weeds) for details)



#### OPTIMUM TREATMENT TIMES

darker colour indicates preferred treatment times

JAN	FEB	MAR	APR	MAY	JUN
JUL	AUG	SEP	OCT	NOV	DEC

Chemical and concentration	Rate	Weed growth stage, method and comments
<b>Fluroxypyr 200 g/L *</b> Starane 200* Plus other registered products	1 L / 100 L	<b>Seedling</b> Foliar spray – < 50 cm tall
<b>Fluroxypyr 333 g/L *</b> Starane™ Advanced Plus other registered products	600 mL / 100 L	<b>Seedling</b> Foliar spray – < 50 cm tall
<b>Triclopyr 600 g/L *</b> Garlon™ 600 Plus other registered products	1 L / 100 L 1 L / 60 L (diesel)	<b>Juvenile – 50 cm - 2 m in height</b> Foliar spray Cut stump/basal bark/foliar spray application

**Non-chemical applications:** Seedlings can be removed by hand.

Large trees can be removed by ripping and bulldozing. The root system must be removed.

**\*Important notice** – these chemicals and rates are specified by **APVMA permit PER81696** which allows minor use of an agvet chemical product to control seedlings athel pine in non-crop areas in and near dry ephemeral waterways.

**The permit expires on 30 November 2020.**

**Critical Use Comments:** DO NOT contaminate streams, rivers or waterways with the chemical or used container.

**Withholding Period:** Garlon™ 600 Herbicide (or equivalent): Not required when used as directed.

Fluroxypyr products: DO NOT graze or cut for stock food for 7 days after application.

Persons who wish to prepare for use/or use the products for the purposes specified above must read, or have read to them, the permit, particularly the information included in the DETAILS OF PERMIT and CONDITIONS OF PERMIT. Contact the Weed Management Branch for further information.

### Barleria – *Barleria prionitis* (Class A and Class C) and *Barleria lupulina*



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Chemical and concentration	Rate	Weed growth stage, method and comments
<b>2, 4-D amine 625 g/L</b> Various trade names	320 mL / 100 L	<b>Seedling or adult (individuals or infestation):</b> Foliar spray – apply when actively growing
<b>Fluroxypyr 200 g/L</b> Various trade names	500 mL / 100 L	<b>Seedling or adult (individuals or infestation):</b> Foliar spray – apply when actively growing For boom rate contact WMB

**Non-chemical applications:** Easily removed by hand and burnt.

**Bellyache bush – *Jatropha gossypifolia* (Class A, Class B and Class C - refer to [www.nt.gov.au/weeds](http://www.nt.gov.au/weeds) for details)**

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JAN	FEB	MAR	APR	MAY	JUN
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Chemical and concentration	Rate	Weed growth stage, method and comments
<b>Fluroxypyr 200 g/L</b> Various trade names	500 mL / 100 L	<b>Seedlings and young plants (before flower) (individuals or infestation):</b> Foliar spray – apply when actively growing. For boom rate contact WMB
	3 L / 100 L (diesel)	<b>Adult (individuals):</b> Cut stump or basal bark
<b>Fluroxypyr 333 g/L</b> Various trade names	300 mL / 100 L	<b>Seedlings and young plants (before flower) (individuals or infestation):</b> Foliar spray – apply when actively growing. For boom rate contact WMB
	1 L / 100 L (diesel)	<b>Adult (individuals):</b> Cut stump or basal bark
<b>Fluroxypyr 400 g/L</b> Various trade names	250 ml / 100 L	<b>Seedlings and young plants up to flower (individuals or infestation):</b> Foliar spray – apply when actively growing.
<b>Metsulfuron-methyl 600 g/kg</b> Various trade names	10 g / 100 L	<b>All growth stages (individuals or infestation):</b> Foliar spray - apply when actively growing, non-ionic wetting agent required. For broadscale application contact WMB
<b>Aminopyralid 375 g/kg + Metsulfuron-methyl 300 g/kg</b> Stinger™	20 g / 100 L	<b>All growth stages (individuals or infestation):</b> Foliar spray - apply when actively growing, wetting agent required: Pulse Penetrant (200 mL/100 L) For broadscale application contact WMB
<b>Triclopyr 240 g/L + Picloram 120 g/L</b> Access™	1 L / 60 L (diesel)	<b>Seedling (individuals):</b> Basal bark < 15 cm stem diameter
	1 L / 60 L (diesel)	<b>Adult (individuals or infestation):</b> Cut stump > 15 cm stem diameter
<b>Aminopyralid 4.47 g/L + Picloram 44.7 g/L</b> Vigilant™ II	Neat	<b>Adult (individuals or infestation):</b> Cut stump - direct application

**Contact the Weed Management Branch for more information on controlling large infestations of bellyache bush.**

**Non-chemical applications:** Individual plants can be removed by hand, however slashing or mulching is more efficient for larger infestations. Mechanical control prior to flowering/seeding will reduce spread, whereas implementation during the dry season, when plants are moisture stressed, will result in a higher kill rate of mature plants. In either instance, follow up control for regenerating plants and seedlings will be necessary. Fire can be used as part of an integrated control program to kill young bellyache bush seedlings and improve access for other control methods, however multiple burns may be required to kill mature infestations. Follow up control may require hand removal.

**‘How to spray bellyache bush’ videos**

To view “how to spray” bellyache bush videos, visit: [www.nt.gov.au/weeds](http://www.nt.gov.au/weeds) then click on A-Z list of weeds in the NT, Bellyache bush in the table, then find them under the Technical Resources tab.

**Brazilian pepper – *Schinus terebinthifolius* (Class A, Class B and Class C - refer to [www.nt.gov.au/weeds](http://www.nt.gov.au/weeds) for details)**



Photo credit Rod Ensbey

**OPTIMUM TREATMENT TIMES**

darker colour indicates preferred treatment times

JAN	FEB	MAR	APR	MAY	JUN
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Chemical and concentration	Rate	Weed growth stage, method and comments
<b>Aminopyralid 8 g/L + Triclopyr 300 g/L + Picloram 100 g/L</b> Grazon™ Extra	350 mL / 100 L	<b>Seedling (individuals and infestations under 2 m):</b> Foliar spray, apply when actively growing + non-ionic wetting agent required
<b>Triclopyr 300 g/L and Picloram 100 g/L</b> Various trade names	350 mL / 100 L	<b>Seedling (individuals and infestations up to 2 m):</b> Foliar spray, apply when actively growing + non-ionic wetting agent required
<b>Triclopyr 600 g/L</b> Various trade names	1 L / 60 L (diesel)	<b>Seedling (individuals):</b> Basal bark < 5 cm stem diameter
	1 L / 60 L (diesel)	<b>Adult (individuals or infestation):</b> Cut stump > 5 cm stem diameter
<b>Fluroxypyr 333 g/L</b> Starane™ Advanced	1.8 L / 100 L (diesel)	<b>Seedling (individuals):</b> Basal bark < 15 cm* stem diameter, treat up to 45 cm from ground
	1.8 L / 100 L (diesel)	<b>Adult (individuals or infestation):</b> Cut stump > 15 cm stem diameter
<b>Triclopyr 240 g/L + Picloram 120 g/L</b> Access™	1 L / 60 L (diesel)	<b>Seedling (individuals):</b> Basal bark < 15 cm* stem diameter
	1 L / 60 L (diesel)	<b>Adult (individuals or infestation):</b> Cut stump > 15 cm stem diameter
<b>Picloram 20 g/Kg</b> Tordon™ granules	35 to 45 g / m <sup>2</sup>	Apply granules over an area extending from the main stem to 30 cm outside the dripline to cover the main part of the root system

**Non-chemical applications:** Mechanical control or burning can be used to improve access to infested areas for follow up chemical control.

\*It is noted that basal barking can be effective on trees of larger diameter. Basal barking, being less labour intensive than cut stumping, may be a preferable option for sparse or remote infestations. Cut stump applications may be the best management option for trees in urban/landscaped situations where the dead tree material will be removed to retain aesthetics.



**Burrs – Bathurst burr – *Xanthium spinosum* (Class B and Class C) and Noogoora burr – *Xanthium strumarium* (Class B and Class C)**



Bathurst burr



Noogoora burr

**OPTIMUM TREATMENT TIMES**

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JAN	FEB	MAR	APR	MAY	JUN
JUL	AUG	SEP	OCT	NOV	DEC

Chemical and concentration	Rate	Weed growth stage, method and comments
<b>2, 4-D amine 625 g/L</b> Various trade names	180 mL / 100 L	<b>Seedling or adult (individuals or infestation):</b> Foliar spray – apply when actively growing
<b>Fluroxypyr 333 g/L</b> Various trade names	45 mL / 100 L or 450 mL / ha (boom)	<b>Seedling (individuals or infestation):</b> Foliar spray – apply when actively growing
<b>Glyphosate 360 g/L</b> Various trade names and formulations	15 mL / 1L	<b>Seedling or adult (individuals or infestation):</b> Foliar spray – apply when actively growing
<b>MCPA 340 g/L + Dicamba 80 g/L</b> Various trade names	190 - 270 mL / 100 L or 2.8-4 L / ha (boom)	<b>Seedling or adult (individuals or infestation):</b> Foliar spray – use higher rates on larger plants

**Non-chemical applications:** Mow, slash, grub and burn plants to prevent burr formation. Biocontrol options are available.

**Cabomba – *Cabomba* spp. (Class A and Class C)**

**\* Report this plant to the Weed Management Branch immediately if found**

The Territory Government currently manages the only known cabomba infestation which is limited to a small, isolated section of the Darwin River. A quarantine order remains in place for this area. For further details go to [www.nt.gov.au/cabomba](http://www.nt.gov.au/cabomba)



### Caltrop – *Tribulus cistoides* and *Tribulus terrestris* (Class B and Class C)



#### OPTIMUM TREATMENT TIMES

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JUL	AUG	SEP	OCT	NOV	DEC

Chemical and concentration	Rate	Weed growth stage, method and comments
<b>2, 4-D amine 625 g/L</b> Various trade names	320 mL / 100 L or 1.1-2.4 L / ha (boom)	<b>Seedling or adult (individuals or infestation):</b> Foliar spray – apply when actively growing
<b>Glyphosate 360 g/L</b> Various trade names and formulations	10 mL / 1L	<b>Seedling or adult (individuals or infestation):</b> Foliar spray – apply when actively growing
<b>Metsulfuron-methyl 600 g/kg</b> Various trade names	10 g / 100 L	<b>Seedling or adult (individuals or infestation):</b> Foliar spray – apply when actively growing, wetting agent required

**Non-chemical applications:** Grub plants out by hand and burn.

### Candle bush – *Senna alata* (Class B and Class C)



#### OPTIMUM TREATMENT TIMES

darker colour indicates preferred treatment times

JAN	FEB	MAR	APR	MAY	JUN
JUL	AUG	SEP	OCT	NOV	DEC

Chemical and concentration	Rate	Weed growth stage, method and comments
<b>2, 4-D amine 625 g/L</b>	320 mL / 100 L	<b>Seedling (individuals or infestation) + adult (infestation):</b> Foliar spray – Uptake® Spraying Oil required For boom rate contact WMB
<b>Triclopyr 240 g/L + Picloram 120 g/L</b> Access™	1 L / 60 L (diesel) 1 L / 60 L (diesel)	<b>Adult (individuals or infestation):</b> Basal bark < 10 cm stem diameter treat up to 30 cm from ground Cut stump > 10 cm stem diameter

**Non-chemical applications:** Isolated plants can be dug out and roots removed.



**Castor oil plant – *Ricinus communis* (Class B and Class C)****OPTIMUM TREATMENT TIMES**

darker colour indicates preferred treatment times

JAN	FEB	MAR	APR	MAY	JUN
JUL	AUG	SEP	OCT	NOV	DEC



Chemical and concentration	Rate	Weed growth stage, method and comments
<b>2, 4-D amine 625 g/L</b> Various trade names	320 mL / 100 L	<b>Seedling (individuals or infestation) + adult (infestation):</b> Foliar spray – apply when actively growing For boom rate contact WMB
<b>Triclopyr 600 g/L</b> Various trade names	1 L / 60 L (diesel) 1 L / 60 L (diesel)	<b>Adult (individuals or infestation):</b> Basal bark < 5 cm stem diameter Cut stump > 5 cm stem diameter

**Non-chemical applications:** Individual plants or small infestations may be removed by hand-pulling.**Chinee apple – *Ziziphus mauritiana* (Class A and Class C)****OPTIMUM TREATMENT TIMES**

darker colour indicates preferred treatment times

JAN	FEB	MAR	APR	MAY	JUN
JUL	AUG	SEP	OCT	NOV	DEC



Chemical and concentration	Rate	Weed growth stage, method and comments
<b>Aminopyralid 8 g/L + Triclopyr 300 g/L + Picloram 100 g/L</b> Grazon™ Extra	350 mL / 100 L	<b>Seedling (individuals and infestations):</b> Foliar spray, apply when actively growing + non-ionic wetting agent required
<b>Triclopyr 300 g/L and Picloram 100 g/L</b> Various trade names	350 mL / 100 L	<b>Seedling (individuals and infestations under 2 m):</b> Foliar spray, apply when actively growing + non-ionic wetting agent required
<b>Triclopyr 600 g/L</b> Various trade names	1 L / 60 L (diesel) 1 L / 60 L (diesel)	<b>Seedling (individuals):</b> Basal bark < 5 cm stem diameter  <b>Adult (individuals or infestation):</b> Cut stump > 5 cm stem diameter
<b>Fluroxypyr 333 g/L</b> Starane™ Advanced	1.8 L / 100 L (diesel) 1.8 L / 100 L (diesel)	<b>Seedling (individuals):</b> Basal bark < 15 cm* stem diameter, treat up to 45 cm from ground  <b>Adult (individuals or infestation):</b> Cut stump > 15 cm stem diameter
<b>Triclopyr 240 g/L + Picloram 120 g/L</b> Access™	1 L / 60 L (diesel) 1 L / 60 L (diesel)	<b>Seedling (individuals):</b> Basal bark < 15 cm* stem diameter  <b>Adult (individuals or infestation):</b> Cut stump > 15 cm stem diameter
<b>Picloram 20 g/Kg</b> Tordon™ granules	35 to 45 g / m <sup>2</sup>	Apply granules over an area extending from the main stem to 30 cm outside the dripline to cover the main part of the root system

**Non-chemical applications:** Mechanical control or burning can be used to improve access to infested areas for follow up chemical control. \*Basal barking can be effective on trees of larger diameter. Basal barking, being less labour intensive than cut stumping, may be a preferable option for sparse or remote infestations. Cut stump applications may be the best management option for trees in urban/landscaped situations where the dead tree material will be removed to retain aesthetics.

## Coffee bush – *Leucaena leucocephala*

### OPTIMUM TREATMENT TIMES

darker colour indicates preferred treatment times

JAN	FEB	MAR	APR	MAY	JUN
JUL	AUG	SEP	OCT	NOV	DEC



Chemical and concentration	Rate	Weed growth stage, method and comments
<b>Aminopyralid 8 g/L + Triclopyr 300 g/L + Picloram 100 g/L</b> Grazon™ Extra	350 mL / 100 L	<b>Seedling (individuals and infestations):</b> Foliar spray, apply when actively growing + non-ionic wetting agent required
<b>Triclopyr 300 g/L and Picloram 100 g/L</b> Various trade names	350 mL / 100 L	<b>Seedling (individuals and infestations under 2 m):</b> Foliar spray, apply when actively growing + non-ionic wetting agent required
<b>Fluroxypyr 333 g/L</b> Starane™ Advanced	1.8 L / 100 L (diesel)	<b>Seedling (individuals):</b> Basal bark < 15 cm* stem diameter, treat up to 45 cm from ground
	1.8 L / 100 L (diesel)	<b>Adult (individuals or infestation):</b> Cut stump > 15 cm stem diameter
<b>Triclopyr 240 g/L + Picloram 120 g/L</b> Access™	1 L / 60 L (diesel)	<b>Seedling (individuals):</b> Basal bark < 15 cm* stem diameter
	1 L / 60 L (diesel)	<b>Adult (individuals or infestation):</b> Cut stump > 15 cm stem diameter
<b>Picloram 20 g/Kg</b> Tordon™ granules	35 to 45 g / m <sup>2</sup>	Apply granules over an area extending from the main stem to 30 cm outside the dripline to cover the main part of the root system
<b>Glyphosate</b> Various trade names	ratio 1:1 of water	<b>Seedling or adult (individuals or infestation):</b> Cut stump

**Non-chemical applications:** Mechanical control or burning can be used to improve access to infested areas for follow up chemical control. \*Basal barking can be effective on trees of larger diameter. Basal barking, being less labour intensive than cut stumping, may be a preferable option for sparse or remote infestations. Cut stump applications may be the best management option for trees in urban/landscaped situations where the dead tree material will be removed to retain aesthetics.

**Coffee senna – *Senna occidentalis* (Class B and Class C)****OPTIMUM TREATMENT TIMES**

darker colour indicates preferred treatment times

JAN	FEB	MAR	APR	MAY	JUN
JUL	AUG	SEP	OCT	NOV	DEC



Chemical and concentration	Rate	Weed growth stage, method and comments
<b>Aminopyralid 25 g/L + Triclopyr 200 g/L + Picloram 100 g/L</b> Tordon DS™ Tordon™ Regrowth Master	375 mL / 100 L	<b>Seedling or adult (individuals or infestation):</b> Foliar spray – apply when actively growing, non-ionic wetting agent required
<b>Dicamba 500 g/L</b> Various trade names	500 mL / 100 L	<b>Seedling or adult (individuals or infestation):</b> Foliar spray, wetting agent may be required
<b>Triclopyr 300 g/L + Picloram 100 g/L</b> Various trade names	200 mL / 100 L	<b>Seedling or adult (individuals or infestation):</b> Foliar spray – non-ionic wetting agent required: do not apply to podding plants
<b>Aminopyralid 8 g/L + Triclopyr 300 g/L + Picloram 100 g/L</b> Grazon™ Extra	200 mL / 100 L	<b>Seedling or adult (individuals or infestation):</b> Foliar spray – non-ionic wetting agent required: do not apply to podding plants For boom rate contact WMB

**Non-chemical applications:** Can be controlled by handpulling and grubbing.

### Common and creeping lantana – *Lantana camara* and *Lantana montevidensis* (Class B and Class C)



#### OPTIMUM TREATMENT TIMES

darker colour indicates preferred treatment times

JAN	FEB	MAR	APR	MAY	JUN
JUL	AUG	SEP	OCT	NOV	DEC

Chemical and concentration	Rate	Weed growth stage, method and comments
<b>Fluroxypyr 200 g/L</b> Various trade names	500 mL – 1 L / 100 L or 3 L / ha (boom)	<b>Seedling or adult (individuals or infestation):</b> Foliar spray – use higher rate on plants over 1.2 m, apply when actively growing
<b>Fluroxypyr 333 g/L</b> Starane™ Advanced	300–600 mL / 100 L	<b>Seedling or adult (individuals or infestation):</b> Foliar spray – use higher rate on plants over 1.2 m, apply when actively growing
<b>Triclopyr 300 g/L + Picloram 100 g/L</b> Various trade names	350–500 mL (750) / 100 L or 3 L / ha (boom)	<b>Seedling (individuals and infestation)</b> Foliar spray – use higher rate on plants > 1 m (highest for harder to kill varieties), apply when actively growing, non-ionic wetting agent required
<b>Aminopyralid 8 g/L + Triclopyr 300 g/L + Picloram 100 g/L</b> Grazon™ Extra	350–500 mL (750) / 100 L or 10 L / ha (aerial)	<b>Seedling (individuals and infestation)</b> Foliar spray – use higher rate on plants > 1 m (highest for harder to kill varieties), apply when actively growing, non-ionic wetting agent required
<b>Triclopyr 240 g/L + Picloram 120 g/L</b>	1 L / 60 L (diesel)	<b>Seedling (individuals):</b> Basal bark < 15 cm stem diameter
	1 L / 60 L (diesel)	<b>Adult (individuals or infestation):</b> Cut stump > 15 cm stem diameter
<b>Triclopyr 600 g/L</b> Various trade names	1 L / 60 L (diesel)	<b>Seedling (individuals)</b> Basal bark < 5 cm stem diameter
	1 L / 60 L (diesel)	<b>Adult (individuals or infestation)</b> Cut stump > 5 cm stem diameter

**Non-chemical applications:** Stick-raking, bulldozing, ploughing and grubbing. Fire can be used prior to mechanical or herbicide control or as follow-up.

**Devil's claw – *Martynia annua* (Class A and Class C)****OPTIMUM TREATMENT TIMES**

darker colour indicates preferred treatment times

JAN	FEB	MAR	APR	MAY	JUN
JUL	AUG	SEP	OCT	NOV	DEC



Chemical and concentration	Rate	Weed growth stage, method and comments
<b>2, 4-D amine 625 g/L</b> Various trade names	320 mL / 100 L	<b>Seedling or adult (individuals or infestation):</b> Foliar spray – apply when actively growing
<b>Glyphosate 360 g/L</b> Various trade names and formulations	10 mL / 1 L	<b>Seedling or adult (individuals or infestation):</b> Foliar spray – apply when actively growing
<b>MCPA 340 g/L + Dicamba 80 g/L</b> Various trade names	320 mL / 100 L	<b>Seedling or adult (individuals or infestation):</b> Foliar spray – apply when actively growing

**Non-chemical applications:** Small plants can be removed by hand, larger plants can be slashed close to the ground.**Flannel weed – *Sida cordifolia* (Class B and Class C)****OPTIMUM TREATMENT TIMES**

darker colour indicates preferred treatment times

JAN	FEB	MAR	APR	MAY	JUN
JUL	AUG	SEP	OCT	NOV	DEC



Chemical and concentration	Rate	Weed growth stage, method and comments
<b>2, 4-D amine 625 g/L</b> Various trade names	320 mL / 100 L 1.8 L / ha (boom)	<b>Seedling or adult (individuals or infestation):</b> Foliar spray – apply when actively growing
<b>Glyphosate 360 g/L</b> Various trade names and formulations	15 mL / 1 L	<b>Seedling or adult (individuals or infestation):</b> Foliar spray – apply when actively growing
<b>Fluroxypyr 200 g/L</b> Various trade names	500 mL – 1 L / 100 L or 3 L / ha (boom)	<b>Seedling or adult (individuals or infestation):</b> Foliar spray – use higher rate on plants over 1.2 m, apply when actively growing
<b>Fluroxypyr 333 g/L</b> Starane™ Advanced	300 mL / 100 L	<b>Seedling or adult (individuals or infestation):</b> Foliar spray – apply when actively growing up until flowering

**Non-chemical applications:** Repeated slashing and vigorous pasture competition.**Fountain grass – *Cenchrus setaceus* (Class B and Class C)****OPTIMUM TREATMENT TIMES**

darker colour indicates preferred treatment times

JAN	FEB	MAR	APR	MAY	JUN
JUL	AUG	SEP	OCT	NOV	DEC



Chemical and concentration	Rate	Weed growth stage, method and comments
<b>Glyphosate 360 g/L</b> Various trade names and formulations	10 mL / 1 L	<b>Seedling or adult (individuals or infestation):</b> Foliar spray – apply when actively growing

**Small infestations should be removed by hand or by using a mattock. Ensure the entire root is removed.**



### Gamba grass – *Andropogon gayanus* (Class A, Class B and Class C - refer to [www.nt.gov.au/weeds](http://www.nt.gov.au/weeds) for details)



#### OPTIMUM TREATMENT TIMES

darker colour indicates preferred treatment times

JAN	FEB	MAR	APR	MAY	JUN
JUL	AUG	SEP	OCT	NOV	DEC

Chemical and concentration	Rate	Weed growth stage, method and comments
<b>Glyphosate 360 g/L</b> Various trade names and formulations	10 mL / 1 L	<b>Seedling or adult (individuals or infestation):</b> Foliar spray – apply when actively growing

Effective chemical control of gamba grass relies on spraying the entire plant. For optimal uptake of the herbicide and high mortality rates gamba grass should be sprayed when actively growing and young (leaves should be at least 40 cm long). Spraying plants prior to reaching full height will reduce time and herbicide requirements. Gamba grass is still sensitive to herbicide when flowering. Once gamba grass is seeding and the leaves are drying out herbicide will not be effective.

#### Non-chemical applications:

**Physical:** Individual plants can be removed by hand or by using a mattock. Ensure the entire root mat is removed. Excess soil should be shaken or kicked off root system to ensure regrowth does not occur from the root mat.

**Burning:** Burning will not kill gamba grass, low intensity fires, undertaken in the Wet season, can remove rank growth improving access for slashing or spraying. Plants may need to be treated with herbicide prior to burning to create enough dry matter to carry a fire. Fire may have the ability to carry seed in hot air currents, therefore avoid using fire as a control method while plants are seeding. Check with the Bushfires NT or NTFRS about permit requirements prior to lighting any fires.

**Slashing:** Slashing will not eradicate gamba grass, but it can reduce the biomass, prevent seeding, create an opportunity for more desirable species to establish and provide improved access to control by other means. Slash young plants prior to seed production from January to March. Ensure equipment and machinery is cleaned prior to moving to new sites.

**Grazing:** In areas within the Class B declaration zone gamba grass may continue to be used in established pasture areas, however there is a requirement to disallow any further spread. Gamba being used as a pasture should be grazed with enough stock to keep grass height below 90 cm. Above this height tussocks may be avoided by stock and allowed to produce vast quantities of seed. After lightly grazing pasture in the early wet season, a stocking density of 4-5 head per hectare is required to control growth for the remainder of the wet season. Increase grazing pressure if the grass nears 90 cm. Gamba grass is not recommended for cattle production on smaller properties as it requires high stocking densities to keep it low and palatable.

### Grader grass – *Themeda quadrivalvis* (Class B and Class C)



#### OPTIMUM TREATMENT TIMES

darker colour indicates preferred treatment times

JAN	FEB	MAR	APR	MAY	JUN
JUL	AUG	SEP	OCT	NOV	DEC

Chemical and concentration	Rate	Weed growth stage, method and comments
<b>Glyphosate 360 g/L</b> Various trade names and formulations	10 mL / 1 L	<b>Seedling or adult (individuals or infestation):</b> Foliar spray – apply when actively growing

**Non-chemical applications:** Identification of grader grass before seeding can be difficult. Small infestations should be controlled manually, preferably before seeding, and burnt on site. There is only a short window of opportunity to control grader grass as seed heads can appear within 5-6 weeks of germination, with mature seed being present after 10 weeks. If seed is present, burn it inside a drum to generate enough heat to kill the seeds. In the event that grader grass goes to seed before control, recording the location of infestations will enable early control during the next growing season. For large infestations contact the Weed Management Branch for options.



**Hyptis – *Hyptis suaveolens* (Class B and Class C)****OPTIMUM TREATMENT TIMES**

darker colour indicates preferred treatment times

JAN	FEB	MAR	APR	MAY	JUN
JUL	AUG	SEP	OCT	NOV	DEC



Chemical and concentration	Rate	Weed growth stage, method and comments
<b>2, 4-D amine 625 g/L</b> Various trade names	320 mL / 100 L	<b>Seedling or adult (individuals or infestation):</b> Foliar spray – apply when actively growing
<b>Glyphosate 360 g/L</b> Various trade names and formulations	15 mL / 1 L	<b>Seedling or adult (individuals or infestation):</b> Foliar spray – apply when actively growing

**Non-chemical applications:** Manually remove all plant material; slash to encourage competition from desirable species.**Khaki weed – *Alternanthera pungens* (Class B and Class C)****OPTIMUM TREATMENT TIMES**

darker colour indicates preferred treatment times

JAN	FEB	MAR	APR	MAY	JUN
JUL	AUG	SEP	OCT	NOV	DEC



Chemical and concentration	Rate	Weed growth stage, method and comments
<b>2, 4-D amine 625 g/L</b> Various trade names	320 mL / 100 L	<b>Seedling or adult (individuals or infestation):</b> Foliar spray – apply when actively growing
<b>Glyphosate 360 g/L</b> Various trade names and formulations	10 mL / 1L	<b>Seedling or adult (individuals or infestation):</b> Foliar spray – apply when actively growing
<b>MCPA 340 g/L + Dicamba 80 g/L</b> Various trade names	350 mL / 100 L	<b>Seedling or adult (individuals or infestation):</b> Foliar spray

**Non-chemical applications:** Grub at least 5 cm of the root; vigorous pasture competition.**Lion's tail – *Leonotis nepetifolia* (Class B and Class C)****OPTIMUM TREATMENT TIMES**

darker colour indicates preferred treatment times

JAN	FEB	MAR	APR	MAY	JUN
JUL	AUG	SEP	OCT	NOV	DEC



Chemical and concentration	Rate	Weed growth stage, method and comments
<b>2, 4-D amine 625 g/L</b> Various trade names	320 mL / 100 L	<b>Seedling or adult (individuals or infestation):</b> Foliar spray – apply when actively growing
<b>Aminopyralid 8 g/L + Triclopyr 300 g/L + Picloram 100 g/L</b> Grazon™ Extra	200 mL / 100 L	<b>Seedling (individuals and infestation)</b> Foliar spray – when actively growing, wetting agent required

**Non-chemical applications:** New infestations should be removed manually prior to seeding.

**Mesquite – *Prosopis* spp. (Class A and Class C)****OPTIMUM TREATMENT TIMES**

darker colour indicates preferred treatment times

JAN	FEB	MAR	APR	MAY	JUN
JUL	AUG	SEP	OCT	NOV	DEC



Chemical and concentration	Rate	Weed growth stage, method and comments
<b>Aminopyralid 8 g/L + Triclopyr 300 g/L + Picloram 100 g/L</b> Grazon™ Extra	200 mL / 100 L	<b>Seedling (individuals and infestation):</b> Foliar spray – non-ionic wetting agent required - do not spray plants bearing pods
<b>Aminopyralid 8 g/L + Triclopyr 300 g/L + Picloram 100 g/Ls</b> Various trade names	350 mL / 100 L	<b>Seedling (individuals and infestation):</b> Foliar spray – non-ionic wetting agent required - do not spray plants bearing pods
<b>Triclopyr 240 g/L and Picloram 120 g/L</b> Access™	1 L / 60 L (diesel) 1 L / 60 L (diesel)	<b>Adult (individuals or infestation):</b> Basal bark < 5 cm stem diameter Cut stump > 5 cm stem diameter

**Non-chemical applications:** Hand grubbing for light infestations or small, dense areas. Blade ploughing or other mechanical control aimed at removing as much of the root system as possible.

**Mexican poppy – *Argemone ochroleuca* (Class B and Class C)****OPTIMUM TREATMENT TIMES**

darker colour indicates preferred treatment times

JAN	FEB	MAR	APR	MAY	JUN
JUL	AUG	SEP	OCT	NOV	DEC



Chemical and concentration	Rate	Weed growth stage, method and comments
<b>2, 4-D amine 625 g/L</b> Various trade names	320 mL / 100 L	<b>Seedling or adult (individuals or infestation):</b> Foliar spray – apply when actively growing
<b>Glyphosate 360 g/L</b> Various trade names and formulations	10 mL / 1L	<b>Seedling or adult (individuals or infestation):</b> Foliar spray – apply when actively growing
<b>MCPA 340 g/L + Dicamba 80 g/L</b> Various trade names	350 mL / 100 L	<b>Seedling or adult (individuals or infestation):</b> Foliar spray

**Non-chemical applications:** Remove by hand grubbing. Take extra precautions to stop seed spread if removal is required once the plants are already seeding.

## Mimosa – *Mimosa pigra* (Class A, Class B and Class C - refer to [www.nt.gov.au/weeds](http://www.nt.gov.au/weeds) for details)



### OPTIMUM TREATMENT TIMES

darkers colour indicates preferred treatment times

FOLIAR SPRAY	JAN	FEB	MAR	APR	MAY	JUN
	JUL	AUG	SEP	OCT	NOV	DEC

BASAL BARK	JAN	FEB	MAR	APR	MAY	JUN
	JUL	AUG	SEP	OCT	NOV	DEC

PELLET GRANULAR	JAN	FEB	MAR	APR	MAY	JUN
	JUL	AUG	SEP	OCT	NOV	DEC

Chemical and concentration	Rate	Weed growth stage, method and comments
<b>Tebuthiuron</b> Various trade names	1 g / m <sup>2</sup>	<b>Seedling or adult (individuals or infestation):</b> Granulated herbicide - ground applied Do not use within 30 m of desirable trees or apply to continuous area > 0.5 ha Do not use if fire is eminent Apply when there is soil moisture or prior to rain
<b>Fluroxypyr 400 g/L</b> Comet™	150 ml / 100 L  1.5 L / 60 L water / ha (aerial)	<b>Seedling or adult (individuals or infestation):</b> Ground foliar application when actively growing. Wetting agent BONZA required - 500 ml / 100 L  <b>Seedling or adult (infestations):</b> <b>Aerial control</b> - Foliar application when actively growing. Wetting agent BONZA required - 1 L / Ha
<b>Fluroxypyr 333 g/L</b> Starane™ Advanced	180 mL / 100 L  1.8 L / 60 L water / ha (aerial)  1 L / 100 L	<b>Seedling or adult (individuals or infestation):</b> Ground foliar application when actively growing Wetting agent Uptake® required - 500mL / 100 L  <b>Seedling or adult (infestations):</b> <b>Aerial control</b> - Foliar application when actively growing. Wetting agent Uptake® required - 1 L / Ha for all Starane™ formulations  <b>Adult (individuals or infestation):</b> Basal bark
<b>Metsulfuron-methyl</b> Various trade names	60 g / 60 L water / ha (aerial)	<b>Seedling or adult (infestations):</b> <b>Aerial control</b> - Foliar application when actively growing. Non-ionic wetting agent required 100 mL / 100 L
<b>Dicamba 500</b> Various trade names	2-2.4 L / 60 L water / ha (aerial)  400 mL / 110 L	<b>Seedling or adult (infestations):</b> <b>Aerial control</b> – Foliar application when actively growing. Use the wetting agent LI700®  <b>Seedling or adult (individuals or infestation):</b> High volume foliar application or spot spray when actively growing. Thoroughly wet all leaves and stems of the plant
<b>Glyphosate</b> Various trade names	ratio 1:1 of water	<b>Seedling or adult (individuals or infestation):</b> Cut stump

**Non-chemical applications:** Hand grubbing for single plants or small outbreaks, ensure removal of the root system. Bulldozers can clear debris post-chemical control and fire can be used to kill surface seed or at least break the dormancy stage. Biocontrol options available.

### Mission grass - annual – *Cenchrus pedicellatus* formerly *Pennisetum pedicellatum*



#### OPTIMUM TREATMENT TIMES

darker colour indicates preferred treatment times

JAN	FEB	MAR	APR	MAY	JUN
JUL	AUG	SEP	OCT	NOV	DEC

Chemical and concentration	Rate	Weed growth stage, method and comments
<b>Glyphosate 360 g/L</b> Various trade names and formulations	10 mL / 1L	<b>Seedling or adult (individuals or infestation):</b> Foliar spray – apply when actively growing

**Non-chemical applications:** Annual mission grass can be controlled by slashing prior to seeding (repeated slashing may be required). Adult plants will not persist to the following year.

### Mission grass - perennial – *Cenchrus polystachios* (Class B and Class C) formerly *Pennisetum polystachion*



#### OPTIMUM TREATMENT TIMES

darker colour indicates preferred treatment times

JAN	FEB	MAR	APR	MAY	JUN
JUL	AUG	SEP	OCT	NOV	DEC

Chemical and concentration	Rate	Weed growth stage, method and comments
<b>Glyphosate 360 g/L</b> Various trade names and formulations	10 mL / 1L	<b>Seedling or adult (individuals or infestation):</b> Foliar spray – apply when actively growing

**Non-chemical applications:** Small infestations can be hand pulled. Slashing can prevent seed formation. Regrowth can then be treated with herbicide.

### Mossman River grass – *Cenchrus echinatus* (Class B and Class C)



#### OPTIMUM TREATMENT TIMES

darker colour indicates preferred treatment times

JAN	FEB	MAR	APR	MAY	JUN
JUL	AUG	SEP	OCT	NOV	DEC

Chemical and concentration	Rate	Weed growth stage, method and comments
<b>Glyphosate 360 g/L</b> Various trade names and formulations	10 mL / 1L	<b>Seedling or adult (individuals or infestation):</b> Foliar spray – apply when actively growing

**Non-chemical applications:** Cultivation, pulling by hand or burning off before plants reach seed set.



**Neem – *Azadirachta indica* (Class B and Class C)****OPTIMUM TREATMENT TIMES**

darker colour indicates preferred treatment times

JAN	FEB	MAR	APR	MAY	JUN
JUL	AUG	SEP	OCT	NOV	DEC



Chemical and concentration	Rate	Weed growth stage, method and comments
<b>Aminopyralid 8 g/L + Triclopyr 300 g/L + Picloram 100 g/L</b> Grazon™ Extra	350 mL / 100 L	<b>Seedling (individuals and infestations under 2 m):</b> Foliar spray, apply when actively growing + non-ionic wetting agent required
<b>Triclopyr 300 g/L and Picloram 100 g/L</b> Various trade names	350 mL / 100 L	<b>Seedling (individuals and infestations up to 2 m):</b> Foliar spray, apply when actively growing + non-ionic wetting agent required
<b>Triclopyr 600 g/L</b> Various trade names	1 L / 60 L (diesel)	<b>Seedling (individuals):</b> Basal bark < 5 cm stem diameter
	1 L / 60 L (diesel)	<b>Adult (individuals or infestation):</b> Cut stump > 5 cm stem diameter
<b>Fluroxypyr 333 g/L</b> Starane™ Advanced	1.8 L / 100 L (diesel)	<b>Seedling (individuals):</b> Basal bark < 15 cm* stem diameter, treat up to 45 cm from ground
	1.8 L / 100 L (diesel)	<b>Adult (individuals or infestation):</b> Cut stump > 15 cm stem diameter
<b>Triclopyr 240 g/L + Picloram 120 g/L</b> Access™	1 L / 60 L (diesel)	<b>Seedling (individuals):</b> Basal bark < 15 cm* stem diameter
	1 L / 60 L (diesel)	<b>Adult (individuals or infestation):</b> Cut stump > 15 cm stem diameter
<b>Picloram 20 g/Kg</b> Tordon™ granules	35 to 45 g / m <sup>2</sup>	Apply granules over an area extending from the main stem to 30 cm outside the dripline to cover the main part of the root system

**Non-chemical applications:** Mechanical control or burning can be used to improve access to infested areas for follow up chemical control.

\*It is noted that basal barking can be effective on trees of larger diameter. Basal barking, being less labour intensive than cut stumping, may be a preferable option for sparse or remote infestations. Cut stump applications may be the best management option for trees in urban/landscaped situations where the dead tree material will be removed to retain aesthetics.

### Olive hymenachne – *Hymenachne amplexicaulis* (Class B and Class C)

#### OPTIMUM TREATMENT TIMES

darker colour indicates preferred treatment times

JAN	FEB	MAR	APR	MAY	JUN
JUL	AUG	SEP	OCT	NOV	DEC



Chemical and concentration	Rate	Weed growth stage, method and comments
<b>Glyphosate 360 g/L</b> Various trade names and formulations	11 mL / 1 L	<b>Seedling or adult (individuals or infestation):</b> Foliar spray – apply when actively growing

Note: The Weed Management Branch hold a permit for aerial application of glyphosate on olive hymenachne. If you would like to consider aerial spraying olive hymenachne, contact the Weed Management Branch on 8999 4567 for information.

**Non-chemical applications:** Heavy grazing in the dry season can decrease seed production. Mechanical or physical removal is ineffective due to highly effective vegetative reproduction from small fragments. The use of heavy earth moving machinery to remove hymenachne from drains has met with some success in north Queensland. Aim to reduce plant bulk prior to wet season flooding and drown it. For large infestations contact WMB.

### Paddy's lucerne – *Sida rhombifolia* (Class B and Class C)

#### OPTIMUM TREATMENT TIMES

darker colour indicates preferred treatment times

JAN	FEB	MAR	APR	MAY	JUN
JUL	AUG	SEP	OCT	NOV	DEC



Chemical and concentration	Rate	Weed growth stage, method and comments
<b>2, 4-D amine 625 g/L</b> Various trade names	320 mL / 100 L	<b>Seedling or adult (individuals or infestation):</b> Foliar spray – apply when actively growing
<b>Glyphosate 360 g/L</b> Various trade names and formulations	15 mL / 1L	<b>Seedling or adult (individuals or infestation):</b> Foliar spray – apply when actively growing
<b>Fluroxypyr 200 g/L</b> Various trade names	1 L / 100 L	<b>Seedling or adult (individuals or infestation):</b> Foliar spray – apply when actively growing
<b>Fluroxypyr 333 g/L</b>	600 mL / 100 L or 2.4 L / ha (boom)	<b>Seedling or adult (individuals or infestation):</b> Foliar spray – apply when actively growing

**Non-chemical applications:** Grub plants out. Slashing before flowering will prevent seed production temporarily and produce new growth for spraying.



## Parkinsonia – *Parkinsonia aculeata* (Class B and Class C)

### OPTIMUM TREATMENT TIMES

darker colour indicates preferred treatment times

JAN	FEB	MAR	APR	MAY	JUN
JUL	AUG	SEP	OCT	NOV	DEC



Chemical and concentration	Rate	Weed growth stage, method and comments
<b>Aminopyralid 8 g/L + Triclopyr 300 g/L + Picloram 100 g/L</b> Grazon™ Extra	350 mL / 100 L or 3 L / ha	<b>Seedling (individuals and infestation)</b> Foliar spray – avoid spraying if plants are stressed or bearing pods – Uptake Spraying Oil required Foliar spray – plants up to 2 m or 2 years old - Uptake Spraying Oil required
<b>Triclopyr 240 g/L + Picloram 120 g/L</b> Access™	1 L / 60 L (diesel) 1 L / 60 L (diesel)	<b>Seedling or adult (individuals or infestation)</b> Basal bark < 5 cm stem diameter Cut stump > 5 cm stem diameter
<b>Tebuthiuron 200 g/kg</b>	1.5 g / m <sup>2</sup>	<b>Seedling or adult (individuals or infestation):</b> Granulated herbicide - ground applied Do not use within 30 m of desirable trees or apply to continuous area > 0.5 ha Do not use if fire is eminent Apply when there is soil moisture or prior to rain

**Non-chemical applications:** Blade-ploughing, stick-raking, bulldozing and chaining can be effective if the root layer is removed from the soil. Cultivation of pasture or native vegetation after mechanical control will help to prevent re-sprouting and seedling establishment. Fire destroys seed in the soil surface and can be used as a follow-up to remove seedlings after other control efforts. Fire may also be used to manage mature trees. Hand grubbing for single plants or small outbreaks, ensure removal of the root system. Biocontrol options are available with Uu establishing slowly in some areas.

## Parthenium weed – *Parthenium hysterophorus* (Class A and Class C)

**\* Report this plant to the Weed Management Branch immediately if found**

### OPTIMUM TREATMENT TIMES

darker colour indicates preferred treatment times

JAN	FEB	MAR	APR	MAY	JUN
JUL	AUG	SEP	OCT	NOV	DEC



Chemical and concentration	Rate	Weed growth stage, method and comments
<b>2, 4-D amine 625 g/L</b> Various trade names	320 mL / 100 L	<b>Seedling or adult (individuals or infestation):</b> Foliar spray – apply when actively growing
<b>Glyphosate 360 g/L</b> Various trade names and formulations	10 mL / 1 L	<b>Seedling or adult (individuals or infestation):</b> Foliar spray – apply when actively growing
<b>MCPA 340 g/L + Dicamba 80 g/L</b> Various trade names	350 mL / 100 L or 5.2 L / ha (boom)	<b>Seedling or adult (individuals or infestation):</b> Foliar spray
<b>Metsulfuron-methyl 600 g/kg</b> Various trade names	10 g / 100 L	<b>Seedling or adult (infestations):</b> Foliar spray – apply when actively growing

**Landholders are urged not to attempt to control or dispose of parthenium themselves. Contact the Weed Management Branch for assistance.**

## Pond apple – *Annona glabra* (Class A and Class C)

\* Report this plant to the Weed Management Branch immediately if found

### OPTIMUM TREATMENT TIMES

darker colour indicates preferred treatment times

JAN	FEB	MAR	APR	MAY	JUN
JUL	AUG	SEP	OCT	NOV	DEC



Chemical and concentration	Rate	Weed growth stage, method and comments
<b>Glyphosate 360 g/L</b> Various trade names and formulations	15 mL / 1L	<b>Seedling (individuals or infestation):</b> Foliar spray - apply when actively growing
<b>Triclopyr 240 g/L + Picloram 120 g/L</b> Access™	1 L / 60 L (diesel) 1 L / 60 L (diesel)	<b>Seedling or adult (individuals or infestation)</b> Basal bark < 5 cm stem diameter Cut stump > 5 cm stem diameter
<b>Fluroxypyr 200 g/L</b> Various trade names	1.5 L / 100 L (diesel) 1.5 L / 100 L (diesel)	<b>Adult (individuals or infestation):</b> Basal bark < 10 cm stem diameter, treat up to 45 cm from ground Cut stump > 10 cm stem diameter
<b>Fluroxypyr 333 g/L</b> Starane™ Advanced	900 mL / 100 L	<b>Adult (individuals or infestation):</b> Basal bark < 10 cm stem diameter, treat up to 45 cm from ground

Landholders are urged not to attempt to control or dispose of pond apple themselves. Contact the Weed Management Branch for assistance.

**Prickly acacia – *Vachellia nilotica* (Class A and Class C)****OPTIMUM TREATMENT TIMES**

darker colour indicates preferred treatment times

JAN	FEB	MAR	APR	MAY	JUN
JUL	AUG	SEP	OCT	NOV	DEC



Chemical and concentration	Rate	Weed growth stage, method and comments
<b>Fluroxypyr 200 g/L</b> Various trade names	750 mL / 100 L	<b>Seedling (individuals or infestation) + adult (infestation):</b> Foliar spray - Uptake® Spraying Oil required
<b>Fluroxypyr 333 g/L</b> Starane™ Advanced	450 mL / 100 L	<b>Seedling (individuals or infestation) + adult (infestation):</b> Foliar spray - Uptake® Spraying Oil required
<b>Metsulfuron-methyl 600 g/kg</b> Various trade names	10 g / 100 L	<b>Seedling (individuals or infestation) + adult (infestation):</b> Foliar spray – apply when actively growing, need wetting agent
<b>Hexazinone 250 g/L</b> Various trade names	4 mL / spot 1 spot for each metre in height	<b>Seedling (individuals or infestation) + adult (infestation):</b> Spot application - apply at the base of plant
<b>Tebuthiuron 200 g/kg</b> Various trade names	1.5 g / m <sup>2</sup>	<b>Seedling (individuals or infestation) + adult (infestation):</b> Granulated herbicide: ground applied – do not use within 30 m of desirable trees or apply to single continuous area > 0.5 ha Use higher rate on dense growth or heavy clay soils
<b>Triclopyr 240 g/L + Picloram 120 g/L</b> Access™	1 L / 60 L (diesel) 1 L / 60 L (diesel)	<b>Adult (individuals or infestation):</b> Basal bark < 5 cm stem diameter Cut stump > 5 cm stem diameter
<b>Fluroxypyr 333 g/L</b> Starane™ Advanced	900 mL / 100 L (diesel) 900 mL / 100 L (diesel)	<b>Adult (individuals or infestation):</b> Basal bark < 10 cm stem diameter, treat up to 45 cm from ground Cut stump > 10 cm stem diameter
<b>Triclopyr 600 g/L</b> Various trade names	1 L / 120 L (diesel) 1 L / 120 L (diesel)	<b>Adult (individuals or infestation)</b> Basal bark < 5 cm stem diameter Cut stump > 5 cm stem diameter

**Non-chemical applications:** Before seed pods have dropped: hand grubbing (small plants), cutting the root < 30 cm below the soil surface (blade ploughing), stick-raking and chaining (larger plants or infestations) can be effective. Fire is useful for mass seedling control if there is a sufficient fuel load.

## Prickly pears & rope cacti – *Opuntia* spp.



### OPTIMUM TREATMENT TIMES

darker colour indicates preferred treatment times

JAN	FEB	MAR	APR	MAY	JUN
JUL	AUG	SEP	OCT	NOV	DEC

Chemical and concentration	Rate	Weed growth stage, method and comments
<b>Triclopyr 600 g/L</b> Garlon™ 600	800 mL / 60 L (diesel)	<b>Seedlings, juvenile, adults (individuals or infestations):</b> Foliar spray entire plant surface, ensuring all plant surfaces are completely covered with spray-mix to the point of runoff. Avoid spraying plants that appear stressed.
<b>Triclopyr 240 g/L + Picloram 120 g/L</b> Access™	1 L / 60 L (diesel)	<b>Seedlings, juvenile, adults (individuals or infestations):</b> Foliar spray entire plant surface, ensuring all plant surfaces are completely covered with spray-mix to the point of runoff. Avoid spraying plants that appear stressed.

## Rat's tail grass – *Sporobolus* spp.



### OPTIMUM TREATMENT TIMES

darker colour indicates preferred treatment times

JAN	FEB	MAR	APR	MAY	JUN
JUL	AUG	SEP	OCT	NOV	DEC

Chemical and concentration	Rate	Weed growth stage, method and comments
<b>Glyphosate 360 g/L</b> Various trade names and formulations	1.5 L / 100 L	<b>Seedling or adult (individuals or infestation):</b> Foliar spray – apply when actively growing
<b>Flupropanate</b> Taskforce™	200 ml / 100 L	<b>Seedling or adult (individuals or infestation):</b> Read label as the aim is to spray the ground rather than the plant.

**Non-chemical applications:** Slashing can trigger seed production in rats tail grass varieties. Slashing can also be a major seed transport mechanism. To stop seed production, rats tail grass would need to be slashed approximately every two weeks before seed matures.



### Rubber bush – *Calotropis procera* (Class B South of 16°30'S latitude and Class C)



#### OPTIMUM TREATMENT TIMES

darker colour indicates preferred treatment times

JAN	FEB	MAR	APR	MAY	JUN
JUL	AUG	SEP	OCT	NOV	DEC

Chemical and concentration	Rate	Weed growth stage, method and comments
<b>Triclopyr 300 g/L + Picloram 100 g/L</b> Conqueror®  <b>+ Aminopyralid 8 g/L</b> Grazon™ Extra	750 mL / 100 L (water)  500-750mL / 100 L (water)	<b>Seedling (individuals or infestation):</b> Foliar spray. Check label for recommended adjuvant product. More effective on plants <2m as thorough coverage on all leaves is required.
<b>Triclopyr 240 g/L + Picloram 120 g/L</b> Access™	1 L / 60 L (diesel)  1 L / 10 L (diesel) 1 L / 60 L (diesel)	<b>Adult (individuals and infestation):</b> Basal bark < 5cm stem diameter. Spray all stems. Spray to point of runoff. ThinLine up to 5cm stem diameter Cut stump > 5cm stem diameter
<b>Tebuthiuron (200g/kg)</b> Graslan Pending registration. Please check with Weed Management Branch for status confirmation.	1.5-2g/m <sup>2</sup>	<b>Seedling or adult:</b> Application to black clay soils in conjunction with seasonal rainfall. Spread granules according to density of the infestation.
<b>Fluroxypyr (333g/L)</b> Starane™ Advanced	3 L / 100 L (diesel)	<b>Adult:</b> Cut stump method for plants up to 10cm diameter and 3m high.

**Non-chemical applications:** This plant is difficult to eradicate as the deep roots survive almost any treatment. Maintenance of a dense pasture sward will assist in preventing invasion.

### Rubber vine – *Cryptostegia* spp. (Class A and Class C)

**\* Report this plant to the Weed Management Branch immediately if found**

#### OPTIMUM TREATMENT TIMES

darker colour indicates preferred treatment times

JAN	FEB	MAR	APR	MAY	JUN
JUL	AUG	SEP	OCT	NOV	DEC



Chemical and concentration	Rate	Weed growth stage, method and comments
<b>Triclopyr 300 g/L + Picloram 100 g/L</b> Various trade names	350 - 500 mL / 100 L	<b>Seedling (individuals and infestation) + adult (infestation):</b> Foliar spray – use higher rates on stands > 1.5 m when flowering, spray leaves and stems to the point of run-off and apply to base
<b>Triclopyr 240 g/L + Picloram 120 g/L</b> Access™	1 L / 60 L (diesel) 1 L / 60 L (diesel)	<b>Adult (individuals or infestation):</b> Basal bark < 5 cm stem diameter Cut stump > 5 cm stem diameter
<b>Triclopyr 600 g/L</b> Various trade names	1 L / 60 L (diesel) 1 L / 60 L (diesel)	<b>Adult (individuals or infestation):</b> Basal bark < 5 cm stem diameter Cut stump > 5 cm stem diameter
<b>Tebuthiuron 200 g/kg</b> Various trade names	1.5 g / m <sup>2</sup>	<b>Seedling or adult (individuals or infestation):</b> Granulated herbicide - ground applied Do not use within 30 m of desirable trees or apply to continuous area > 0.5 ha. Do not use if fire is eminent Apply when there is soil moisture or prior to rain

**Non-chemical applications:** Fire can destroy seeds, seedlings and adult plants with sufficient fuel loads. Blade or disk ploughing can be effective and will open up dense infestations for access. Slashing reduces vigour but may not kill plant.

**Saffron thistle – *Carthamus lanatus* (Class B and Class C)****OPTIMUM TREATMENT TIMES**

darker colour indicates preferred treatment times

JAN	FEB	MAR	APR	MAY	JUN
JUL	AUG	SEP	OCT	NOV	DEC



Chemical and concentration	Rate	Weed growth stage, method and comments
<b>2, 4-D amine 625 g/L</b> Various trade names	320 mL / 100 L or 1.1 - 2.4 L / ha	<b>Seedling or adult (individuals or infestation):</b> Foliar spray – apply when actively growing Foliar spray – use lower rate on seedlings
<b>Glyphosate 360 g/L</b> Various trade names and formulations	15 mL / 1 L	<b>Seedling or adult (individuals or infestation):</b> Foliar spray – apply when actively growing

**Non-chemical applications:** Improved perennial or native pastures will prevent establishment. Avoid heavy grazing as it will encourage growth. Slashing shortly before flowering can also effectively prevent seed production – but not too early as plants can re-sprout and produce new flower heads.

**Salvinia – *Salvinia molesta* (Class B and Class C)**

**Non-chemical applications:** Remove small infestations by hand, ensuring all of the plant is removed and destroyed. Biocontrol options are available.

**Sicklepod – *Senna obtusifolia* (Class B and Class C)****OPTIMUM TREATMENT TIMES**

darker colour indicates preferred treatment times

JAN	FEB	MAR	APR	MAY	JUN
JUL	AUG	SEP	OCT	NOV	DEC



Chemical and concentration	Rate	Weed growth stage, method and comments
<b>Aminopyralid 25 g/L + Triclopyr 200 g/L + Picloram 100 g/L</b> Tordon™ Regrowth Master	375 mL / 100 L	<b>Seedling or adult (individuals and infestation):</b> Foliar spray – apply when actively growing, non-ionic wetting agent required
<b>Dicamba 500 g/L</b> Various trade names	500 mL / 100 L	<b>Seedling or adult (individuals or infestation):</b> Foliar spray, wetting agent may be required
<b>Aminopyralid 8 g/L + Triclopyr 300 g/L + Picloram 100 g/L</b> Various trade names	200 mL / 100 L or 3 L / ha (boom)	<b>Seedling or adult (individuals and infestation):</b> Foliar spray – non-ionic wetting agent required: do not apply to podding plants

**Non-chemical applications:** Slashing can reduce old plants to a manageable size. Slashing should always be done prior to seed set, preferably when plants are flowering. Rotary hoeing or discing infested areas and immediately sowing with improved pastures can be effective, if the grasses are well managed. Avoid grazing paddocks containing sicklepod or senna, especially when mature seed is present. A constant, dense sward of grass will exclude sunlight and help to maintain soil moisture.



**Snake weeds – *Stachytarpheta* spp. (Class B and Class C)****OPTIMUM TREATMENT TIMES**

darker colour indicates preferred treatment times

JAN	FEB	MAR	APR	MAY	JUN
JUL	AUG	SEP	OCT	NOV	DEC



Chemical and concentration	Rate	Weed growth stage, method and comments
<b>2, 4-D amine 625 g/L</b> Various trade names	320 mL / 100 L	<b>Seedling or adult (individuals or infestation):</b> Foliar spray - apply when actively growing
<b>Fluroxypyr 200 g/L</b> Various trade names	750 mL / 100 L	<b>Seedling (individuals or infestation):</b> Foliar spray - Uptake® spraying oil required
<b>Fluroxypyr 333 g/L</b> Starane™ Advanced	450 mL / 100 L	<b>Seedling (individuals or infestation)</b> Foliar spray - Uptake® spraying oil required

**Non-chemical applications:** Slash before seed set and re-establish pasture grass for competition.**Spinyhead sida – *Sida acuta* (Class B and Class C)****OPTIMUM TREATMENT TIMES**

darker colour indicates preferred treatment times

JAN	FEB	MAR	APR	MAY	JUN
JUL	AUG	SEP	OCT	NOV	DEC



Chemical and concentration	Rate	Weed growth stage, method and comments
<b>2, 4-D amine 625 g/L</b> Various trade names	320 mL / 100 L	<b>Seedling or adult (individuals or infestation):</b> Foliar spray - apply when actively growing
<b>Metsulfuron-methyl 600 g/L</b> Various trade names	10g / 100 L	<b>Seedling or adult (individuals or infestation):</b> Foliar spray - apply when actively growing, wetting agent required
<b>Fluroxypyr 200 g/L</b> Various trade names	1 L / 100 L	<b>Seedling (individuals or infestation):</b> Foliar spray - Uptake® spraying oil required
<b>Fluroxypyr 333 g/L</b> Starane™ Advanced	900 mL / ha + Uptake 1 L / ha	<b>Seedling (individuals or infestation)</b> Foliar spray - Uptake® spraying oil required Boom application - apply when actively growing

**Non-chemical applications:** Repeated slashing and cultivation; vigorous pasture competition. Biocontrol options are available.

### Thornapples – *Datura ferox* (Class A and Class C), *Datura* spp. (Class C)



#### OPTIMUM TREATMENT TIMES

darker colour indicates preferred treatment times

JAN	FEB	MAR	APR	MAY	JUN
JUL	AUG	SEP	OCT	NOV	DEC

Chemical and concentration	Rate	Weed growth stage, method and comments
<b>2, 4-D amine 625 g/L</b> Various trade names	320 mL / 100 L	<b>Seedling or adult (individuals or infestation)</b> Foliar spray - apply when actively growing
<b>Glyphosate 360 g/L</b> Various trade names and formulations	15 mL / 1L	<b>Seedling or adult (individuals or infestation):</b> Foliar spray – apply when actively growing
<b>MCPA 340 g/L + Dicamba 80 g/L</b> Various trade names	350 mL / 100 L	<b>Seedling or adult (individuals or infestation):</b> Foliar spray
<b>Fluroxypyr 200 g/L</b> Various trade names	1 L / 100 L	<b>Seedling (individuals or infestation):</b> Foliar spray - Uptake® spraying oil required
<b>Fluroxypyr 333 g/L</b> Starane™ Advanced	450 mL / ha (boom)	<b>Seedling (individuals or infestation)</b> Foliar spray - Uptake® spraying oil required Boom application - apply when actively growing

**Non-chemical applications:** Easily removed by hand, collect and burn mature seeds.

### Thatch grass – *Hyparrhenia rufa* (Class A and Class C)



#### OPTIMUM TREATMENT TIMES

darker colour indicates preferred treatment times

JAN	FEB	MAR	APR	MAY	JUN
JUL	AUG	SEP	OCT	NOV	DEC

Chemical and concentration	Rate	Weed growth stage, method and comments
<b>Glyphosate 360 g/L</b> Various trade names and formulations	2 L / 100 L	<b>Seedling or adult (individuals or infestation):</b> Foliar spray – apply when actively growing
<b>Glyphosate 450 g/L</b> Various trade names and formulations	1.6 L / 100 L	<b>Seedling or adult (individuals or infestation):</b> Foliar spray – apply when actively growing
<b>Glyphosate 540 g/L</b> Various trade names and formulations	1.4 L / 100 L	<b>Seedling or adult (individuals or infestation):</b> Foliar spray – apply when actively growing

**Non-chemical applications:** Small infestations can be hand pulled. Slashing can prevent seed formation. Regrowth can then be treated with herbicide.

**Water hyacinth – *Eichhornia crassipes* (Class A and Class C)**

**\* Report this plant to the Weed Management Branch immediately if found**

If you think you may have seen water hyacinth or have this weed on your property do not attempt to control it, contact the Weed Management Branch for assistance.



**Water mimosa – *Neptunia plena* and *N. oleracea* (Class A and Class C)**

**\* Report this plant to the Weed Management Branch immediately if found**

If you think you may have seen water mimosa or have this weed on your property do not attempt to control it, contact the Weed Management Branch for assistance.



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## Websites

- Australian Pesticides and Veterinary Medicines Authority [www.apvma.gov.au/index.asp](http://www.apvma.gov.au/index.asp)
- Australian Weeds Strategy, A national strategy for weed management in Australia, [www.weeds.org.au/docs/The Australian Weeds Strategy.pdf](http://www.weeds.org.au/docs/The%20Australian%20Weeds%20Strategy.pdf).
- Commonwealth Scientific and Industrial Research Organisation (CSIRO): [www.csiro.au](http://www.csiro.au) – search ‘weeds’
- Co-operative Research Centre for Tropical Savannas: [savanna.cdu.edu.au](http://savanna.cdu.edu.au) - search ‘weeds’
- Invasive Plants and Animals Committee <http://www.pestsmart.org.au/connect/ipac/>
- *Northern Territory Weeds Management Act* [www.nt.gov.au/dcm/legislation/current.html](http://www.nt.gov.au/dcm/legislation/current.html)
- Weed Identification Tool: [www.weeds.org.au/ntmap.htm](http://www.weeds.org.au/ntmap.htm)
- Weed Management Branch, Department of Environment and Natural Resources: [www.nt.gov.au/weeds](http://www.nt.gov.au/weeds)
- Weeds of National Significance (WoNS): [www.weeds.org.au/natsig.htm](http://www.weeds.org.au/natsig.htm)

## Acknowledgements

Some sections of this manual have been directly reproduced, with permission, from the NSW Noxious and Environmental Weed Handbook (3rd edition) 2007 by Rod Ensbey and Annie Johnson.



## Appendix A – Preventing Weed Seed Spread

### Vehicle Hygiene

Vehicles, including quad bikes, boats and farm machinery can easily spread weed seed if a high level of vigilance is not maintained. Ideally a strict inspection regime should be implemented before and after all travel, especially when travelling to areas known to be infested with weeds.

It should also be noted that many plants have developed special adaptations to facilitate their spread. Many have hooks or burrs which catch readily in clothing, footwear or in animal hair, so people and animals should be checked prior to moving into clean areas.

The checklist below can be used as a guide to establish a checking program for your property.

#### Before Travel

- Before travelling check clothing and shoes are free of mud and seeds.

#### Inside the Vehicle

- Check the foot wells and mats to make sure that no weed seed has fallen off your shoes.

#### Engine

- Check radiator and grill.

#### Around the Vehicle

- Check along wheel trims, mud flaps, tyres and tray of the vehicle for mud and weed seed.

#### Quad Bikes/Machinery

- Check around the wheels and where mud or weed seed may be caught.

#### Underneath the Vehicle

- Check the undercarriage and guards to ensure that there is no mud or weed seed.

#### Washing Down Procedures

- Establish a designated location to wash down your vehicle.
- Monitor plants growing in this area.
- Control all weed growth immediately.



*Rubber bush seeds are easily transported.*



*Burrs stuck to sock.*



*Mimosa seed pods.*



*Bellyache bush fruit and flowers.*



*Rat's tail grass seeds.*

## Appendix B – Research and Development of Biological Control Agents in the NT

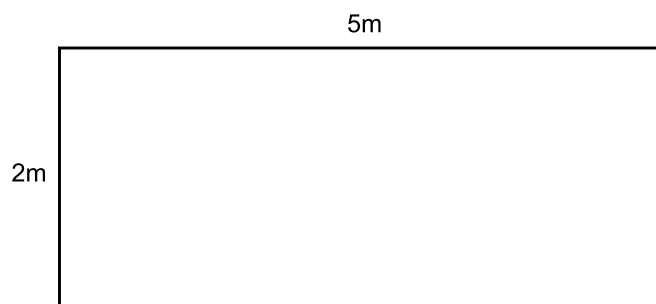
Weed	Agent	Type of agent	first released	plant part attacked	Established?
Mimosa ( <i>Mimosa pigra</i> )	<i>Acanthoscelides puniceus</i>	beetle	1983	mature seed	yes
	<i>Acanthoscelides quadridentatus</i>	beetle	1983	mature seed	no
	<i>Chlamisus mimosae</i>	beetle	1985	leaves and stems	yes
	<i>Neurostrota gunniella</i>	moth	1989	pinnae and tips	yes
	<i>Carmenta mimosa</i>	moth	1989	large stems	yes
	<i>Coelocephalapion aculeatum</i>	weevil	1992	flower buds	no
	<i>Coelocephalapion pigrae</i>	weevil	1994	flower buds and leaves	yes
	<i>Phloeospora mimosae-pigrae</i>	fungus	1995	leaves , stems and pods	no
	<i>Chalcodermus serripes</i>	weevil	1996	green seed and tips	yes
	<i>Diabole cubensis</i>	fungus	1996	leaves	yes
	<i>Sibinia fastigiata</i>	weevil	1997	green seed and flowers	no
	<i>Malacorhinus irregularis</i>	beetle	2000	Leaves, roots and nodules	yes
	<i>Macaria pallidata</i>	moth	2002	leaves	yes
	<i>Leuciris fimbriaria</i>	moth	2005	leaves	yes
	<i>Nesaecrepida infuscata</i>	beetle	2007	roots and leaves	yes
Bellyache bush ( <i>Jatropha gossypifolia</i> )	<i>Agonosoma trilineatum</i>	bug	2003	fruit	no
Parkinsonia ( <i>Parkinsonia aculeata</i> )	<i>Eueupethicia cisplatensis</i>	moth	2013	leaves	yes
	<i>Rhinacloa callicrates</i>	bug	1989	leaves and flower buds	no
	<i>Mimosestes ulkei</i>	beetle	1995	seed	no
	<i>Penthobruchus germaini</i>	beetle	1995	seed	yes
Salvinia ( <i>Salvinia molesta</i> )	<i>Cyrtobagous salviniae</i>	weevil	1981	leaves, roots	yes
Sida ( <i>Sida acuta</i> )	<i>Calligrapha pantherina</i>	beetle	1989	leaves	yes
	<i>Eutinobothrus</i> sp.	weevil	1997	stems	no
	<i>Eutinobothrus pilosellus</i>	weevil	1997	stems	no
Noogoora Burr ( <i>Xanthium strumarium</i> )	<i>Epiblema strenuana</i>	moth	1982	stems	yes
	<i>Puccinia xanthii</i>	fungus	~1975	leaves	yes



## Appendix C – Calibrating Spray Equipment

### Hand gun calibration

1. Mark out an area  $5\text{ m} \times 2\text{ m} = 10\text{ m}^2 = 1/1000\text{th}$  of 1 hectare (representative of the area to be treated)



2. Time taken in **seconds** to spray **10 m²**
3. Measure output in litres/seconds taken to spray  $10\text{ m}^2$
4. Multiply **output x 1000** = L/ha

### Boom sprayer calibration

1. Record **output** from each nozzle for 1 minute (replace if flow rate varies  $\pm 10\%$  or if spray pattern is visually faulty)
2. Record total **spray output** (add **output** for all nozzles) as **litres per minute**
3. Measure effective **spray width** and record in metres
4. Determine actual ground speed by timing in seconds the **time taken** to travel **100 metres**

$$\text{* Actual ground speed} = \frac{100 \text{ metres} \times 3.6}{\text{Time taken (seconds)}} = \text{km/h}$$

Note: 3.6 is a conversion factor to convert seconds to hours

5. Determine **water application rate** by using steps 2-4

$$\text{*Water application rate} = \frac{\text{spray output (L/minute)} \times 600}{\text{spray width (m)} \times \text{ground speed (k/h)}} = \text{L/hectare}$$

## Appendix D - Courses Relevant to Chemical Application in the NT

### Charles Darwin University

Chemical training courses offered:

- AHCPMG301A Control weeds (may be run in conjunction with the AQF3 SMARTtrain Accreditation course)
- AHCPMG201A Treat weeds (may be run in conjunction with AQF2 Apply chemicals course)
- AHCPMG202A Treat plant pests, diseases and disorders - self paced or on request
- AHCPMG302A Control plant pests, diseases and disorders - self paced or on request
- HLTA301C First Aid course - on request

The following courses meet requirements for some pest control or ground spray application licenses:

- RTC3401 Control weeds
- RTC2401 Treat weeds
- RTC3404 Treat pest and disease
- RTC2404 Control pest and disease
- RTC2704A First Aid course

Chainsaw operations course - many companies are using chainsaws and chemicals together for bush clearing or woody weed control.

- Operate chainsaws - (2 days) - basic chainsaw skills.
- Tree felling course - (2 days) - more advanced for controlled felling of trees.

Please contact Charles Darwin University directly for current information on courses offered on (08) 8946 7513 or email [hort\\_aqua@cdu.edu.au](mailto:hort_aqua@cdu.edu.au)

## Appendix E – Modes of Action

Modes of Action (Barrett, M. and Reed, G., 1997)

Resistance Risk	Mode of Action Group	Typical Actives
High	A - Inhibitors of acetyl co-enzyme A Carboxylase (lipid synthesis, cell membranes)	diclofop-methyl clethodim fluzafop-P haloxyfop propaquizafop sethoxydim
	B - Inhibitors of acetolactase synthase (ALS) (amino acid synthesis)	chlorsulfuron halosulfuron-methyl imazapyr metsulfuron-methyl triasufuron iodosulfuron
Moderate	C - Inhibitors of photosynthesis at photosystem II	atrazine diuron fluometuron prometryn
	D - Inhibitors of tubulin formation	pendimethalin trifluralin
Low	E - Inhibitors of mitosis	Carbetamide Triallate bensulide
	F - Inhibitors of carotenoid biosynthesis	norflurazon
	G - Inhibitors of chlorophyll biosynthesis	oxyfluorfen
	H - Inhibitors of protein synthesis	thiobencarb
	I - Disruption of plant hormone action	2,4-D 2,4-DB dicamba triclopyr fluroxypyr MCPA picloram
	J - Inhibitors of fat synthesis	flupropanate
	K - Herbicides with diverse sites of action	metolachlor MSMA
	L - Inhibitors of photosynthesis at photosystem I	diquat paraquat
	M - Inhibitors of aromatic amino acid synthesis	glyphosate glyphosate-trimesium
	N - Inhibitors of glutamine synthetase	glufosinate-ammonium

In Australia, the letters (A, B, C etc) are used to identify the different Mode of Action groups whereas overseas, the numbers (1, 2, 3 etc) are used.

## Appendix F – Appropriate Disposal of Chemicals and Containers

### drumMUSTER

To solve the problem of what to do with used, non-returnable chemical containers, Croplife Australia, the NFF (National Farmer's Federation), the Veterinary Manufacturers and Distributors Association (VMDA) and local governments developed the national collection and recycling scheme, drumMUSTER.

drumMUSTER is Australia's most extensive environmental program for the collection and recycling of agricultural and veterinary chemical containers.

Contact 1800 008 707 for further information. As more collection sites are set up, you can check on the locations through the drumMUSTER website : [WWW.drummuster.com.au](http://WWW.drummuster.com.au)

From 1 February 1999, land managers and farmers have paid a 4c per litre or kilogram levy on non-returnable chemical containers, with capacities greater than 1 L or 1 kg, which funds drumMUSTER and ChemClear programs.

The levy funds local government to:

- pay staff to inspect returned containers;
- process the returned containers; and
- publicise local collection sites and times;
- provide collection services for the ChemClear program.

Since drumMUSTER's inception in late 1998, drumMUSTER has collected and recycled more than 23 million empty agvet chemical containers and transformed them into practical items such as fence posts, wheelie bins and road signs. Once councils enter into an agreement with drumMUSTER, land managers are able to deliver cleaned (that is, triple or pressure-rinsed) containers to designated collection points run by participating councils.

At these collection points, the delivered containers are inspected and either accepted or rejected.

Check the drumMUSTER website [www.drummuster.com.au](http://www.drummuster.com.au) for the location of collection points in the Northern Territory.

Since the inception of the ChemClear program in 2003 more than 397 tonnes of unwanted chemical has been collected and disposed of in an appropriate manner.

For more information on ChemClear visit : [www.chemclear.com.au](http://www.chemclear.com.au)

### Cleaning Containers for Collection

When rinsing, the personal protective equipment specified on the label for application and/or mixing and loading the pesticide should be worn. This is because the chemical remaining in a container is the concentrate - the most toxic form of the chemical.

To triple-rinse containers:

- remove the cap, invert the container and allow it to drip drain into the mixing tank for 30 seconds;
- add rinse water 20%;
- replace cap and shake vigorously for 1 minute;
- remove cap, Invert and drip drain into mixing tank for 30 seconds;
- repeat twice; and
- wash cap separately and leave off the container to allow it to dry.

Triple-rinsing is only suitable for small containers up to 20 L. Rinsing is most effective immediately after using the chemical. The longer the residue has time to dry and cake on the inside of the container, the more difficult it is to remove. This is the reason for rinsing during mixing and loading. If rinsing is done during mixing and loading, the rinsate can be emptied into the spray or mixing tank of the application equipment. Using the rinsate avoids the need to dispose of the container residues separately.

An alternative to manually triple-rinsing small containers is using a pressure rinsing nozzle. There are two main types. One has a rotating spray head that can be used to rinse an inverted container in the induction hopper or directly over the tank. The other has a hardened, pointed shaft to pierce drums, and the hollow shaft itself has four holes at 90 degrees to spray the water around the container.

To pressure rinse a container up to 20 L:

- remove the cap, invert the container and allow it to drip drain into the mixing tank for 30 seconds;
- ensure clean rinse water is between 35 and 60 psi;
- Insert pressure-rinsing probe, either through the container opening or through the pierced base of the container (depending upon the type of nozzle);
- Invert container over mixing tank and rinse for 30 seconds or longer if the water coming from the container neck is not clear, moving the probe about to ensure all inner surfaces are rinsed;
- wash cap in clear rinse water from container;

- turn off water, remove probe and drip drain container into mixing tank for 30 seconds; and
- leave the lid off the container to allow it to dry.

## ChemCLEAR - Disposal of unwanted chemicals

ChemClear® is the national program for the collection and disposal of unwanted currently registered agvet chemicals. The objective of the program is to minimise the accumulation of unwanted agvet chemicals held in storage which may create potential risks to the environment, public health and trade.

There are two categories of agvet chemicals ChemClear® collects:

- Group 1 chemicals are currently registered products manufactured by participating companies signed to the Industry Waste Reduction Agreement. These products are collected free of charge by virtue of having been included in the drumMUSTER levy.
- Group 2 chemicals are products manufactured by non-participating companies, or, deregistered, unknown, mixed or out of date products.  
A per litre/kilogram fee for disposal applies.

Registrations are essential and can be made at [www.chemclear.com.au](http://www.chemclear.com.au) or 1800 008 182.

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[www.nt.gov.au/weeds](http://www.nt.gov.au/weeds)

# Threatened Species of the Northern Territory

## AUSTRALIAN PAINTED SNIPE *Rostratula benghalensis australis*

### Conservation status

Australia: Endangered

Northern Territory: Vulnerable



©Tom Tarrant  
www.aviceda.org

Photo: Tom Tarrant

### Description

The Australian painted snipe is a wader of around 220-250 mm in length. The head, neck and upper breast is chestnut-bronze. The back and wings are dark olive-green, finely barred black and are ornamented with bright chestnut spots and black bars. The back has a conspicuous buff-coloured V. A broad white band separates the neck and wings. There is a broad white horizontal band through the eye.

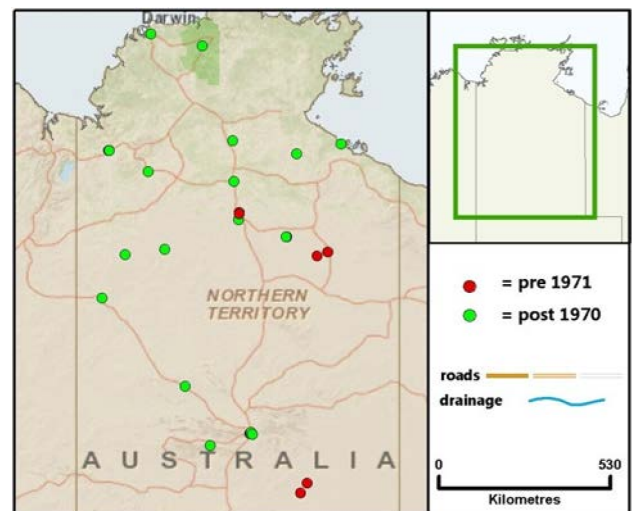
The male is a smaller, less colourful bird, lacking the rufous on the hindneck. This species is generally inconspicuous, and occurs solitarily or in only small parties.

### Distribution

Until recently (Lane and Rogers 2000), the Australian painted snipe was generally considered part of a more widespread species that extended throughout Indonesia, Asia and Africa and on many Pacific Islands. As re-defined, the species is now considered restricted to Australia. Australian painted snipe are most frequently recorded in south eastern Australia, particularly in the Murray-Darling Basin.

Records from tropical northern Australia are mostly from Queensland. In northern Western Australia it has been recorded from

the Pilbara and Derby but not since 1950 (Blakers et al. 1984). In the Northern Territory (NT) it was recorded breeding at Tarrabool Lake on Eva Downs on the Barkly Tablelands in 1993



Known locations of Australian painted snipe

(Jaensch 1994), with non-breeding records from Lake Woods in 1993 and an un-named swamp on Sturt Plateau in 2001 (Jaensch 2003). It is likely that the species could occur on any shallow ephemeral wetlands in central or southern Northern Territory. It is also possible that the species could occur in northern areas of the NT.

*Conservation reserves where reported:*

Kakadu National Park.



## Ecology

Australian painted snipe occur in shallow, vegetated, freshwater swamps, claypans or inundated grassland (including temporary wetlands). They feed at the water's edge and on mudflats, taking seeds and probing for invertebrates. Three to six eggs are laid in a shallow scrape nest. No sites are known where the species is resident and the species may well be nomadic. Its occurrence appears to be unpredictable (Rogers 2001). It is unobtrusive during the day, feeding primarily at night.



Habitat of the painted snipe at Tarrabool Lake on the Barkly Tablelands. (Photo: Jaensch 1994)

## Conservation assessment

Australian painted snipe appear to have disappeared from south-western Australia (Johnstone and Storr 1998). The reporting rate for the species has declined steadily since the 1950s (Lane and Rogers 2000) with fewer than 100 records since 1990 (Garnett and Crowley 2000). Garnett et al. (2011) classified the status of the species as endangered at a national level because of this small population size and continued population decline.

Assigning a status for the species in the Northern Territory is more problematic because of lack of knowledge of population size and trends. As it appears to be nomadic, the species is unlikely to have a population that is separate to that inhabiting other areas of Australia. Accordingly, it would mean the species is likely to have declined in the Territory. This is supported by evidence of a decline in northern Western Australia (Johnstone and Storr 1998). Watkins (1993) estimated that the Australian population was 1,500 individuals, but provided no explanation as to how this was derived. The species

qualifies as Vulnerable (under criteria A2b; C1) in the NT due to:

- population reduction of >30% over the last 10 years or 3 generations; and
- population size less than 10,000 and continuing decline of at least 10% within 10 years or three generations.

## Threatening processes

The main process affecting the species in southern areas is wetland drainage. Johnstone and Storr (1980) attribute the decline of painted snipe in the Kimberley to degradation of habitat by cattle. Cattle degrade habitat by trampling and grazing of tussocks. As most NT swamplands suitable for this species occur on pastoral lands, this process may also be detrimentally affecting this species in the NT, although there are no substantial data to assess this impact (Jaensch 2003).

## Conservation objectives and management

There is no existing management program for the wild population of this species in the Northern Territory.

Research priorities are to:

- I. increase surveys of wetlands with specific searches undertaken for painted snipe.

Management priorities are to:

- I. ensure a range of shallow ephemeral wetlands throughout central and southern Northern Territory are managed to ensure that habitat degradation by cattle does not occur.

## Compiled by

Robert Taylor  
Ray Chatto  
John Woinarski  
[updated November 2013]

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Australasian Ornithologists Union and World Wide  
Fund for Nature, Melbourne.)

# Threatened Species of the Northern Territory

## CURLEW SANDPIPER

### *Calidris ferruginea*

#### Conservation status

Australia: Critically Endangered

Northern Territory: Vulnerable



Photo supplied by BirdLife Australia

#### Description

The Curlew Sandpiper is a small-medium sized shorebird with long legs and a long black tapering down-curved bill. In non-breeding plumage (typical of Australian visitors) the top and back of the head and the upperparts are grey-brown with little mottling or scalloping.

There is a white 'eye-brow'. The underparts are light with a grey wash across the breast. A white rump and broad wing bar are apparent in flight.

#### Distribution

Curlew Sandpipers breed in central and eastern Siberia (Russia). Annual southerly migration takes them to Africa, southern Asia and Australasia. Their distribution in Australia during the non-breeding season is quite widespread, with records in the north and south, and scattered through inland Australia (Garnett et al. 2011).

In the Northern Territory (NT), Curlew Sandpipers have been recorded from most coastal areas and these are important non-breeding and stop-over areas. Chatto (2003) considered the Fog Bay and Chambers Bay areas and the Port McArthur area as the main areas for the species in the NT. They have also been reported at Alice Springs and Newhaven Station (presumed to be migrants passing through).

Conservation reserves where reported: Barranyi National Park, Djukbinj National Park, Kakadu National Park, Keep River National Park and Limmen National Park.

#### Ecology

After breeding in the northern summer on the arctic tundras of Siberia, those that overwinter in Australia migrate southwards along the East Asian-Australasian flyway. These non-breeding birds forage around coastal brackish lagoons, intertidal mud and sand flats, estuaries, saltmarshes and occasionally on inland freshwater wetlands (Garnett et al 2011). They feed on marine worms, molluscs and crustaceans.

#### Conservation assessment

The status of this species in Australia and globally was reviewed in 2010 (by Garnett et al. (2011), and BirdLife International (2011), respectively). For the population(s) migrating to Australia, Garnett et al. (2011) considered that its recent decline was 50-79 per cent in three generations (c. 23 years). This was based on many years of counts at key sites across Australia: e.g. Rogers et al 2010. Garnett et al (2011) rated its Australian status as Vulnerable A2bc+3c+4bc. Globally, other populations have not shown such declines and BirdLife International (2011) rates its global status as Least Concern.

Birds visiting the NT probably comprise a minor proportion of the global population of this species: Chatto (2003) estimated that the minimum Top End population of Curlew Sandpipers was 17 800 individuals; BirdLife International (2011) estimated the current total global population at 1.8 -1.9 million individuals.

Birds occurring in the NT are a component of the migratory Australian population, and can reasonably be assumed to have suffered a reduction of similar proportion. So at first pass the species rates as Endangered (under criterion A2ac+4c):

- observed reduction of the migratory population visiting Australia of >50 per cent over the last three generations (c. 23 years), expected to continue in the future;
- causes of reduction have not ceased and may not be reversible; and
- decline in habitat quality of northern hemisphere breeding grounds.

decline in habitat quality of northern hemisphere breeding gr

However, following the International Union for the Conservation of Nature Regional Guidelines, this status should be downgraded by one level because conditions within the NT are not deteriorating and the global population is large and relatively stable such that the breeding population could rescue the regional population if it declined. Consequently, this species is listed as Vulnerable (A2ac+4c) in the NT.

### **Threatening processes**

The main acute cause of population decline for birds migrating to Australia is habitat loss at migratory stop-over grounds (mudflats in the Yellow Sea area: Barter 2002; Moores et al. 2008; Hassell 2010), but habitat degradation has also occurred more gradually across most of its range.

### **Conservation objectives and management**

In the NT, the primary conservation objective is to maintain stable non-breeding populations by retaining healthy coastal mudflat, sandflat, estuarine and other wetland habitats.

Secondarily, the Australian Government should be supported in its international endeavours to promote conservation of shorebirds along the East Asian-Australasian flyway.

### **Compiled by**

Simon Ward

[updated December 2012]

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# Threatened Species of the Northern Territory

## GREATER BILBY BILBY

### Macrotis lagotis

#### Conservation status

Australia: Vulnerable

Northern Territory: Vulnerable



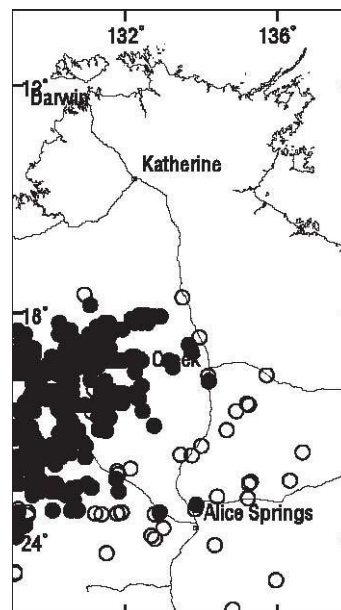
#### Description

The greater bilby is a large bandicoot (body mass males, 800-2500g; females, 600-1100g) with soft silky fur. The fur is ash grey over most of the body, whereas on the belly it is pure white to cream. The basal 20 percent of the tail is the same colour as the upper-body, the central 40 percent is black and the distal 40 percent, pure white. The forelimbs are robust and equipped with three stoutly clawed toes (and two unclawed toes) giving the animal a formidable burrowing capacity. The slender hind limbs are long and resemble those of macropods. The snout is long and delicate and the ears are large and rabbit-like.

#### Distribution

Within the Northern Territory, it occurs in the central and western parts of the Tanami bioregion, the southern Sturt Plateau bioregion and the northern Great Sandy Desert bioregion. The distribution is highly fragmented within this area. The most southerly recent records are in the vicinity of Kintore, the most northerly around Newcastle Waters and Wave Hill.

Historically, the greater bilby occupied a vast area of arid and semi-arid Australia. Its distribution declined dramatically in the years following European settlement and it now occupies about 20% of its former range. The species occurs in two separate geographic areas; one extending from the western deserts region of the Northern Territory and Western Australia north to the Pilbara and Kimberley regions, the second in the Channel Country of south-west Queensland (Watts 1969; Southgate 1990a).



Known locations of the greater bilby.  
○ = pre 1970; ● = post 1970.



*Conservation reserves where reported:*  
None (although it formerly occurred in areas that are now included within Uluru Kata-Tjuta National Park, Watarrka National Park and West MacDonnell National Park).

## Ecology

Habitat of the greater bilby in the Northern Territory is characterised by sandy soils dominated by hummock grasslands covered predominantly by three species of spinifex, *Triodia basedowii*, *T. pungens* and *T. schinzii*. An overstorey of low shrub cover dominated by *Acacia* and *Melaleuca* species grows over much of this country. This predominantly sandy landscape also includes rocky outcrops, laterite rises and low lying drainage systems (Southgate 1990b). Broad-scale surveys of bilbies in the Northern Territory in the 1990s indicated that laterite and drainage line land systems were occupied more frequently than sand plain and dune systems.

The greater bilby is omnivorous and major foods vary across seasons (Southgate 1990b). Important plant foods include seed from various grasses and sedges including Button Grass (*Dactyloctenium radulans*), Desert Flinders Grass (*Yakirra australiensis*) and Parakeelya (*Calandrinia* spp.) and bulbs from Bush Onion or Yalka (*Cyperus bulbosus*) and *Wurmbea deserticola*, many of which are most abundant soon after fires (Southgate and Carthew 2006). At a site in central Australia, fruiting bodies of underground fungi were the major dietary component. Major invertebrate prey includes termites, ants, beetles, insect larvae and spiders. Most of the food of the Greater Bilby is excavated from the soil and holes may attain 25 cm in depth.

Bilbies dig burrows up to two metres deep and an individual may have over a dozen regularly used burrows within its home-range. Bilbies forage at night. Movements of 5 km during one night have been recorded for male

bilbies. Males, females and juveniles may occupy overlapping home ranges. Densities of 12–16 individuals/km<sup>2</sup> are reached in optimal habitat. However; a density of 1-2/km<sup>2</sup> is more typical (Southgate 1987).

Litters, comprising one to three young, can be produced at any time of year (Southgate *et al.* 2000). Young remain in the pouch for approximately 75 days, before being cached and suckled in maternal burrows for a further two weeks prior to independence. Under ideal conditions, there is the potential to produce four litters every year. Captive animals live up to 10 years (Southgate *et al.* 2000).

## Conservation assessment

No estimates are available for the size of the Northern Territory population of the greater bilby. The range of the species in the Territory is declining and contracting northwards. For example, populations located in the vicinity of Alice Springs in the late 1960s (Watts 1969) are no longer present. However, bilbies in the Northern Territory appear to be nomadic and undergo large population fluctuations in response to food availability. These characteristics result in it being difficult to accurately assess population trends for two reasons. First, no sites are known in the Territory that are considered to permanently hold colonies of bilbies. Second, depending on rainfall and food availability, very few bilby records may be reported during one time period but this can change quickly. This natural variation must be taken into account when considering the conservation status of the species.

Notwithstanding the above caveats, the greater bilby is **Vulnerable** in the Northern Territory (under criteria C2a(i)) based on:

- population size estimated to be <10,000 mature individuals;



- continuing decline in numbers of mature individuals; and
- no subpopulation estimated to contain more than 1000 mature individuals.

### Threatening processes

Predation by the introduced European fox appears to be the major threat faced by the greater bilby in the Northern Territory (Southgate 1987). Predation by other carnivores (i.e. feral cat, dingo) could also threaten bilby populations. However, there is considerable interaction between these three predators. Specifically, dingoes may protect a range of native species, including bilbies, by controlling cats and foxes either through direct predation or excluding them from carrion during droughts.

Competition with rabbits may also be an important threatening process faced by the greater bilby. However, the negative impact of rabbits has been greatly reduced following the release of rabbit calicivirus disease (RCD) in the 1990s. Grazing by cattle may be a threat on some pastoral leases. Unsuitable fire regimes may restrict breeding and impede dispersal into unoccupied areas, and reduce food options and availability (Southgate and Carthew 2006).

### Conservation objectives and management

A national Recovery Plan for the greater bilby was established in 2006 (Pavey 2006).

The plan recommends the following management actions that include the Northern Territory:

- reduce fox and cat numbers at key wild populations where bilbies are in decline;
- continue husbandry and coordinated management of captive populations;

- refine monitoring methodology;
- monitor trends in occurrence at wild populations; and
- continue to manage the recovery process through a national recovery team.

The greater bilby is maintained in captivity at the Alice Springs Desert Park and is displayed in its nocturnal house. National Bilby Day takes place in September each year and the Desert Park is a focus for educational activities involving the species.

### Compiled by

Chris Pavey  
[May 2006]

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# Threatened Species of the Northern Territory

## GREY FALCON

### *Falco hypoleucos*

#### Conservation status

Australia: Not listed

Northern Territory: Vulnerable



Photo: P. McDonald

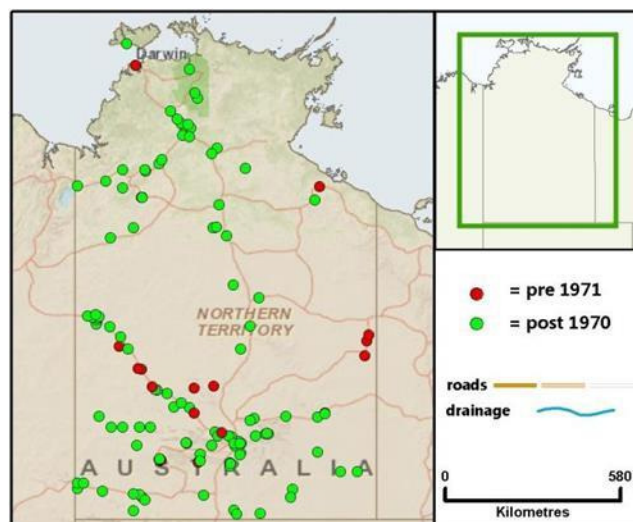
#### Description

The Grey Falcon is a medium-sized compact pale falcon. The head and upperparts are a light blue-grey, with darker grey flecking on the wings and barring on the tail. The wing-tips are black. The cheeks and chin are white, except for the faint grey tear under each eye, and the underparts are white with fine dark streaks. The bill is grey with a dark tip. The cere, eye-ring and legs are bright yellow.

#### Distribution

The Grey Falcon is found in low densities through much of the arid and semi-arid areas of Australia and has been recorded in all Australian mainland states and territories. The majority of records from the Northern Territory (NT) are from the southern half, but there are records all the way up to Darwin and also a record from Groote Eylandt.

Conservation reserves where reported: Finke National Park, Kakadu National Park, Nitmiluk National Park, Uluru National Park, Watarrka National Park and West MacDonnell Ranges National Park.



Known locations of the Grey Falcon

#### Ecology

Grey Falcons live in areas of lightly-timbered lowland plains, typically on inland drainage systems, where the average annual rainfall is less than 500 mm. Where they occur they are always at low densities and are mostly seen as singles or pairs. They use nests built by other species and prefer nests in the tallest trees along watercourses. Clutches are of one to four eggs. Nesting has been recorded from June to November, but in any one area may occur only in above-average rainfall years.

Grey Falcons hunt birds, often parrots and pigeons, typically from the air with a distinctive fast, level and low-to-the-ground hunting flight. They will also take insects on the wing. They many also pounce on mammals, reptiles and birds from a high perch.

### **Conservation assessment**

The status of Grey Falcons in Australia was assessed in 2010 by Garnett et al. (2011). They considered the Australia-wide population to be in the order of 500 pairs and they considered the species to be Vulnerable.

The population of breeding birds in the NT must be fewer than the Australia-wide population, so the species qualifies as Vulnerable in the NT (under criterion D1), based on:

A very small total population size (<1 000).

### **Threatening processes**

Threats to the Grey Falcon are not clearly defined. Habitat alteration and destruction through clearing for grazing and agriculture probably lead to declines in the species' southern and eastern ranges early last century, and confined them more to the arid parts of its range (Garnett et al. 2011). n the NT, such factors have probably been less influential.

Here landscape-scale changes in fire-regimes or grazing by feral or domestic herbivores may, in the long-term, reduce the availability of nesting trees and appropriate prey species.

### **Conservation objectives and management**

Conservation objectives are to maintain stable populations of Grey Falcons across their range in the NT and to maintain successful breeding. The management required includes developing methods of assessing population trends and implementing long-term monitoring of populations.

### **Compiled by**

Simon Ward

[updated December 2012]

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# Threatened Species of the Northern Territory

## NIGHT PARROT

### *Pezoporus occidentalis*

#### Conservation status

Australia: Endangered

Northern Territory: Critically Endangered



Night parrot. (WT Cooper, National Library of Australia)

#### Description

The night parrot is a medium-sized (22-25 cm head-body length) bird with a dumpy build and a short tail. The head, neck, upperbody and chest are bright green, whereas the rest of the underparts are yellow-green to yellow. The body plumage features a range of black and yellow streaks, bars and spots. The uppertail is black-brown in the centre and pale yellow on the sides. When wings are folded, the primary flight feathers are black-brown. The bill, legs and feet are blue-grey. The eyes are dark. Sexes are similar in size and appearance.

#### Distribution

The distribution of the night parrot has not been well documented, but it is restricted to arid and semi-arid Australia. Twenty-two museum specimens existed prior to 1990, all but one taken in the 19th century. Of the specimens, three were collected in north-west and north-central Western Australia (including the only 20th century specimen in 1912) and the remainder in South Australia (Forshaw et al. 1976). F. W. Andrews collected 16 of the South Australian specimens in the vicinity of the Gawler Ranges and Lake Eyre in the 1870s. A specimen was apparently taken in south-west New South Wales in 1897 (Forshaw 1970)

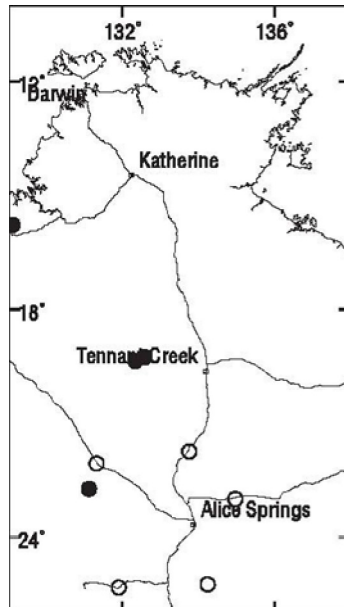
and a number of recent sightings, including a carcass by the roadside in 1990, come from north-western Queensland in the vicinity of Boulia and Cloncurry (Boles et al. 1991; Garnett et al. 1993). Prior to the discovery of the 1990 specimen, the night parrot was widely considered to be extinct.

No specimens of the night parrot have been taken in the Northern Territory; however, sightings were made up to 1923 at the Alice Springs Telegraph Station, Horseshoe Bend Station, Idracowra Station, Henbury Station and Hermannsburg (Whitlock 1924). The notes of the Horn Expedition indicate that the species was relatively common in central Australia in the 1890s, but by the 1920s it was already scarce (Whitlock 1924). Potential sightings in the Northern Territory between 1950 and 2005 are from Harts Range, Stirling Station, Muckaty Station, Keep River National Park, Kildurk Station and the Tanami Desert. A well-publicised potential sighting of the species in the Northern Territory was in January 1996 when two individuals were reported at dusk near a stock watering point on Newhaven Station, 350 km WNW of Alice Springs.

#### Conservation reserves where reported:

There are no conservation reserves in the NT where populations of night parrot are known

to be extant. The only recent (post 1930) records in reserves are of one possible sighting in Keep River National Park, and the 1996 record from Newhaven (managed by Australian Wildlife Conservancy and Birds Australia as a reserve).



Known locations of the night parrot.

□ = pre 1970; • = post 1970.

## Ecology

Almost all our knowledge of the night parrot comes from the observations of naturalists from the late 19th century. The night parrot appears to be a nocturnal bird that forages on the ground. During the day it rests within clumps of spinifex. It also nests within spinifex hummocks, building a rough nest in which up to four white eggs are laid. The bird becomes active during dusk and, generally, flies to water to drink prior to foraging. The diet consists of seeds of grasses and herbs, particularly those of spinifex (*Triodia*).

The night parrot appears to be highly nomadic, moving in response to availability of food and water. After periods of heavy rain with abundant seeding of spinifex, the species was often locally common (Andrews cited in Wilson 1937). However, during droughts, the species would disappear from formerly suitable habitat.

The night parrot is known from spinifex grasslands in stony or sandy areas and samphire and chenopod associations on floodplains, salt lakes and clay pans. Suitable

habitat is characterized by the presence of large and dense clumps of spinifex. It may prefer mature spinifex that is long unburnt (Ashby 1924).

A number of calls have been reported. The typical call when birds come into water to drink is described as a long drawn-out mournful whistle that carries for a considerable distance (Bourgoin cited in Wilson 1937).

## Conservation assessment

The night parrot may be extinct in the Northern Territory. Although it was apparently not uncommon in the 19th century, numbers declined during the early part of the 20th century with no confirmed records since the mid 1920s. However, regular reports of potential sightings indicate that the species may continue to persist in low numbers.

No systematic field surveys for the species have been undertaken, although a number of people have spoken with and obtained information on records of the species from Aboriginal people. In the absence of suitable surveys and following continued potential sightings, it is not appropriate to classify the night parrot as extinct. Therefore, it is classified as **Critically Endangered** (under criterion C2b) due to:

- a population size estimated to be <250 mature individuals;
- continuing decline in numbers of mature individuals; and
- extreme fluctuations in numbers of mature individuals.

## Threatening processes

If any individuals remain in the Northern Territory, key threatening processes are likely to be habitat degradation caused by altered fire regimes and grazing by stock, and predation by introduced carnivores.

## Conservation objectives and management

There is no existing management program for this species in the Northern Territory. However, any potential sightings of the



species that seem feasible will be investigated.

More broadly, the conservation outlook for this species will benefit from broad-scale management of feral predators (cats and foxes), reduction in feral herbivores, and amelioration of fire regimes.

### **Compiled by**

Chris Pavey [April 2006]

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# Threatened Species of the Northern Territory

## RED GOSHAWK

### *Erythrotriorchis radiates*

#### Conservation status

Australia: Vulnerable

Northern Territory: Vulnerable



Red goshawk. (Photo: I. Morris)

#### Description

The red goshawk is a large reddish-brown hawk, with conspicuous dark streaks from chin to belly, conspicuously barred on the underwing and tail. The head is whitish with dark streaks. The legs and feet are strong and yellowish, with prominent red feathering ("trousers"). Compared with the common Brown Goshawk, the wings are longer and more pointed and the tail is shorter.

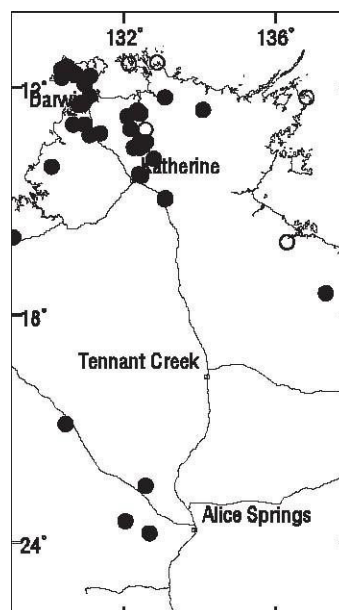
#### Distribution

The red goshawk occurs across much of northern Australia, from near Broome in the south-west Kimberley to south-eastern Queensland. Within this range it generally occurs in taller forests characteristic of higher rainfall areas, but there are some isolated recent records from central Australia.

It appears to be unusually common on the Tiwi Islands (Bathurst and Melville).

Conservation reserves where reported:

Garig Gunak Barlu National Park, Kakadu National Park, Litchfield National Park, Nitmiluk National Park.



Known locations of the red goshawk.

□ = pre 1970; • = post 1970.

#### Ecology

The red goshawk hunts mainly for medium-sized birds (up to the size of kookaburras and black cockatoos). Territory size is typically very large (up to 200 km<sup>2</sup>) (Debus and Czechura 1988; Czechura and Hobson 2000).

The preferred habitat is tall open eucalypt forest and riparian areas (including paperbark forest and gallery forests). The conspicuous basket-shaped stick nest is typically placed in large trees near watercourses (Aumann and Baker-Gabb 1991).

### Threatened Species Information Sheet

Conservation assessment Based on a series of surveys across northern Australia (Debus and Czechura 1988; Aumann and Baker-Gabb 1991; Czechura and Hobson

2000), there is now reasonably reliable information available on distribution and total population. Garnett and Crowley (2000) collated these surveys to estimate the population size as 1000 breeding birds, and considered it to be Vulnerable at the national level, on the IUCN 1994 criterion of D1 (<1000 mature individuals).

Based on the proportion of the known distribution, the Northern Territory population probably accounts for about one-third of the total population (that is, about 330 mature individuals). Of this tally, an estimated 120 live on Melville Island (Woinarski et al. 2000). Developing forestry operations may reduce this Melville Island population by about 10%. Given these figures, the red goshawk qualifies as Vulnerable in the Northern Territory (under criteria C2a(i)) due to:

- population size estimated to number <10000 mature individuals;
- a continuing decline (observed, projected or inferred); and
- population structure with no subpopulation containing more than 1000 mature individuals.

Threatening processes Nationally, the red goshawk has been threatened chiefly by clearance of preferred habitat for agriculture, with some localised problems related to

illegal egg-collection, shooting, and fire (Garnett and Crowley 2000). In the Northern Territory, the most immediate threat is clearing of prime habitat on Melville Island for short rotation plantations of exotic pulpwod.

### Conservation objectives and management

The management priorities are:

(i) to minimise the impact of the developing Melville Island forestry industry, through retention of adequate habitat especially around known nest sites, and (ii) the establishment of an appropriate monitoring program. Such habitat retention (around nesting sites) and monitoring is now established (Hadden 2000; D. Baker-Gabb pers. comm.)

Elsewhere, across its NT range, a monitoring program should be established, and populations safeguarded from ongoing clearing of tall open forests.

### Compiled by

John Woinarski [April 2006]

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