Mining Management Plan Exploration Activities

Northern Territory of Australia – *Mining Management Act*

It is recommended that the Mining Management Plan is completed in conjunction with the user guide, available on the Northern Territory Government website.

Section 1 – Project Details

Project Name Provide new or existing project name	Wollogorang Project

Authorisation Number Insert existing authorisation number, where applicable	0956-01

Operator Name Use ASIC-ABR registered name (if a company), or name of the applicant	Resolution Minerals Limited

Location and Access Details Include brief description of the location, access details, and distance to nearest town or community	The project area is located on Wollogorang Station located near the Queensland border in the gulf country. Access to the project area is via graded road form Borroloola via the Wollogorang Road (Highway 1) to Wollogorang Homestead and then via station tracks.

Target Commodity Details Include target commodities (i.e. gold, copper etc)	Copper, cobalt, base metals

Mining Activities Summarise the mining activities (exploration) to be the subject of the proposed Authorisation or Variation	Reverse circulation drilling of 18 x 200m holes (total 3600m) and 892.6m of new tracks to access collars.

Proposed Schedule Include start and finish dates of ground disturbing work	May 2021 – Nov 2021 – depending upon access after significant wet season

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	Property Name or Land Holder
EL31272	Mangrove Resources Pty Ltd (Subsidary of Resolution Minerals Ltd)		Wollogorang Station – owned by McMillan Pastoral Company Pty Ltd Corella Park Station, CLONCURRY QLD 4824

Delete or add rows as required

Organisational Structure

Position Title	Name
Managing Director	**Duncan Chessell**
General Manager	**N/A**
Exploration Manager	**Christine Lawley**
Senior Geologist	
Environmental Manager	**Duncan Chessell & Christine Lawely**
Radiation Safety Officer	**Christine Lawley**

Delete or add rows for various position titles as required

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 (Evidence of consultation with DENR and/or management plan)
Step 1: Are there any threatened flora and fauna species or habitats of significance that may occur in the proposed work area?	YES	It is likely a threatened species will show up in most reports. Therefore, the Operator must undertake a likelihood analysis, which looks at the likelihood of the species or its habitat occurring at or near the site. If the analysis results in a high likelihood, then a "Significant Impact Assessment" should be undertaken, which may require consultation with the DENR – Flora and Fauna Division. The DENR may recommend a Biodiversity Management Plan – this must be developed and attached to the MMP.	Resolution Minerals (RML) has reviewed the information from a search of INFONET which has outlined threatened species in the Wollogorang area (see Supporting Documents). There is one Critically Endangered species – the Carpentaria Rock-rat – after completing a likelyhood analysis, there is a low likelyhood RML's activities will have any impact on this species as the Company is not drilling in areas of prominent sandstone ridges which is their preferred habitat. None of the listed CR, EN or VU species have been observed in the proposed activity area.

ASSESSMENT ASPECT	YES or NO	ACTIONS REQUIRED (if answered YES)	APPENDED INFORMATION (Evidence of consultation with DENR and/or management plan)
Step 2: Are there any known declared weeds within the proposed work area?	YES	Under the *Weeds Management Act* declared weeds are required to be eliminated or controlled by the owner and occupier of land. Seek advice from DENR – Weeds Management to ensure management measures are appropriate for the level of activity proposed and attach a Weed Management Plan (if required).	All vehicles including RML field vehicles and drill rig will be cleaned for weeds/seeds before entering Wollogorang station
Step 3: Will you be using water from bores or other sources for the operation?	YES	*Note the Government is proposing to amend the exemption of water licencing under the Water Act for mining activities, including exploration. This section will be updated in light of any changes in the future.*	Yes – RML will use water from an existing exploration drill hole for camp water RC Drilling

Meets NT Water Resources exemption criteria: < 5 ML of groundwater p.a. outside of the Darwin Rural Water Control District, therefore no water extraction licence is required.

Environmental assessment and cultural considerations

ASSESSMENT ASPECT	YES or NO	MANAGEMENT REQUIREMENTS
Step 4: Is your project likely to have a significant impact on the environment?	No	Refer to the NTEPA Environmental Factors and Objectives Guideline.
Step 5: Are there Aboriginal sacred sites in the Project area?	Yes	Sacred Sites are protected under the NT *Aboriginal Sacred Sites Act* and administered by the Aboriginal Areas Protection Authority (AAPA). It is recommended that advice be sought from AAPA in relation to sacred site protection. A search of the AAPA register was undertaken and several sites are located – nearest site is approximately 5km and 7km from proposed drilling areas. The location of the sacred site is included on the general location plan
Step 6: Are there archaeological and heritage sites in the Project area?	No	Heritage and archaeology sites are protected in the NT. NT Heritage Branch of the Department of Natural Resources and Environment (DENR) administers the *Heritage Act*. Seek advice in relation to protection of heritage and archaeological sites.

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 clearly identify amendments made.

Section	Amendment
Section 1	Operator Name: changed from Northern Cobalt to Resolution Minerals
Section 1	Mining Activities: increased number of proposed drillholes and tracks
Section 1	Proposed schedule: changed date to May 2021 to Nov 2021
Section 1	Land ownership: changed to McMillan Pastoral Company Pty Ltd
Section 1	Organisational Structure: changed to Duncan Chessell Christine Lawley
Section 4	Activities Proposed: increase number of proposed holes, tracks and disturbance area.
Section 2, Step 3	Confirmation from NT Water Resources that water source and requirements falls under an exemption category (ground water source, < 5 mega litres per annum, outside the Darwin Rural Water Control District) and therefore no water extraction licence is required.

Section 4 – Activities Proposed

Mining Interests (i.e. titles)	**EL31272**	**EL**
Number and type of proposed drill holes	18 RC Holes	
Maximum depth of proposed holes (m)	200m	
Number and size of drill pads to be cleared	18 pads, length 30m x width 20m	
Total area of drill pads to be cleared (ha)	1.08ha	
Is drilling likely to encounter groundwater? (Y, N, unsure)	Yes	
Number of costeans (Length: m x Width: m x Depth: m)	Nil	
Number of bulk sample pits	Nil	
Total bulk sample (tonnes) (Length: m x Width: m x Depth: m)	Nil	
Bulk sample pits approved under *Mineral Titles Act*? (Y or N)	N/A	
Length of line/track clearing (km: 0.3 x Width: 5 m)	0.89km x 5m = 0.45ha	
Camp area to be cleared (ha)	N/A	
Camp Infrastructure (i.e. demountable, tents)	Two Shipping containers and one caravan	
Previous disturbance yet to be remediated on title (ha) if known	0	
Other		
Total area disturbed proposed (ha)	1.53ha	

Note: Exact collar track location may vary within outlined red polygon areas (see Maps under supporting documents) but total disturbance area will not exceed that proposed in the MMP.

Section 5 – Previous Disturbance (for existing Authorisations only)

Mining Interests (i.e. titles)	EL31272	EL31272	EL	EL
Number/type of holes drilled	127 RC holes	1403 aircore/rab holes		
Maximum depth of holes drilled (m)	100m	84m		
Number of holes remediated (i.e. plugged/capped)	126	1403		
Number and size of drill pads cleared (Length: m x Width: m)	127 x20mx30m = 7.62 ha	Nil		
Total area of drill pads cleared (ha)	7.62ha	Nil		
Total area of drill pads remediated (ha)	7.62ha	N/A		
Was groundwater encountered? (Y or N)	Y	Y		
Length of line/track cleared (Length: km x Width: m)	Tracks still currently in use	Nil		
Length of line/track remediated (Length: km x Width: m)	Tracks still currently in use	Nil		
Number of costeans excavated (L: m x W: m x D: m)	Nil	Nil		
Number of costeans remediated	N/A	N/A		
Total bulk sample pits excavated (Length: x Width: x Depth: m)	N/A	N/A		
Total bulk sample pits remediated	N/A	N/A		
Camp area/s cleared (ha)	50 x 50m = 0.25ha			
Camp area/s remediated (ha)	Nil – still active			
Total area disturbed (ha)	7.62 ha	nil		

Mining Interests (i.e. titles)	**EL31272**	**EL31272**	**EL**	**EL**
Total area remediated (ha)	7.62 ha	n/a		

Section 6 – Environmental Management

By checking these 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	**X**	Blade-up approach for clearing will be used (i.e. no windrows, leave root stock and topsoil)
6.2	**X**	Significant vegetation will be avoided during clearing (i.e. large trees, specimens providing habitat or food sources, riparian vegetation, and threatened species)
6.3	**X**	Vegetation clearing during, and immediately after rainfall events, will be avoided
6.4	**X**	Vegetation clearing will be kept to the minimum required to safely traverse vehicles and drill rigs along tracks and drill pads
6.5	**X**	Where blade-up techniques cannot be employed, topsoil and vegetation will be stockpiled appropriately for remediation purposes
6.6	**X**	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	**NA**	Sumps will be lined or tanks of appropriate size to contain water, sediment and drilling fluids encountered during drilling, will be used
6.8	**X**	Sumps, drill holes, and fuel stores will be located away from environmentally significant areas and water courses
6.9	**NA**	Excavations (sumps, costeans and pits) will be appropriately ramped to allow fauna egress
6.10	**X**	Drill holes will be securely capped immediately after drilling
6.11	**X**	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	**X**	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	**X**	Hazardous substances (including hydrocarbons) will be stored and handled in accordance with relevant Australian Standards
6.14	**X**	Hydrocarbons will be stored in lined and bunded areas
6.15	**X**	Waste will be stored securely while on-site to minimise windblown rubbish and access by feral animals
6.16	**X**	Waste will be removed off-site and disposed of at an appropriate waste management facility

6.17	**X**	All environmental incidents will be reported to the Department in accordance with Section 29 of the *Mining Management Act*.

Justification and alternative management measures:

No sumps to be excavated – any required water management sumps will be hand dug

Section 7 – Remediation and Closure

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

7.1	**X**	Drill holes 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	**X**	Drill samples/spoil returned down drill holes, buried in sumps, or removed from site
7.3	**X**	All drill hole and access markers including flagging tape, wooden markers and star pickets will be removed from site
7.4	**X**	Re-contouring of cut and fill drill pads will be consistent with the surrounding terrain
7.5	**X**	Ripping/scarifying of drill pads, and compacted areas along the contour (on sloping ground) and cross-ripping (zig-zag) along tracks
7.6	**X**	Tracks will be remediated, including pushing in all windrows
7.7	**X**	Appropriate erosion and sediment controls will be installed where erosion is evident or likely to occur
7.8	**X**	All tracks will be remediated unless otherwise agreed in writing by the land holder or appropriate third party
7.9	**X**	Access through watercourses will be removed and banks restored
7.10	**X**	No erosion is occurring in disturbed areas, on tracks and in remediated areas
7.11	**X**	All excavations backfilled within 6 months of completion of drilling
7.12	**X**	All water bores decommissioned unless otherwise agreed in writing by the land holder or appropriate third party. The bore must comply with the Minimum Construction Requirements for Water Bores in Australia and may require permits or licenses under the *Water Act*
7.13	**X**	All rubbish and infrastructure will be removed from site
7.14	**X**	Replacement of topsoil and vegetation
7.15	**X**	Contaminated soils (e.g. hydrocarbon or hazardous chemicals) will be remediated or removed from site
7.16	**X**	Monitoring will be undertaken following the wet season or a significant rainfall event

Justification and alternative management measures:

Section 8 – Required Attachments

8.1	**X**	Security Calculation Spreadsheet
8.2	**X**	Nomination of Operator Form
8.3	**X**	Spreadsheet with coordinates of proposed drill holes or polygons of target areas
8.4	**X**	Google Earth KML/shape files/track logs of proposed tracks and camp sites
8.5	**X**	A map of the work area(s) showing: 1. title boundaries and title numbers 2. current and proposed drill holes, or polygons of target areas 3. current and proposed tracks 4. remediated areas 5. camp sites 6. sacred/heritage sites 7. environmental constraints
8.6	**X**	Remediation Register (for existing Authorisations)
8.7	**X***	Photographs of remediation work (* included in submitted reports – see Remediation Register)
8.8	**NA**	Radiation Management Plan (if applicable)

Section 9 - Declaration

The MMP must be endorsed by a senior representative of the company who has the appropriate level of delegation.

	Author	Reviewed by	Approved by
Date	12/03/2021	12/03/2021	12/03/2021
Name	Christine Lawley	Duncan Chessell	Duncan Chessell
Signature			

I Christine Lawley (Exploration Manager) declare that to the best of my knowledge the information contained in this mining management plan is true and correct and commit to undertake the works detailed in this plan in accordance with all the relevant Local, Northern Territory and Commonwealth Government legislation.

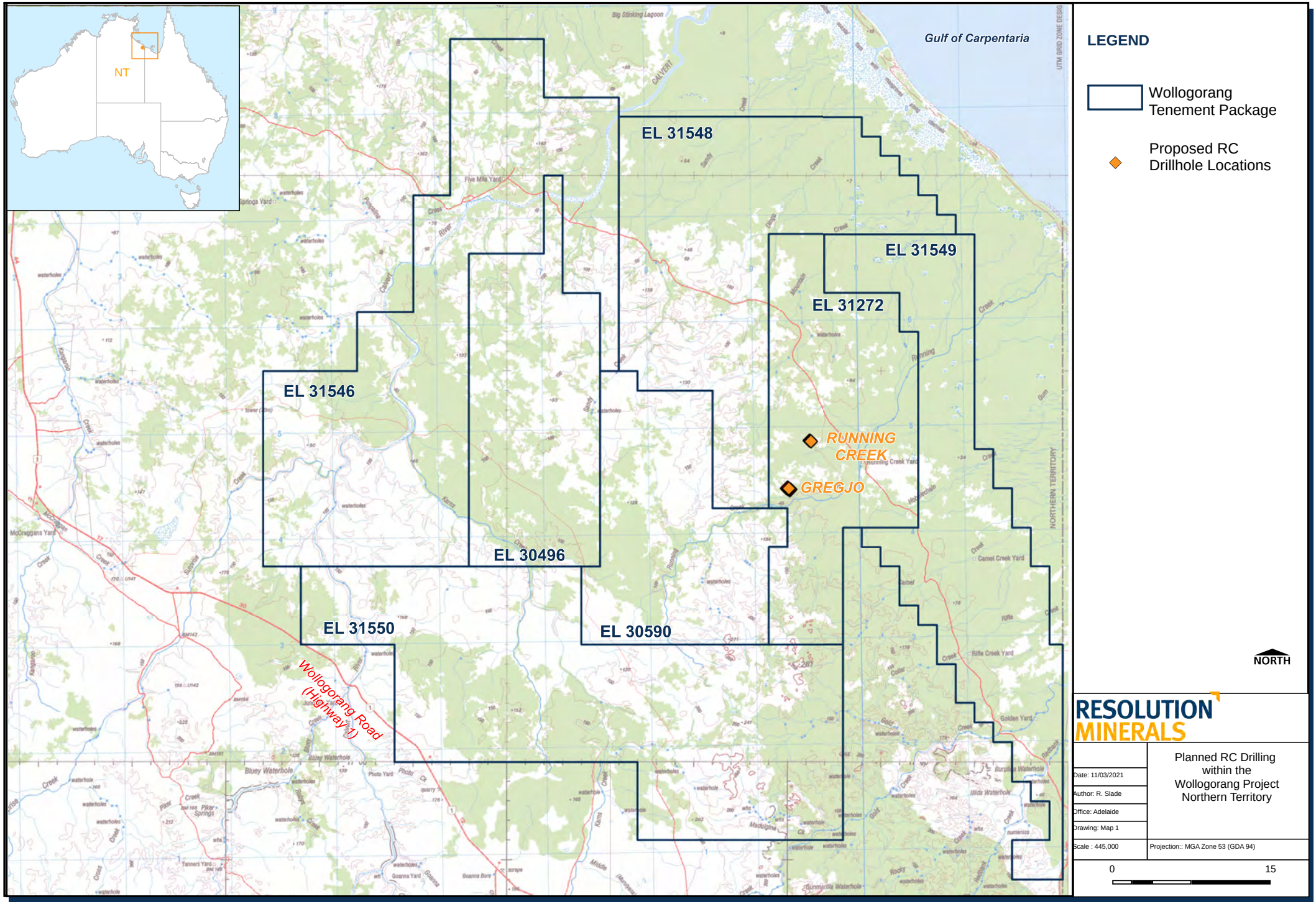
SIGNATURE:

DATE: 12/03/2021

Resolution Minerals Wollogorang Project

Supporting Documents

- Figures
- INFONET Searches
- Drill Hole information
- Remediation Register
- Security Calculation


NT
Gulf of Carpentaria
EL 31548
EL 31549
EL 31272
EL 31546
EL 30496
EL 31550
EL 30590
RUNNING CREEK
GREGJO
Wollogorang Road (Highway 1)
NORTHERN TERRITORY
LEGEND
Wollogorang Tenement Package
Proposed RC Drillhole Locations
NORTH
RESOLUTION MINERALS
Planned RC Drilling within the Wollogorang Project Northern Territory
Date: 11/03/2021
Author: R. Slade
Office: Adelaide
Drawing: Map 1
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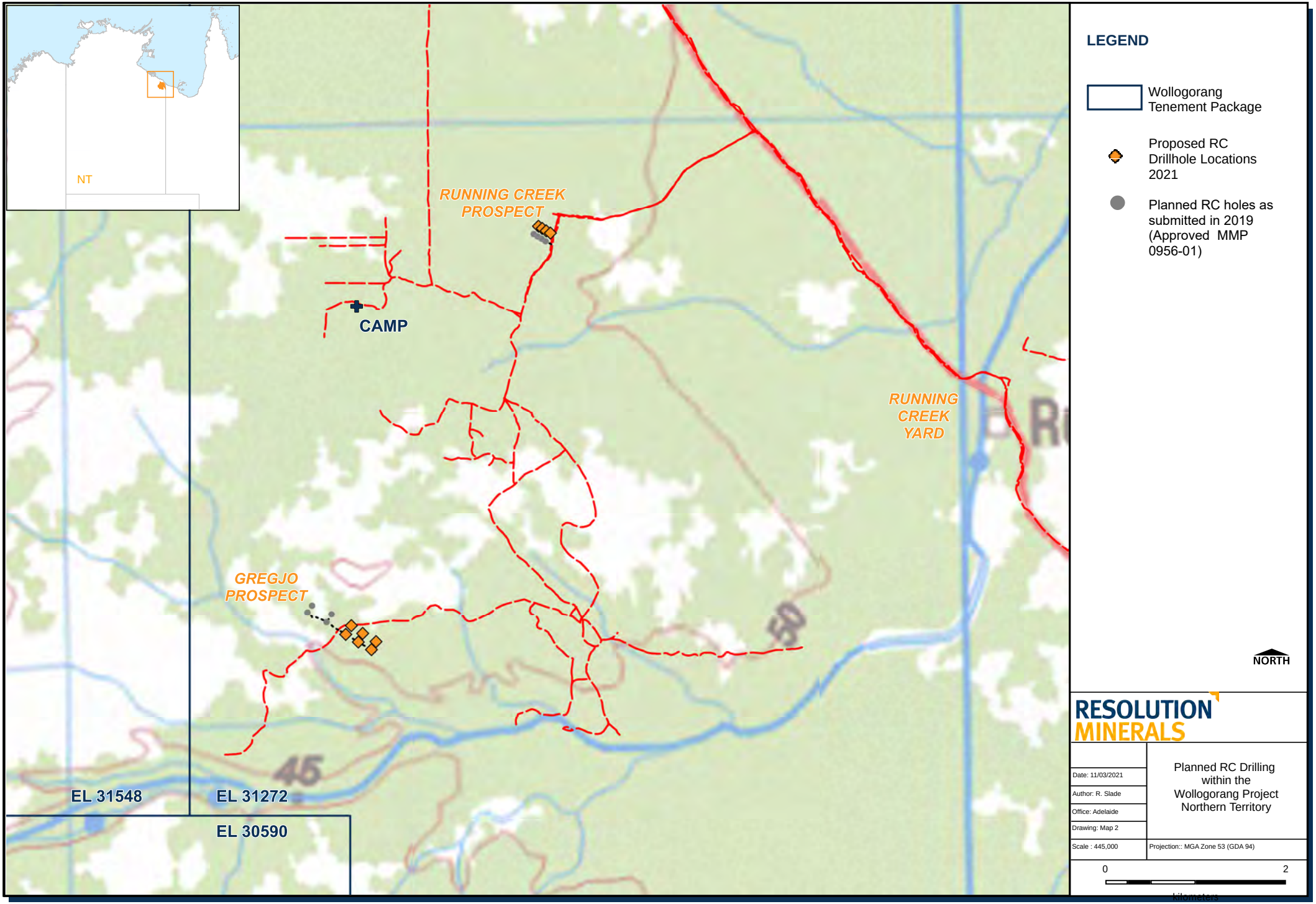
15


NT
RUNNING CREEK PROSPECT
CAMP
RUNNING CREEK YARD
GREGJO PROSPECT
50
45
EL 31548
EL 31272
EL 30590
LEGEND
Wollogorang Tenement Package
Proposed RC Drillhole Locations 2021
Planned RC holes as submitted in 2019 (Approved MMP 0956-01)
NORTH
RESOLUTION MINERALS
Planned RC Drilling within the Wollogorang Project Northern Territory
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Author: R. Slade
Office: Adelaide
Drawing: Map 2
Scale : 445,000
Projection:: MGA Zone 53 (GDA 94)
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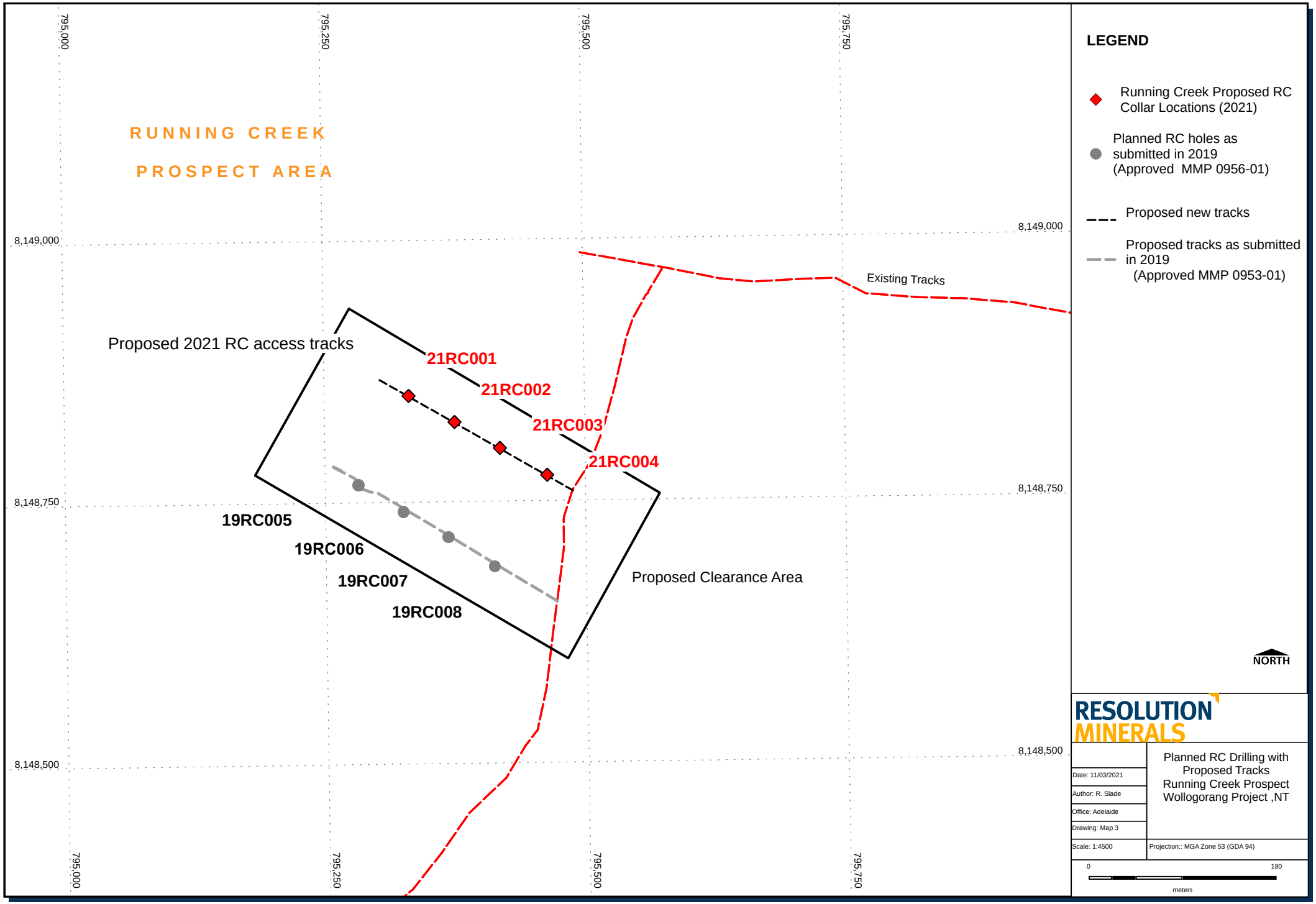
2
kilometers


795,000
795,250
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795,750
RUNNING CREEK
PROSPECT AREA
8,149,000
8,148,750
8,148,500
Existing Tracks
Proposed 2021 RC access tracks
21RC001
21RC002
21RC003
21RC004
19RC005
19RC006
19RC007
19RC008
Proposed Clearance Area
LEGEND
Running Creek Proposed RC Collar Locations (2021)
Planned RC holes as submitted in 2019 (Approved MMP 0956-01)
Proposed new tracks
Proposed tracks as submitted in 2019 (Approved MMP 0953-01)
NORTH
RESOLUTION MINERALS
Planned RC Drilling with Proposed Tracks Running Creek Prospect Wollogorang Project ,NT
Date: 11/03/2021
Author: R. Slade
Office: Adelaide
Drawing: Map 3
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Projection:: MGA Zone 53 (GDA 94)
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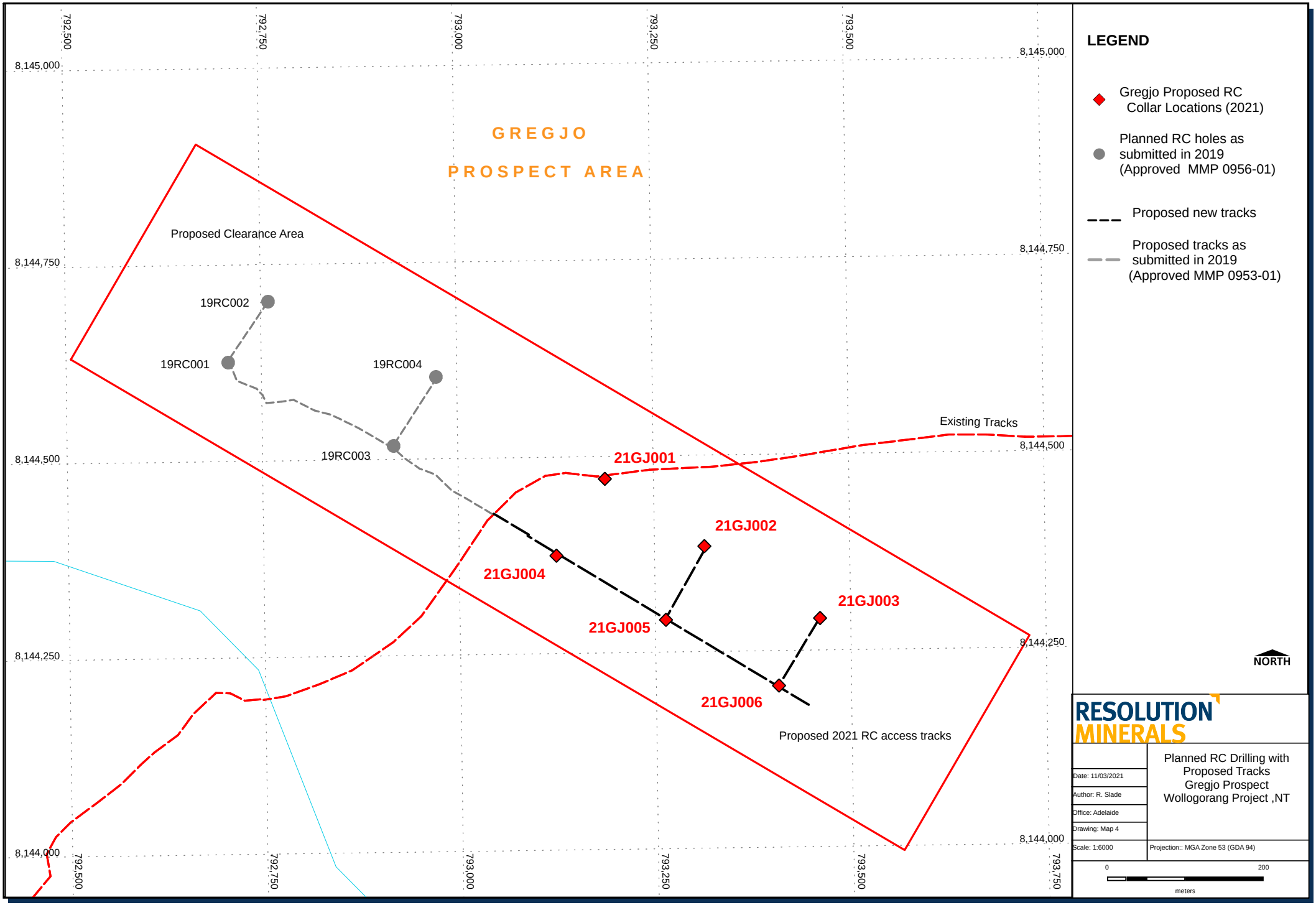
meters


792,500
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GREGJO
PROSPECT AREA
Proposed Clearance Area
19RC002
19RC001
19RC004
19RC003
Existing Tracks
21GJ001
21GJ002
21GJ004
21GJ003
21GJ005
21GJ006
Proposed 2021 RC access tracks
LEGEND
Gregjo Proposed RC Collar Locations (2021)
Planned RC holes as submitted in 2019 (Approved MMP 0956-01)
Proposed new tracks
Proposed tracks as submitted in 2019 (Approved MMP 0953-01)
NORTH
RESOLUTION MINERALS
Planned RC Drilling with Proposed Tracks Gregjo Prospect Wollogorang Project ,NT
Date: 11/03/2021
Author: R. Slade
Office: Adelaide
Drawing: Map 4
Scale: 1:6000
Projection:: MGA Zone 53 (GDA 94)
0
200
meters

Territory Natural Resource Management

Northern Territory Government

CHARLES DARWIN UNIVERSITY

Threatened Species of

Wollogorang

This booklet is an extract from Crowley, G.M. (ed.) (2008) Management Guidelines for the Threatened species of the Northern Territory. Version 1. Tropical Savannas CRC, Darwin.
Generated from www.infonet.org.au on 20 February, 2019.

Best Practice Management for Threatened Species

Introduction

The plant and animal species found in an area can show whether the country is healthy for wildlife and being managed sustainably. We place particular value on some of these species because they are rare or threatened in the Northern Territory, Australia or worldwide, or are only found in a small area. Some are important because their presence shows that the special needs they share with a wide range of other species are being met.

Most land in the Northern Territory is already managed in a way that supports native wildlife, by avoiding clearing and loss of ground cover, and with few weeds or pest animals. However, a few native species can only flourish under active management, and these deserve special attention. Species that have become threatened usually depend on one or more elements of the environment that are sensitive to change. Restoring these elements will benefit a wide range of wildlife, and if the threatened species is present, their number should also recover. A diverse range of habitats is needed to support the diversity of wildlife. So a range of different management actions will be required to preserve all species.

Many of the management actions recommended can also improve the sustainability of pastoral production. Most adjustments needed are also considered best practice for pasture management, such as using moderate stocking rates and periodically spelling country, managing weeds and controlling feral animals. These practices help ensure healthy and productive native pastures. In very few cases, pastoral production is incompatible with the preservation of a particular threatened species. Management for these species necessitates removing stock and other grazing animals from key areas of habitat. Some species persist only under the lightest grazing pressure. This booklet explains how to manage grazing pressure across the property to make sure there is habitat for these species even on a production property.

Wetland and marine species face particular challenges associated with overfishing and pollution.

Using this booklet

This booklet provides information to help land and sea managers protect threatened species and their habitats in the Northern Territory. Using the recommended management actions will also benefit a wider range of native plants and animals.

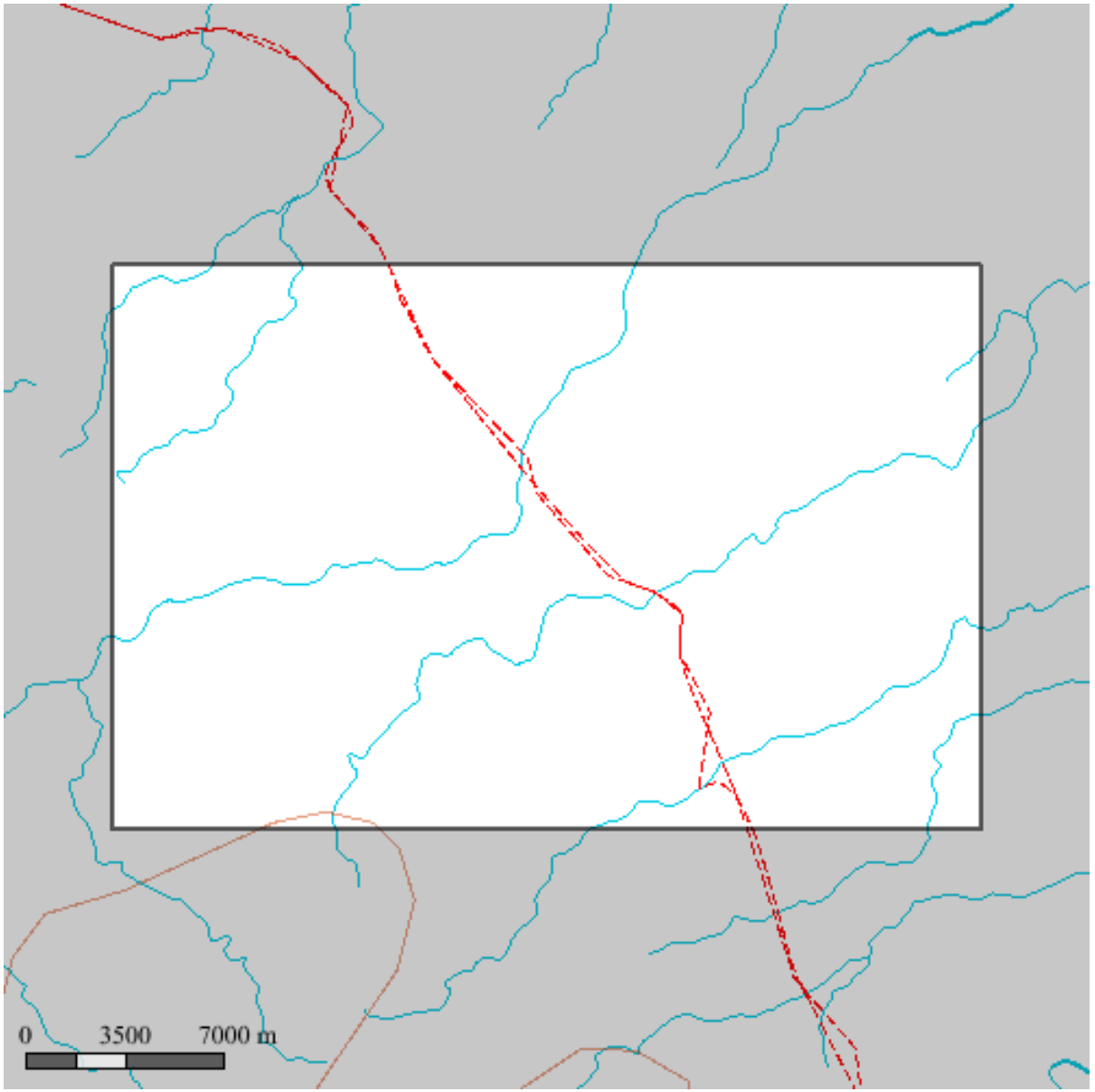
Databases kept by the Northern Territory Department of Land Resource Management (DLRM) were used to identify all threatened plants, frogs, reptiles, birds and mammals recorded in the selected area, or within grid cells that overlap the area. This list reflects the range of threatened species likely to be found in the selected area, and the range of habitats and management challenges faced. However, future booklets for this area may include additional species as databases are updated several times a year.

A more detailed explanation of the recommended management actions, listed at the bottom of each species page, can be found in the management guidelines for weeds, pest animals and practices for wildlife conservation booklets.

Additional threatened species booklets and information on natural resource values for this and other areas in the Northern Territory can be found on the Infonet (www.infonet.org.au), North Australian Land Manager (www.landmanager.org.au) and DLRM (http://www.lrm.nt.gov.au/biodiversity-conservation/animals/home) web pages.

Location Map for Wollogorang

Species listed in the table below were recorded from all the grid cells shown above that overlap Wollogorang



Species List

Threatened species of the Wollogorang in the Northern Territory

Group	Common Name	Scientific Name	NT Status	National Status	ID	Info
Ferns	Fern	*Macrothelypteris torresiana*	EN	.	.	
Fish	Freshwater Sawfish	*Pristis pristis*	VU	VU	176261	Info
Reptiles	Green Turtle	*Chelonia mydas*	.	VU	176291	Info
Reptiles	Olive Ridley	*Lepidochelys olivacea*	VU	EN	176305	Info
Reptiles	Flatback Turtle	*Natator depressus*	.	VU	176284	Info
Reptiles	Gulf Snapping Turtle	*Elseya lavarackorum*	.	EN	351215	Info
Reptiles	Mertens` Water Monitor	*Varanus mertensi*	VU	.	347295	Info
Reptiles	Mitchell`s Water Monitor	*Varanus mitchelli*	VU	.	.	
Birds	Lesser Sand Plover	*Charadrius mongolus*	VU	EN	.	
Birds	Bar-tailed Godwit	*Limosa lapponica*	VU	.	.	
Birds	Eastern Curlew	*Numenius madagascariensis*	VU	CE	.	
Birds	Great Knot	*Calidris tenuirostris*	VU	CE	.	
Birds	Curlew Sandpiper	*Calidris ferruginea*	VU	CE	.	
Birds	Gouldian Finch	*Erythrura gouldiae*	VU	EN	176370	Info
Mammals	Carpentarian Antechinus	*Pseudantechinus mimulus*	.	VU	176925	Info
Mammals	Common Brushtail Possum (southern)	*Trichosurus vulpecula vulpecula*	EN	.	177146	Info
Mammals	Carpentarian Rock-rat	*Zyzomys palatalis*	CR	EN	177139	Info
Mammals	Pale Field-rat	*Rattus tunneyi*	VU	.	.	

* Click on the "Info" links on the right to go to the management related information on each species. Where the "Info" column is blank no management guidelines have been created, usually because the species is not a significant threat to wildlife.

CR = Critically Endangered

EN = Endangered

VU = Vulnerable

Freshwater Sawfish

Pristis microdon

What it looks like: The Freshwater Sawfish is a large sawfish that is reputed to reach up to 7 m, but is more commonly less than 3 m. Its body is yellowish above, pale below, slender and shark-like. Its saw-shaped snout has 23 pairs of teeth, or modified scales. Like other sawfish, it has five pairs of gill openings on its head.

Where it lives: In the Northern Territory the Freshwater Sawfish is known to occur in the Keep, Victoria, Darwin, Adelaide, East and South Alligator, Daly, Goomadeer, Wearyan, McArthur and Robinson Rivers. It is primarily a marine/estuarine species, and is usually be found in water that is more than 1 m deep. Its first few years are spent on the muddy bottoms of freshwater areas, after which it migrates to and from marine areas according to the season.

Importance as an indicator: Presence of Freshwater Sawfish is likely to reflect healthy rivers and coastal waters, in which there are good commercial and recreational fishing practices, and where the catchments are also well managed.

Look after Freshwater Sawfish by avoiding unsustainable fishing practices. Do not gill net or trawl in areas where this species is known to occur. If you catch a live Freshwater Sawfish, return it into the water as soon as possible. Protect the health of rivers and coastal areas from pollution and land clearance along riverine areas.

Photo: © *Stirling Peverell*

Northern Territory Status: Vulnerable
Australian Status: Vulnerable

Text compiled by Riikka Hokkanen & Gabriel Crowley

based on Woinarski J.C.Z., Pavey C., Kerrigan R., Cowie I. & Ward S. 2007. *Lost from our Landscape - Threatened Species of the Northern Territory*. Northern Territory Department of Natural Resources, Environment and the Arts, Darwin.

www.landmanager.org.au/view/index.aspx?id=176261

Last updated August 2009

Best practice management for Freshwater Sawfish in the Northern Territory

- **Limit pesticide use**
- **Take care with fertiliser use**
- **Manage water extraction sustainably**
- **Protect wetland habitat**
- **Manage fisheries sustainably**
- **Reduce bycatch**
- **Report new populations**
- **More information is needed about this species**

Green Turtle *Chelonia mydas*

What it looks like: The Green Turtle is the most abundant of sea turtles in Northern Territory waters. It can be distinguished from other turtles by its olive-green, heart-shaped, darkly patterned shell and four pairs of shields between the centre and outer margin of the shell. Adults can grow to a metre long. They leave a symmetrical trail in the sand.

Where it lives: Adult Green Turtles feed on seagrass and algae in seagrass meadows. Juveniles take small fish as well. Both breeding and non-breeding animals are found in Northern Territory waters, but these individuals probably range far outside this jurisdiction. Green Turtles nest on sandy beaches and are found in tropical and subtropical waters worldwide.

Importance as an indicator: Healthy Green Turtle populations are a reflection of the fishing and hunting activities across their range, as well as predation levels at nesting sites.

Look after Green Turtle and other sea turtles by controlling potential predators at nesting sites, especially pigs and wild dogs. Removing pigs that have learned to prey on nests is more important than removing entire pig populations, which is really only possible on naturally isolated beaches. Clean up marine debris, particularly abandoned ghost nests, and prevent such items as plastic bags from contributing to marine pollution. Make sure any harvesting of turtles or their eggs is undertaken according to sustainable management planning, and that measures are taken to prevent turtles ending their days as bycatch. Do not trawl seagrass beds. On commercial fishing boats, fit appropriate turtle exclusion or bycatch reduction devices to fishing nets.

Photo: © EPA Qld

Australian Status: Vulnerable

Text compiled by Gabriel Crowley & Mark Ziembicki

based on Environment Australia. 2003. Recovery Plan for Marine Turtles in Australia. © Commonwealth of Australia, Canberra.

NAILSMA (2005). Dugong and Marine Turtle Knowledge Handbook. North Australian Indigenous Land and Sea Management Alliance, Darwin.

Woinarski J.C.Z., Pavey C., Kerrigan R., Cowie I. & Ward S. 2007. Lost from our Landscape - Threatened Species of the Northern Territory. Northern Territory Department of Natural Resources, Environment and the Arts, Darwin.

http://www.landmanager.org.au/view/index.aspx?id=176291

Last updated June 2009

Best practice management for Green Turtle in the Northern Territory

- **Control pest animals**
- **Limit harvest to sustainable levels**
- **Reduce bycatch**
- **Clean up ghost nets**
- **Prevent marine pollution**
- **Protect seagrass beds**
- **More information is needed about this species**

Olive Ridley

Lepidochelys olivacea

What it looks like: The Olive Ridley is the smallest Australian sea turtle, only reaching 70 cm in length. It has an olive-grey shell, with six large scales along either side of its back.

Where it lives: Olive Ridleys are bottom-feeders in shallow near-shore waters, where they take molluscs, crabs, echinoderms and gastropods. They are found in tropical and subtropical waters worldwide, and travel long distances from their nesting sites. Northern Territory beaches between Melville Island and Groote Eylandt provide the majority of Australia's nesting habitat for Olive Ridleys.

Importance as an indicator: Healthy Olive Ridley populations are a reflection of the fishing and hunting activities across their range, as well as predation levels at nesting sites.

Look after Olive Ridley and other sea turtles by controlling potential predators at nesting sites, especially pigs and wild dogs. Removing pigs that have learned to prey on nests is more important than removing entire pig populations, which is really only possible on naturally isolated beaches. Clean up marine debris, particularly abandoned ghost nests, and prevent such items as plastic bags from contributing to marine pollution. Make sure any turtle harvesting is undertaken according to sustainable management planning, and that measures are taken to prevent turtles ending their days as bycatch. On commercial fishing boats, fit appropriate turtle exclusion or bycatch reduction devices to fishing nets.

Photo: © EPA Qld

Northern Territory Status: Vulnerable
Australian Status: Endangered

Text compiled by Gabriel Crowley & Mark Ziembicki

based on Environment Australia. 2003. Recovery Plan for Marine Turtles in Australia. © Commonwealth of Australia, Canberra.

NAILSMA (2005). Dugong and Marine Turtle Knowledge Handbook. North Australian Indigenous Land and Sea Management Alliance, Darwin.

Woinarski J.C.Z., Pavey C., Kerrigan R., Cowie I. & Ward S. 2007. Lost from our Landscape - Threatened Species of the Northern Territory. Northern Territory Department of Natural Resources, Environment and the Arts, Darwin.

http://www.landmanager.org.au/view/index.aspx?id=176305

Last updated January 2013

Best practice management for Olive Ridley in the Northern Territory

- **Control pest animals**
- **Limit harvest to sustainable levels**
- **Reduce bycatch**
- **Clean up ghost nets**
- **Prevent marine pollution**
- **More information is needed about this species**

Flatback Turtle

Natator depressus

What it looks like: The shell of the Flatback Turtle is greenish-grey, has four large scales arranged either side, curves up at the edges, and can be nearly a metre in length. This marine turtle leaves symmetrical tracks in the sand.

Where it lives: Flatback Turtles feed on soft corals, jellyfish and sea cucumbers in shallow marine waters. They are found only in the tropical waters of Australia and New Guinea. They have an extensive distribution around the coastline of the Northern Territory, and breed at many mainland and island sites.

Importance as an indicator: Healthy Flatback Turtle populations are a reflection of the fishing and hunting activities across their range, as well as predation levels at nesting sites.

Look after Flatback Turtle and other marine turtles by controlling potential predators at nesting sites, especially pigs and wild dogs. Removing pigs that have learned to prey on nests is more important than removing entire pig populations, which is really only possible on naturally isolated beaches. Clean up marine debris, particularly abandoned ghost nests, and prevent such items as plastic bags from contributing to marine pollution. Make sure any turtle harvesting is undertaken according to sustainable management planning, and that measures are taken to prevent turtles ending their days as bycatch. Fit appropriate turtle exclusion or bycatch reduction devices to fishing nets.

Photo: *© EPA Qld*

Australian Status: Vulnerable

Text compiled by Gabriel Crowley & Mark Ziembicki

based on Environment Australia. 2003. Recovery Plan for Marine Turtles in Australia. © Commonwealth of Australia, Canberra.

NAILSMA (2005). *Dugong and Marine Turtle Knowledge Handbook*. North Australian Indigenous Land and Sea Management Alliance, Darwin.

Woinarski J.C.Z., Pavey C., Kerrigan R., Cowie I. & Ward S. 2007. *Lost from our Landscape - Threatened Species of the Northern Territory*. Northern Territory Department of Natural Resources, Environment and the Arts, Darwin.

www.landmanager.org.au/view/index.aspx?id=176284

Last updated June 2009

Best practice management for Flatback Turtle in the Northern Territory

- **Control pest animals**
- **Limit harvest to sustainable levels**
- **Reduce bycatch**
- **Clean up ghost nets**
- **Prevent marine pollution**
- **More information is needed about this species**

Gulf Snapping Turtle

Elseya lavarackorum

What it looks like: The Gulf Snapping Turtle is a short-necked freshwater turtle. It can grow to about 35 cm in length. Its head and shell are coppery-brown. Some shields on its white under-shell have wavy edges. It is similar to the more widespread and common Northern Snapping Turtle (*Elseya dentata*), which has straight edges to all its belly shields.

Where it lives: The Gulf Snapping Turtle is found only in rivers that drain into the Gulf of Carpentaria. This includes the rivers systems from the Calvert River, in the Northern Territory, to the Gregory River in Queensland. This freshwater turtle is mainly herbivorous, and feeds on leaves, fruits, flowers, bark and Pandanus roots. Figs may be this turtle's most important food. Young animals may eat more animal matter, such as insect larvae.

Importance as an indicator: Presence of healthy populations of Gulf Snapping turtle is a good indication of a healthy riparian ecosystem with stable river banks that are not weed infested. The nests of this species are found in soil near the water's edge, where they are particularly vulnerable to being raided by feral pigs, or trampled by stock. The species may also get caught in fishing nets.

Look after Gulf Snapping Turtle by controlling feral animals, especially pigs. Restrict access by stock to riparian areas, where necessary fencing off the riparian zone. Keep the river banks clear of weeds, such as Rubber Vine (*Cryptostegia grandiflora*) and Prickly Acacia (*Acacia nilotica*). When controlling weeds, ensure pesticides do not enter the waterway and avoid disturbing the river banks. Ensure turtles do not get entangled in fishing nets.

Photo: *© Arthur Georges*

Australian Status: Endangered

Text compiled by Gabriel Crowley & Mark Ziembicki

based on Woinarski J.C.Z., Pavey C., Kerrigan R., Cowie I. & Ward S. 2007. *Lost from our Landscape - Threatened Species of the Northern Territory*. Northern Territory Department of Natural Resources, Environment and the Arts, Darwin.

www.landmanager.org.au/view/index.aspx?id=351215

Last updated June 2009

Best practice management for Gulf Snapping Turtle in the Northern Territory

- **Control pest animals**
- **Control weeds**
- **Fence key habitat**
- **Limit pesticide use**
- **Reduce bycatch**
- **Report new populations**
- **More information is needed about this species**

Mertens' Water Monitor *Varanus mertensi*

What it looks like: Mertens' Water Monitor is a medium to large goanna that can grow up to 1 metre long. It has a dark brown to black back and numerous small dark-edged cream or yellow spots. Its sideways flattened tail is well-adapted for swimming.

Where it lives: Mertens' Water Monitor has a broad geographic range, occupying coastal and inland waters across the far north of Australia from the Kimberley to the west side of Cape York Peninsula. In the Northern Territory it has been recorded across most of the Top End and the Gulf Region. This semi-aquatic monitor is seldom seen far from water.

Importance as an indicator: This species is found where it has access to abundant food - fish, frogs, carrion, insects and small terrestrial vertebrates - and can lay its eggs in a burrow in the ground, away from predators. It appears to have declined with the spread of cane toads, being particularly sensitive to the toad's toxin. Recovery of Mertens' Water Monitor populations from areas where it has declined indicates local adaptation to this exotic pest.

Look after Mertens' Water Monitor by controlling introduced pests. When travelling, check your load to make sure you do not transport toads to islands or beyond their current range. Prevent degradation of riparian areas to maintain habitat for prey.

Photo: *© Simon Ward*

Northern Territory Status: Vulnerable

Text compiled by Gabriel Crowley & Mark Ziembicki

based on Woinarski J.C.Z., Pavey C., Kerrigan R., Cowie I. & Ward S. 2007. *Lost from our Landscape - Threatened Species of the Northern Territory*. Northern Territory Department of Natural Resources, Environment and the Arts, Darwin.

www.landmanager.org.au/view/index.aspx?id=347295

Last updated September 2008

Best practice management for Mertens' Water Monitor in the Northern Territory

- **Control pest animals**
- **Protect wetland habitat**

Gouldian Finch

Erythrura gouldiae

What it looks like: Male Gouldian Finches are small multi-coloured birds with black or red heads, violet breasts and yellow bellies. Females and young birds are mostly green. Gouldian Finches are found in small or large flocks, often with other finch species, and can most easily be seen at waterholes.

Where it lives: Gouldian Finches nest in hollows in white gum trees, and feed on grass seeds, relying on perennial grasses through the early wet season and annual grasses the rest of the year. Though once more common throughout northern Australia, they are now known to nest at a small number of isolated locations, mostly within the Northern Territory and the Kimberley. The largest known population is in the Yinberrie Hills.

Importance as an indicator: Presence of nesting Gouldian Finches indicates a healthy environment with an abundance of seeding perennial grasses that have not been overgrazed by cattle or feral pigs, and where fire has been well-managed. Airsac mite has been identified as a threat to this species in the past, but its current incidence is unknown. Trapping is also a threat that was more significant before the species was well established in captivity.

Look after Gouldian Finch by patch-burning in the early dry season to break up the fuel load and prevent extensive late dry season fires. Storm-burn small patches of perennial grasses to extend the availability of high quality seeds in the wet season. Control weeds, such as Gamba Grass, that modify feeding habitat and increase fire hazard. Control pigs, which dig up and destroy clumps of Cockatoo Grass, and spell areas of perennial grasses periodically in the wet season to allow them to recover vigour and produce seed.

Photo: © Steve Murphy & AWC

Northern Territory Status: Vulnerable
Australian Status: Endangered

Text compiled by Gabriel Crowley & Mark Ziembicki

based on Woinarski J.C.Z., Pavey C., Kerrigan R., Cowie I. & Ward S. 2007. Lost from our Landscape - Threatened Species of the Northern Territory. Northern Territory Department of Natural Resources, Environment and the Arts, Darwin.

http://www.landmanager.org.au/view/index.aspx?id=176370

Last updated January 2013

Best practice management for Gouldian Finch in the Northern Territory

- **Maintain tree cover**
- **Maintain tree hollows**
- **Maintain ground layer**
- **Control pest animals**
- **Control weeds**
- **Graze moderately & wet season spell**
- **Manage fire**
- **Do not collect from the wild**
- **Investigate/manage disease**
- **More information is needed about this species**

Carpentarian Antechinus *Pseudantechinus mimulus*

What it looks like: The Carpentarian Antechinus is a grey, mouse-sized marsupial, with reddish-brown fur behind its large ears. Healthy animals have swollen, carrot-shaped tails that are reddish brown in colour.

Where it lives: The earliest record of this species came from the relatively featureless Mitchell Grass Downs bioregion. All recent records have come from the islands in the south-west of the Gulf of Carpentaria, in the Northern Territory, or the Mount Isa region of Queensland. Currently, animals are found only amongst rocks and boulders, but do not appear to be particular about vegetation types. They eat insects and other small animals.

Importance as an indicator: The early decline of this species, along with its subsequent contraction to rocky refuges, is mirrored in the decline of a number of northern marsupials, notably the Northern Quoll. Although the cause for this contraction is unclear, rocky areas appear to offer some refuge from intense fires, cane toads and predation by cats.

Look after Carpentarian Antechinus by reducing the frequency and extent of late dry season fires. Introduce a fire regime that ensures a mosaic of habitats burnt at different times, with most areas being burnt no more frequently than every three to five years. To do this, small areas may need to be burnt most years in order to create breaks in the fuel load. Fires should only be lit under mild weather conditions, when the extent of burn can be controlled. Control cats, which are a significant threat to native mammals across the continent. When travelling, check your load to make sure you do not transport toads to islands or beyond their current range.

Photo: © Kym Brennan

Australian Status: Vulnerable

Text compiled by Gabriel Crowley & Mark Ziembicki

based on Woinarski J.C.Z., Pavey C., Kerrigan R., Cowie I. & Ward S. 2007. Lost from our Landscape - Threatened Species of the Northern Territory. Northern Territory Department of Natural Resources, Environment and the Arts, Darwin.

http://www.landmanager.org.au/view/index.aspx?id=176925

Last updated January 2013

Best practice management for Carpentarian Antechinus in the Northern Territory

- **Control pest animals**
- **Manage fire**
- **More information is needed about this species**

Common Brushtail Possum (southern) *Trichosurus vulpecula vulpecula*

What it looks like: The Common Brushtail possum is a medium-sized mammal with fur that is grey or brown, and usually paler on the breast and belly. It has large, prominent ears that have a narrowly round tip and are longer than they are broad. Its bushy tail is slightly shorter than its combined head and body length.

Where it lives: This subspecies is the rarer of the two subspecies of Common Brushtail Possum occurring in the Northern Territory, and is found only in isolated populations in the south. It shelters in caves, rock holes, tree hollows, and the tops of dense trees, and sometimes even in house roofs, and feeds on flowers, fruits and leaves of a wide range of non-eucalypt species.

Importance as an indicator: The decline of Common Brushtail Possum in central Australia indicates a deterioration of environmental conditions for this species. It has been attributed severe drought being exacerbated by a suite of potential threatening processes such as grazing by cattle and rabbits, hunting, altered fire regimes, and predation.

Look after Common Brushtail Possum (southern) by implementing sustainable grazing practices on pastoral leases. Manage for high habitat diversity by establishing a patchwork of recently burnt and long unburnt areas, leaving patches of fruiting and flowering shrubs. Limit fire intensity to protect tree hollows and prevent canopy scorch, which diminishes flower and fruit production. Control rabbits and other grazing animals that compete for food, and cats and foxes, which have had a significant impact on native arid land mammals. Make sure any possum harvesting is undertaken according to a sustainable management plan.

Photo: © NRETA

Northern Territory Status: Endangered

Text compiled by Gabriel Crowley & Mark Ziembicki

based on Woinarski J.C.Z., Pavey C., Kerrigan R., Cowie I. & Ward S. 2007. *Lost from our Landscape - Threatened Species of the Northern Territory*. Northern Territory Department of Natural Resources, Environment and the Arts, Darwin.

www.landmanager.org.au/view/index.aspx?id=177146

Last updated September 2008

Best practice management for Common Brushtail Possum (southern) in the Northern Territory

- **Maintain tree cover**
- **Maintain tree hollows**
- **Maintain shrub layer**
- **Control pest animals**
- **Graze moderately & periodically spell country from grazing**
- **Manage fire**
- **Limit harvest to sustainable levels**

Carpentarian Rock-rat *Zyzomys palatalis*

What it looks like: The Carpentarian Rock-rat is a large brown rodent with a white belly and white feet. Its long tail, which is particularly fat close to its body, may break off to form a stump.

Where it lives: Carpentarian Rock-rats are restricted to scree slopes of sandstone gorges and escarpments, where they live in rainforest and mixed broadleaf woodland close to permanent water. They are known only from Wollogorang Station in the Gulf of Carpentaria hinterland.

Importance as an indicator: Persistence of Carpentarian Rock-rats depends on the health of the monsoon forests in which it grows.

Look after Carpentarian Rock-rat and other species that are restricted to small monsoon forest patches by managing fire in the surrounding woodlands. Back-burning around rainforest patches early in the year to reduce fuel hazards will protect these sensitive habitats from periodic fire incursions. However, repeated burning may promote the growth of Annual Sorghum, which increases fire hazard. So try not to burn exactly the same place every year. If necessary, burn after the first wet season storms to control Sorghum and reduce fire hazard. Control cats using effective methods such as shooting or baits. Make sure at least parts of the property are free of grazing animals.

Photo: © *Kym Brennan*

Northern Territory Status: Critically Endangered
Australian Status: Endangered

Text compiled by Gabriel Crowley & Mark Ziembicki

based on Woinarski J.C.Z., Pavey C., Kerrigan R., Cowie I. & Ward S. 2007. *Lost from our Landscape - Threatened Species of the Northern Territory*. Northern Territory Department of Natural Resources, Environment and the Arts, Darwin.

www.landmanager.org.au/view/index.aspx?id=177139

Last updated June 2009

Best practice management for Carpentarian Rock-rat in the Northern Territory

- **Protect rainforest habitat**
- **Maintain tree cover**
- **Control pest animals**
- **Exclude stock from at least part of pastoral properties**
- **Manage fire**
- **More information is needed about this species**

Territory Natural Resource Management

Northern Territory Government

CHARLES DARWIN UNIVERSITY

Guidelines for the Management of the Weeds of

Wollogorang

This booklet is an extract from Crowley, G.M. and Hill, B. M. (eds.) (2011)
Management Practices for Wildlife Conservation in the Northern Territory. Version 1.
Charles Darwin University, Darwin. Generated from www.infonet.org.au on 20 February, 2019.

Managing Weeds for Wildlife Conservation

Introduction

The plant and animal species found in an area can show whether the country is healthy for wildlife and being managed sustainably. We place particular value on some of these species because they are rare or threatened in the Northern Territory, Australia or worldwide, or are only found in a small area. Some are important because their presence shows that the special needs they share with a wide range of other species are being met.

Most land in the Northern Territory is already managed in a way that supports native wildlife, by avoiding clearing and loss of ground cover, and with few weeds or pest animals. However, a few native species can only flourish under active management, and these deserve special attention. Species that have become threatened usually depend on one or more elements of the environment that are sensitive to change. Restoring these elements will benefit a wide range of wildlife, and if the threatened species is present, their number should also recover. A diverse range of habitats is needed to support the diversity of wildlife. So a range of different management actions will be required to preserve all species.

Many of the management actions recommended can also improve the sustainability of pastoral production. Most adjustments needed are also considered best practice for pasture management, such as using moderate stocking rates and periodically spelling country, managing weeds and controlling feral animals. These practices help ensure healthy and productive native pastures. In very few cases, pastoral production is incompatible with the preservation of a particular threatened species. Management for these species necessitates removing stock and other grazing animals from key areas of habitat. Some species persist only under the lightest grazing pressure. This booklet explains how to manage grazing pressure across the property to make sure there is habitat for these species even on a production property.

Wetland and marine species face particular challenges associated with overfishing and pollution.

Using this booklet

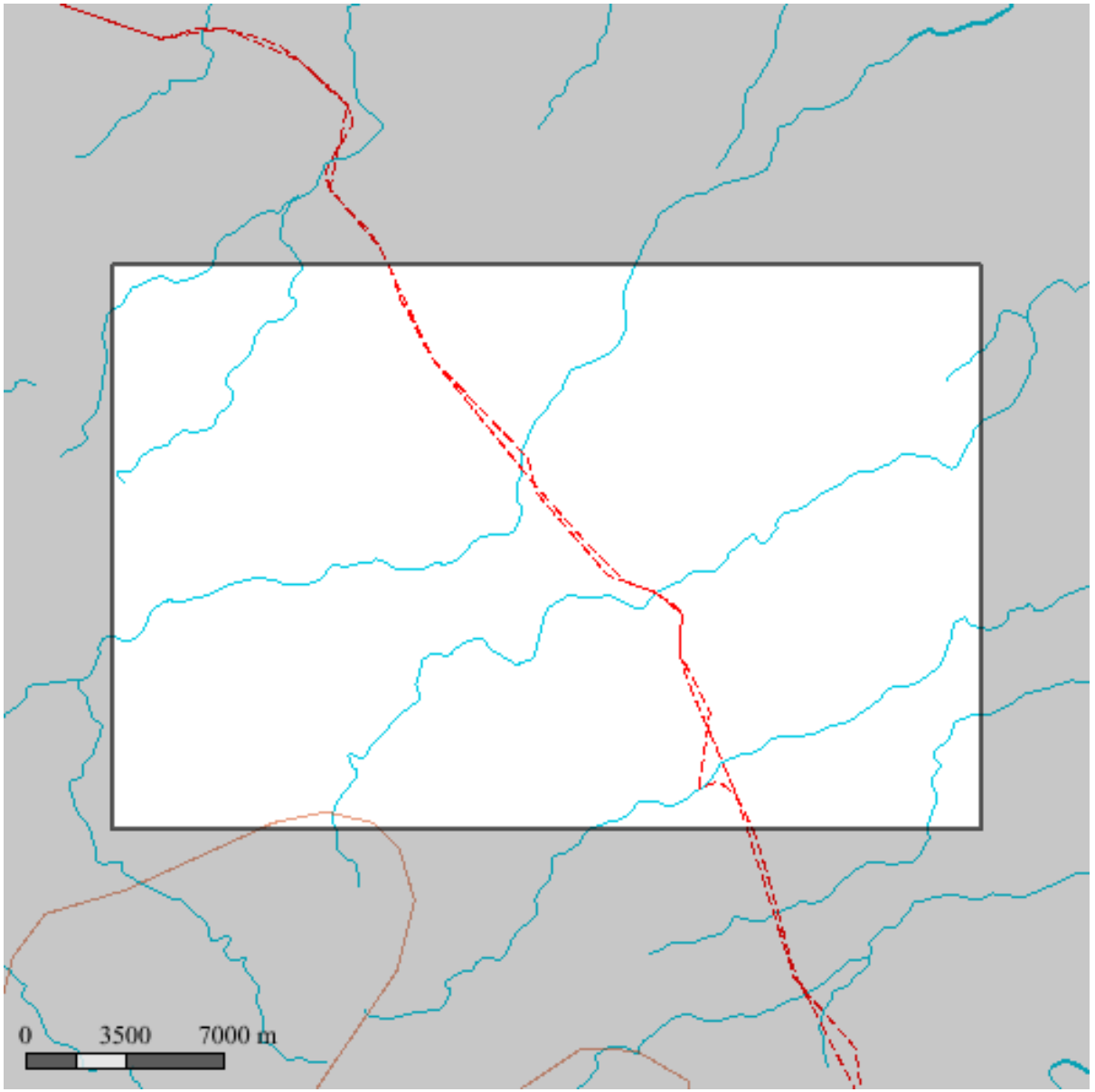
This booklet provides information to help land managers control weeds in the Northern Territory. Profiles of individual species outlining impacts on wildlife and production; and recommended methods of control have been produced for the weed species considered a higher priority for control across the whole Territory. Over time more profiles will be developed as priority species for control change and localised weed profiles are developed.

Databases kept by the Northern Territory Department of Land Resource Management (DLRM) were used to identify the weed species recorded in the selected area, or within grid cells that overlap the area. This list reflects the range of weeds likely to be found in the selected area. However, future booklets for this area may include additional species as databases are updated several times a year.

Additional threatened species booklets and information on natural resource values for this and other areas in the Northern Territory can be found on the Infonet (www.infonet.org.au), North Australian Land Manager (www.landmanager.org.au) and DLRM (http://www.lrm.nt.gov.au/weeds) web pages.

Location Map for Wollogorang

Species listed in the table below were recorded from all the grid cells shown above that overlap Wollogorang



Species List

Weeds of the Wollogorang in the Northern Territory

Common Name	Scientific Name	NT Status	National Status	Other Status	ID	Info
Starburr	*Acanthospermum hispidum*	B C	.	.	288214	
Khaki Weed	*Alternanthera pungens*	B C	.	*DEU NSW SA*	288354	
Hyptis	*Hyptis suaveolens*	B C	.	*G&M*	290734	
Spiked Malvastrum	*Malvastrum americanum*	.	.	*DEU*	291084	
Lippia	*Phyla nodiflora var. nodiflora*	.	.	*G&M NSW*	291964	
Bitter Broom	*Scoparia dulcis*	.	.	*DEU*	292424	
Spiny-head Sida	*Sida acuta*	B C	.	*WA1 G&M*	292584	
Flannel Weed	*Sida cordifolia*	B C	.	*WA1 G&M DEU*	292594	
Spiny Sida	*Sida spinosa*	.	.	*DEU*	292614	
Townsville Lucerne	*Stylosanthes humilis*	.	.	*DEU*	292984	
Beach Caltrop	*Tribulus cistoides*	B C	.	.	361545	
Sabi Grass	*Urochloa mosambicensis*	.	.	*DEU*	293294	
Noogoora Burr	*Xanthium strumarium*	B C	.	*MP WA1 WA2 WA4 DEU NSW SA*	183498	Info

* Click on the "Info" links on the right to go to the management related information on each species. Where the "Info" column is blank no management guidelines have been created, usually because the species is not a significant threat to wildlife.
For further information on species without management guidelines go to www.landmanager.org.au/view/index.aspx?id=#### where #### is the ID number from the table above for the species of interest.

B = Growth & spread to be controlled

C = Not to be introduced

DEU = Plants listed as environmental weeds by the Desert Uplands Strategic Land Resource Assessment

G&M = Grice AC, Martin TG. 2005. The Management of Weeds and Their Impact on Biodiversity in the Rangelands.

MP = Northern Territory Parks & Conservation Masterplan

NSW = Declared Noxious Weed in NSW

SA = Declared Plant in South Australia
WA1 = WA Weed Class P1 (movement prohibited)
WA2 = WA Weed Class P2 (aim to eradicate)
WA4 = WA Weed Class P4 (prevent spread)

Managing weeds for wildlife conservation

Introduction

Weeds are introduced plants that reproduce or even proliferate unaided. Most weeds are exotic, however native plants can also be considered weeds if introduced outside of their natural range. In many cases it is not for many years, or even decades after a plant's introduction that it is considered a weed as they tend to be recognised as such only when they have already spread.

Environmental weeds are plants that represent a threat to the conservation values of natural ecosystems.

Weeds can out-compete native plants for essential resources such as space, light, water and nutrients. As they invade native plant communities they cause a reduction in plant diversity with the loss of threatened species.

This alteration of plant communities affects animals when plants they depend on for food and shelter are replaced. Species that are already threatened are particularly vulnerable to weed invasion. Weeds can change the structure of a habitat, making it unsuitable for threatened animals and native wildlife in general and dense thickets of weeds impede movement of wildlife.

Weeds can alter landscapes by choking rivers and smothering grasslands. They can also alter fire regimes, in most cases increasing the frequency and intensity of fires. This can lead to the death of plants and animals and destroy essential habitat features.

Weeds are encouraged by disturbance of the natural environment, increased nutrient levels and the absence of predators. In tropical savannas, disturbance of the natural environment includes floods, alteration of the natural fire regime, over-grazing, extensive tree-clearing and changes in water availability.

Photo: *© Gabriel Crowley*

Hyptis flourishes in overgrazed environments

Profile written by John Westaway & Gabriel Crowley, edited by Zoe Disher

www.landmanager.org.au/view/index2.aspx?id=644857

Link to legislation and Weed Management Plans:

http://www.lrm.nt.gov.au/weeds/legislation

Last updated Jan 2013

Weeds in the Northern Territory

The Northern Territory features some of the most extensive, unmodified natural landscapes in Australia. Of the rich flora of the northern savannas less than 10% is introduced (compared for example to 16 and 24% for New South Wales and Victoria respectively). Despite the comparatively good condition of northern savannas there are some significant weed issues. These include highly invasive introduced pasture grasses, aquatic weeds, prickle bushes and weeds of disturbed land. Environmental weeds in the Northern Territory are discussed briefly below by life form.

Trees

The Northern Territory has relatively few tree weeds, and none are currently deemed a direct problem for any threatened species. However, Athel Pine is a significant transformer weed, meaning it has the capacity to completely change the landscape. Athel Pine has spread through waterways in central Australia, where it interferes with stream flow and replaces River Red Gums. Neem is also a transformer weed which is rapidly dominating riparian zones in the Queensland Gulf and the East Kimberley regions. It is presently found only at scattered locations in the Northern Territory, but is a common environmental weed around Darwin. Neem has been cultivated for centuries for its medicinal and insecticidal properties. Its fruit are readily spread by birds. Both Athel Pine and Neem support a narrower range of wildlife than do the native trees they replace.

Photo: © Peter Duce

Neem tree, foliage, flowers and fruit

The enthusiasm for converting northern Australia into a carbon bank is likely to see increased pressure for more exotic tree plantations. It is probable that at least some of the trees introduced for this purpose will do well enough outside plantations to pose a threat to biodiversity. One of the favoured species for biofuel production, Physic Nut, is already a declared weed in Western Australia and the Northern Territory.

Exotic grasses

A handful of the hundreds of grasses that been introduced into Australia have become a serious problem for biodiversity. Most were chosen for being productive and nutritious for livestock and introduced with the intention of replacing native species. Few people would argue against the usefulness of exotic grasses within the confines of a grazed paddock. If introduced grasses were highly palatable at all stages of their life cycle, then they would be eaten down by livestock and not present a problem. However not all exotic grasses are palatable, or their palatability may fluctuate through their life cycle. So there are times when these grasses can grow out of control. Some problem grasses are not palatable at all - most of these came into the country accidentally or for use in gardens or erosion control.

Problematic introduced grasses also tend to be good breeders: Mission Grass produces prolific seeds; Gamba Grass has robust basal clumps that resprout after rain; Para Grass sends out long tillers that set down new roots in the mud; Buffel Grass has both a perennial root stock and abundant, wind- and animal-dispersed seed. All of these grasses are highly invasive. Due to their capacity to fuel extensive high-intensity fires that weaken and kill trees, these exotic, perennial grasses now constitute one of the most serious environmental issues facing Australia's tropical savannas.

Photo: © John Westaway

Tall Gamba Grass forming dense stand to the exclusion of native ground flora

Grader Grass is an introduced, unpalatable annual grass that has invaded savanna woodlands and croplands in high rainfall areas, especially in Queensland but also on properties in the Katherine and Darwin regions. It has the ability to smother native plants and should be controlled and not spread further.

Because of their reproductive properties, exotic grasses often escape into the wider environment where they threaten biodiversity values. These grasses also reduce the ability of pastoral properties to conserve wildlife.

Prickle bushes

Another group of significant weeds in the Northern Territory is the thicket-forming prickle bushes. These include Mimosa and Prickly Acacia which are well established in threatened species habitat in the Top End. A number of other prickle bushes, including Mesquite and Parkinsonia, are also widespread and problematic but have not yet encroached on threatened species habitat. These bushes form dense thickets which out-compete native vegetation, use up valuable soil water and shade out native grass species. This results in a loss of ground cover and increased soil erosion.

Aquatic weeds

A number of aquatic plants have been introduced into Australian waterways, some of which have become invasive weeds. These weeds replace native aquatic plants and choke wetlands and waterways. This in turn prevents birds and other wildlife from using the habitat and reduces fish stocks by depleting oxygen levels in the water.

Examples include Alligator Weed, Water Hyacinth, Cabomba, Salvinia and the grasses Para Grass and Olive Hymenachne. They are aggressive invaders of waterways and swampy areas and most are regarded as Weeds of National Significance.

Photo: © *NRETAS*

Salvinia forming dense aquatic mat to the exclusion of native wetland plants

Photo: © *Darryl Evans*

Siam weed is regarded as one of the worlds worst weeds and is on the Alert List for Environmental Weeds

Shrubs and herbs

There are also a number of herbaceous shrubs and sub-shrubs that can transform large areas of habitat. Primary among these is Noogoora Burr which occurs along parts of the Victoria River. Others to watch out for are Sicklepod, Malachra and Lion's Tail, all of which have markedly expanded their distributions in northern Australia in recent decades.

This group includes a number of weeds, such as Hyptis, Rubber Bush, Snakeweed and Sida, which tend to be more of a problem in overgrazed or heavily disturbed areas. These weeds may be more an indicator than a cause of environmental degradation.

Also within this group are species on the Alert List for Environmental Weeds, a list of 28 non-native plants that threaten biodiversity and cause other environmental damage. These include Barleria, also known as Porcupine Flower, and Siam Weed.

Barleria is an erect, prickly shrub that can form dense thickets in open woodlands due to its persistent and invasive nature. It has been found around townships in the Northern Territory including Darwin, Berry Springs, Katherine, Mataranka and in the Victoria River district. Siam Weed is another highly invasive plant. It is recognised as one of the world's worst tropical weeds and is currently present in a few small infestations in far north Queensland. Although only in the early stages of establishment, these weeds have the potential to seriously degrade Australia's ecosystems. Preventing spread of such species will protect savannas and riverine habitat of northern Australia.

Impacts on wildlife conservation

Wetlands and floodplains are particularly prone to weed invasion because of the regular disturbance caused by floodwaters, combined with the nutrients washed in from across the catchment. Weeds taking advantage of these conditions include a number of exotic grasses, prickly bushes, herbs, shrubs and trees. Couch Grass, Buffel Grass, Para Grass, Prickly Mimosa, Prickly Acacia and Noogoora Burr are identified problems for one or more of the Northern Territory's threatened species found in these environments.

There are also a number of threatened species for which weeds are a potential threat (particularly in association with pest animal disturbance), but for which no single weed menace has been identified. Native ferns found along moist sheltered streams in the Top End are particularly at risk of such weed invasions, either through direct replacement or by resulting changes to fire regimes.

General weediness can also cause the deterioration of animal habitat and reduce the abundance of many small animals, including insects. Even where this decline is not significant enough to class the affected animals as threatened, both reduced prey abundance and reduced visibility of prey could have a flow-on effect to threatened predators. These predators include the Arnhem Leaf-nosed Bat, Bare-rumped Sheath-tailed Bat, Red Goshawk and Masked Owl. For this reason, it is important to control any significant weed infestation, whether or not it has a known impact on a threatened species.

Control

Much effort can be invested in weed control but there are few demonstrated cases of a problem weed being entirely eliminated. So it is extremely important that a strategic approach is adopted to maximise the effectiveness of control efforts.

The first thing to do is to work with your neighbours and the wider community so that weeds removed from your country are not simply replaced through seeds washed or blown in from nearby infestations. Working collaboratively may provide access to financial support or weed management teams. So find out if there is a local Landcare or ranger group.

Photo: © Chris Brock

Buffel Grass outcompetes other understorey plants and increases fire hazard

Concentrate your efforts on priority weeds, based on severity of impact and ease of control. To benefit threatened species, focus your control on the weeds listed in this document. Remove weeds at the edge of any infestation, especially any outliers. Don't wait until the problem is too big to handle. Control of new weeds before they become a problem is particularly important.

There is no point in clearing up a patch of weeds once or twice, only to let it regrow. So get to know your weeds, where they grow, when they produce seed, and when they are most susceptible to pesticides. Plan a follow-up control program, regularly returning to check areas that you may think are now weed free.

Constantly assess what you have achieved. Map weeds or record their locations so that you know if they are expanding or contracting. Even recording areas that are currently weed-free can be useful down the track. Record the control measures that you have used, so that you can assess which is the most effective. If one approach is not working, try another.

The best control is prevention. So when choosing plants for your garden or for pasture forage, check whether they have weedy characteristics. They may already be on a list of prohibited or undesirable species. But there are signs to watch out for once you plant them. Check whether they spread uncontrollably from seeds or suckers. Do the birds feed on and spread the seeds? If it is hard to control in your own garden, especially if you are not pampering them with ample water or fertilizers, it is even more likely to become a weed in the bush.

Look out for plants coming up outside your property, focus on areas that are downstream and downwind. Even if they aren't in your area yet, familiarize yourself with Rubber Vine and Pond Apple which have had serious impacts on native riparian vegetation in Queensland. Look out for strange plants that could become a menace, and send them to the Northern Territory Herbarium for identification. Avoid use of hay from weed-infested areas.

Don't bring in trouble accidentally. Practising good weed hygiene is essential to avoid the spread of weeds, for example aquatic weeds such as Salvinia, Cabomba and Olive Hymenachne that are potentially devastating to wetlands. So when retrieving boats and trailers from waterways, take care that weed plants and seeds are not transported to other catchments. Wash-down your vehicle if you think you have been driving through areas where it might have collected weed seeds. When controlling weeds, ensure pesticides do not enter the waterway and avoid disturbing the river banks.

For further information:
Read

+ Anon 2008. *Do you have a Garden Thug in your Garden or Aquarium?* Greening Australia, Northern Territory Government, Nursery and Garden Industry of the Northern Territory and Weedbusters Australia. http://lrm.nt.gov.au/__data/assets/pdf_file/0019/13195/TopEndGardenThug.pdf
+ Anon 2008. *Landholders' guidelines to property pest management plans.* Queensland Government. http://www.daff.qld.gov.au/documents/Biosecurity_EnvironmentalPests/IPA-Pest-Management-Plan-Guideline.pdf
+ Cook G.D. and Dias L. 2006. Turner Review No. 12. It was no accident: deliberate plant introductions by Australian government agencies during the 20th century. *Australian Journal of Botany* 54, 601-625.
+ Dixon, I. & Douglas, M. 2007 Field Guide to Assessing Australia's Tropical Riparian Zones http://www.savanna.cdu.edu.au/environorth/teach/downloads/Field-Guide-Assess-Tropical-Riparian-Zones-07_low-res.pdf
+ Dixon, I., Douglas, M., Dowe, J. & Burrows, D. 2006. Tropical Rapid Appraisal of Riparian Condition: Version 1 (for use in tropical savannas). River Management Technical Guideline No. 7. Canberra, Land & Water Australia.http://lwa.gov.au/files/products/river-landscapes/pr061169/pr061169.pdf
+ Duguid A., Barnetson J., Clifford B., Pavey C., Albrecht D., Risler J. and McNellie M. 2002. Wetlands in the arid Northern Territory. A report to Environment Australia on the inventory and significance of wetlands in the arid NT. Parks and Wildlife Commission of the Northern Territory. Alice Springs. http://lrm.nt.gov.au/herbarium/nature/aridwetlands

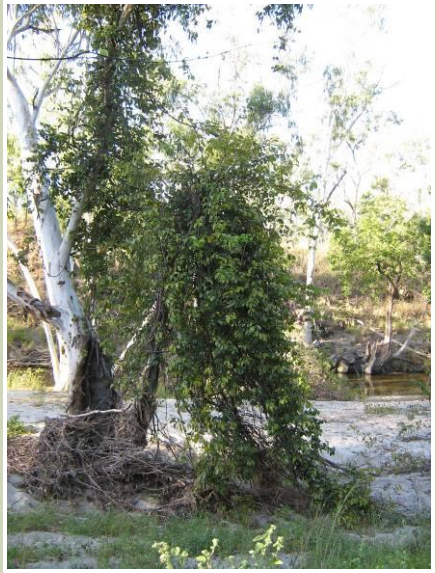


Photo: © Gabriel Crowley

Rubber Vine - a weed for Northern Territorians to watch out for

+ Fisher A. and Kutt A.S. 2006. *Biodiversity and land condition in tropical savanna rangelands: summary report*. Tropical Savannas CRC, Darwin. www.landmanager.org.au/savanna_web/publications/downloads/Biodlc.pdf
+ Grice AC, Martin TG. 2006. *Weed Management: Managing for biodiversity in the rangelands - Summary Report*. Department of Environment and Heritage, Commonwealth of Australia, Canberra, Australia. www.environment.gov.au/land/publications/pubs/weed-management.pdf
+ Charles Darwin University and NT Government 2009. Northern Territory Weed Management Handbook. http://lrm.nt.gov.au/weeds/manage.
+ Overview of Northern Territory Weed Control Legislation www.weeds.org.au/nt2.htm
+ Water and Rivers Commission 2001. Herbicide use in wetlands. Water Notes WR22, April 2001, 4pp. http://www.nynrm.sa.gov.au/Portals/7/pdf/LandAndSoil/49.pdf
+ Weeds Branch, Northern Territory Department of Land Resource Management 2007. *Guidelines for weed data collection in the Northern Territory*. Northern Territory Government, Australia. http://lrm.nt.gov.au/__data/assets/pdf_file/0003/13485/weed_data_collection_guidelines_jan2011.pdf
+ Woinarski J.C.Z., Mackey, B, Nix, H. & Traill, B. 2007. *The Nature of Northern Australia: Natural values, ecological processes and future prospects*. ANU E-Press, Canberra. epress.anu.edu.au/nature_na/pdf_instructions.html

Visit

Weeds Australia: National Portal www.weeds.org.au

Northern Territory Department of Land Resource Management http://www.lrm.nt.gov.au/home

Weeds of National Significance Web Site http://www.weeds.org.au/WoNS/

Contact

Weeds Branch, Department of Land Resource Management
Contacts - Weeds Branch - Land Resource Management

Noogoora Burr

Introduction

Noogoora Burr is a herbaceous daisy bush from Central America. It was accidentally introduced to Australia in the late 19th century, probably as contamination in cotton seed. It is found in all eastern mainland states, in the Kimberley region of Western Australia, in the Victoria River District and around Alice Springs. Although its potential distribution has not been determined, its current wide extent suggests that it could colonise most waterways in the Northern Territory.

The bristly fruits of Noogoora Burr are dispersed on animal fur and on clothing. Seed may remain dormant but viable for over a decade. Their ability to spread in floodwater has enabled the weed to establish along stream channels. Noogoora Burr also colonises disturbed ground.

Noogoora Burr needs full sunlight and an adequate moisture supply. It flourishes on rich soils, including black soil and alluvium, but can persist almost anywhere its sunlight and moisture requirements are met. It is toxic to livestock.

Impacts

Noogoora Burr forms dense thickets which exclude the majority of understorey plants. Due to the spread along water courses, wetland plant biodiversity is threatened by Noogoora Burr infestation. Noogoora Burr replaces the Cane Grass in which Purple-crowned Fairy-wrens nest. Fairy-wrens will feed in Noogoora Burr while its lush greenery provides shelter, but they avoid it once it shrivels and turns brown. If Noogoora Burr continues to spread, this weed could also affect a wider range of threatened species.

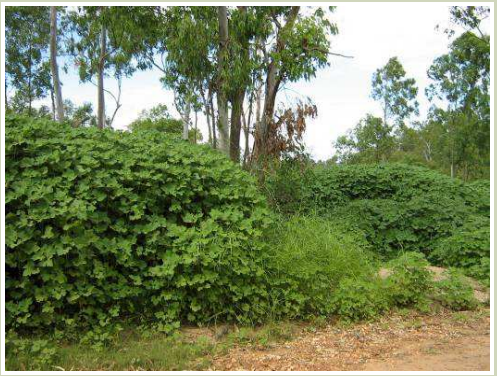
Noogoora Burr also has an impact on pastoral productivity. Due to its rapid growth rate and extensive root system, it competes with edible pasture species. If its seedlings are eaten, they are poisonous to most stock, and its fruits contaminate wool in sheep growing areas, increasing processing costs. Dense stands can also restrict stock access to watering points.

Classification

Noogoora Burr is a declared weed in the Northern Territory and Western Australia. It is recognised as a significant environmental weed in the Northern Territory Parks and Conservation Masterplan and is listed as a high impact weed in the Field Guide to Assessing Australia's Tropical Riparian Zones.

Control

Control practices recommended for Noogoora Burr include hand-hoeing to remove isolated plants; grazing of plants that are between seedling stage and flowering; and spraying young, actively growing plants. A number of chemicals are registered for control in the Northern Territory including 2,4-D, MCPA, metsulfuron-methyl, fluroxypyr, glyphosate, picloram and triclopyr. The recommended application of these chemicals is as a foliar spray.



Photos: © Gabriel Crowley

Noogoora Burr (*Xanthium occidentale*) takes over the vegetation along streams

NT Class B Weed (growth & spread to be controlled) & NT Class C Weed (not to be introduced)

WA Weed Class P1 (movement prohibited), WA Weed Class P2 (aim to eradicate) & WA Weed Class P4 (prevent spread)

Profile written by Gabriel Crowley and edited by Zoe Disher

www.landmanager.org.au/view/index2.aspx?id=183498

Last updated Jan 2013

In Western Australia, Noogoora Burr is one of the few weeds where quarantine restrictions have been used in an attempt to limit its spread. In the Kimberly, all pastoral leases from Fitzroy Crossing to the river mouth are quarantined in an attempt to prevent the spread of the weed.

Biological control has had mixed results. Until recently, insects released have had little effect on the species. A Puccinia rust reduced populations in eastern Australia, but has had little impact in the Northern Territory or Western Australia. However, Noogoora Burr is now reappearing in some of the northern Queensland rivers from which it has previously been largely eliminated by the rust. Investigations are underway into new strains of this rust that are adapted to northern climatic conditions.

For further information:

Read

- Northern Territory Government Weed Identification Guide: Noogoora Burr http://www.lrm.nt.gov.au/weeds/find/noogoora
- Queensland Government Pest Plant Guide: Noogoora Burr http://www.daff.qld.gov.au/4790_7329.htm
- Western Australian Government Declared Plants Guide: Noogoora Burr http://www.daff.qld.gov.au/4790_7329.htm
- Duguid A., Barnetson J., Clifford B., Pavey C., Albrecht D., Risler J. and McNellie M. 2002. Wetlands in the arid Northern Territory. A report to Environment Australia on the inventory and significance of wetlands in the arid NT. Parks and Wildlife Commission of the Northern Territory. Alice Springs. http://lrm.nt.gov.au/herbarium/nature/aridwetlands
- Weeds in Australia web page: Noogoora Burr *Xanthium strumarium* http://www.environment.gov.au/cgi-bin/biodiversity/invasive/weeds/weeddetails.pl?taxon_id=6119
- CSIRO Research Project: Management of Noogoora burr http://www.csiro.au/en/Outcomes/Safeguarding-Australia/Noogoora-burr.aspx

Drillhole Information

Hole-ID	Easting	Northing
19RC001	792708	8144626
19RC002	792760	8144703
19RC003	792918	8144517
19RC004	792974	8144604
19RC005	795282	8148767
19RC006	795325	8148741
19RC007	795368	8148716
19RC008	795412	8148688
21GJ001	793188	8144474
21GJ002	793314	8144386
21GJ003	793461	8144293
21GJ004	793124	8144377
21GJ005	793264	8144293
21GJ006	793407	8144207
21RC001	795331	8148853
21RC002	795375	8148827
21RC003	795418	8148802
21RC004	795463	8148776

Note: Exact collar location may vary within outlined red polygon areas (see Maps under supporting documents) but total disturbance area will not exceed that proposed in the MMP.

Remediation Register

Date	Name of Report Submitted	Authorisation No.	Exploration Conducted	MMP Ref
28/08/2018	Stanton Rehabilitation Report	0956-01	66 RC holes @ Stanton Cobalt Deposit	MR2017/0256
12/09/2018	Wollogorang Regional Drilling Rehabilitation Report	0956-01	61 RC Holes - around Stanton	MR2017/0280
14/09/2018	Wollogorang aircore Drilling Program Rehabilitation Report	0956-01	1267 aircore holes	MR2018/0098

https://nt.gov.au/minerals-

AF7-014		last review: September 2012

M & E Security Calculation Tool
Exploration Operations

"OPERATOR"

Security Calculation Summary

Details			
Contact Name	Christine Lawley	**Authorisation #**	0956-01
Project	Wollogorang	**Date**	12/03/2021
MMP	Wollogorang Project: Gregjo and Running Creek Drilling Project		

Calculation Trigger			
New Authorisation	**MMP Renewal/amendment**	**Audit Finding**	**Client Request**

Domains	Calculated Cost
Site Infrastructure	$0.00
Exploration	$2,700.00
Post Closure Management	$382.50
Sub-Total - All Domains	$3,082.50
CONTINGENCY @15%	$462.38
TOTAL COST	$3,544.88
10% Discount	$354

Note: According to Resolution Minerals Balance Sheet, current M & E Security held with DME is well in excess of the Total Cost outlined above ($20,956).

NORTHERN TERRITORY GOVERNMENT