

Amrun Project (EPBC 2010/5642)- Annual Environmental Monitoring Report 2024

09 August 2024



Flatback turtle hatchling recorded during the 2021 surveys

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1 Purpose

The Amrun Project (formerly South of Embley Project) involves the construction and operation of a bauxite mine and associated processing and port facilities to be located near Boyd Point on the western side of Cape York Peninsula. A detailed description of the Project is provided in the Queensland EIS (RTA 2011), the Queensland SEIS (RTA 2012), and the Commonwealth Environmental Impact Statement (RTA 2013). The marine works associated with the new port facility included the construction of jetty, wharf and ship loaders and dredging of berth pockets and departure channel.

Amrun Project Commonwealth approvals (EPBC/5642 Condition 57) require environmental survey methodology and results associated with activities to be reported and published on the Rio Tinto Website. This annual report presents the monitoring and methodologies implemented between 12 May 2023 and 11 May 2024 associated with:

- Pre-disturbance reporting.
- Weed management.
- Fire management.
- Feral animal monitoring and control.
- Marine turtle monitoring.
- Marine pests monitoring.

In previous years these reports have been published individually but have been combined based on the interactive nature of the activities.

1.1 Project Overview

The Amrun (formerly Boyd components of the South of Embley) Project involves the construction and operation of a bauxite mine and associated processing and port facilities for shipping of bauxite to either Gladstone or international markets. The Amrun Project is located near Boyd Point on the western side of Cape York Peninsula approximately 40km south of Weipa (Figure 1).

The project is currently in the Operations phase with commencement of bauxite shipping on 02 December 2018¹. The project has a current estimated production rate of approximately 22.8 million dry product tonnes per annum (Mdptpa). Actual production rates, timing and extent of future capacity expansions that are consistent with this approval will depend on market conditions. The anticipated mine life is approximately 40 years, depending on production rates.

The main Amrun Project activities that have been completed to date are listed below. Detailed information on the full Project is presented in the South of Embley Project Commonwealth EIS (RTA 2013).

- Commencement of shipping and production.
- Bauxite processing infrastructure –construction and operation of the Amrun (Boyd) beneficiation plant.
- Product bauxite stockpiles –construction and operation of beneficiated product stockpiles adjacent to Amrun (Boyd) Port.
- Ancillary infrastructure –construction of a diesel-fuelled power station, workshops, warehouse, administration facilities, package sewage treatment plant, temporary waste storage prior to disposal off-site and diesel storage facilities.
- Barge, ferry and tug facilities – construction and operation of a new a roll on/roll off barge and ferry facility at Humbug Wharf, and a new barge and ferry terminal on the western bank of the Hey River.

¹ Preliminary works commenced October 2015 and significant construction commenced in May 2016.

- On-site camp – the construction and operation of camp facility (also referred to as the Amrun Accommodation Village).
- Water infrastructure –construction and operation of a water supply dam on a freshwater tributary of Norman Creek (Arrow Dam (formerly Dam C), plus pipelines, water treatment plants (for potable water) and artesian bores.
- Port and ship-loading facilities –construction and operation of the Port of Amrun, including ship-loading and tug mooring facilities between Boyd Point and Pera Head. The Port of Weipa continues to receive deliveries of fuel, cargo, and equipment for the Amrun Project from domestic (mostly the Port of Cairns) and international ports.

2 Pre-Disturbance Monitoring

The requirements for the Pre-disturbance Program are specified by Condition 22 to 24 of the South of Embley Bauxite Mine and Port Development approval (EPBC2010/5642), issued under the *Environmental Protection and Biodiversity Conservation Act 1999*. The Pre-disturbance Program is presented in Section 5.3 of the Terrestrial Management Plan – South of Embley Project. The Pre-disturbance Program has been implemented in accordance with approval conditions and the Terrestrial Management Plan.

2.1 Methods

2.1.1 Pre-disturbance program

Condition 22 of the EPBC 2010/5642 approval sets out a Pre-Disturbance Program to be implemented prior to the clearing of any vegetation. Pre-disturbance surveys will be conducted to:

- Determine the presence of any active or potentially active Red Goshawk and/or Masked Owl nests prior to clearing any vegetation. Surveying will be undertaken:
 - Red Goshawk – in areas located within one (1) kilometre of permanent water supporting riparian gallery forest or Paperback wetland; seasonally inundated coastal wetlands and seasonal water courses supporting riparian gallery forest, or an estuary.
 - Masked Owl – in areas within 200 metres of permanent water supporting riparian gallery forest of paperbark wetland, seasonally inundated Paperbark wetlands, seasonal watercourses supporting riparian gallery forest or an estuary.
- Surveys will involve walkthroughs of those areas to be cleared, prior to clearing.
- Any observations of nests that may be used by Red Goshawks and/or Masked Owls will be recorded and further assessment undertaken to determine whether the nest is being actively used.
- If an active nest is identified, avoidance, mitigation or management measures will be implemented and a 200m buffer will be established around the nest trees. The nest tree and buffer zone will not be cleared or disturbed until the end of the breeding season (being until fledglings no longer use the nest). Nesting periods are as follows:
 - Red Goshawk - courtship starts as early as April and young do not leave their natal territories until as late as the end of December. Breeding occurs generally in the spring with eggs laid between May and October.
 - Masked Owl - probably breeds between March and October but may breed when conditions are favourable, which can be any time of the year. It is thought that the female occupies the nest for up to 10 weeks before laying. The incubation period is generally 33–35 days but could be as much as 42 days. The fledging period is 10–12 weeks.
- If a potential Red Goshawk and/or Masked Owl nest is located but is not actively being utilised, the tree may be felled immediately to encourage any future nesting pairs to establish a nest outside of the disturbance area².

In addition to the Pre-Disturbance Program under Condition 22, pre-disturbance surveys for Eastern Osprey and White-bellied Sea-eagle will be undertaken within potential nesting riparian forest habitat within Arraw Dam (previously named Dam C) and at infrastructure crossings of riparian forest. Any active nests identified will be buffered until the end of the breeding season for the species in question. The protocol for surveys conducted under the Pre-Disturbance Program shall be prepared by an experienced environmental

² Under the Nature Conservation (Wildlife Management) Regulation 2006 an active breeding place is defined as (Department of Environment and Science 2016); A bower, burrow, cave, hollow, nest or other thing that is commonly used by the animal to incubate or rear the animal's offspring; or the animal is preparing, or has prepared, the place for incubating or rearing the offspring; or the animal is breeding, or is about to breed, and is physically occupying the place; or the animal and the animal's offspring are physically occupying the place, even if the occupation is only periodical; or the animal has used the place to incubate or rear the animal's offspring and is of a species generally known to return to the same place to incubate or rear offspring in each breeding season for the animal.

professional with knowledge of the identification of the Red Goshawk, Masked Owl, Eastern Osprey, White-bellied Sea-eagle and their nests.

2.2 Target fauna survey methods

The survey methodology implemented during the reporting period for each of the target fauna species are presented in (Table 1) below. The survey methods were implemented within areas to be cleared, prior to clearing. The following parameters are to be recorded for each observation where relevant and possible, however in many instances some of this data (e.g. age class, habitat type) are indeterminable or not applicable for bird observations:

- Species name (common and scientific).
- Time and day of survey.
- GPS location.
- Number of individuals located.
- Age class (if known).
- Habitat type.
- EPBC Act listing status.

Table 1: Pre-disturbance Program target fauna species survey methods.

Species	Red Goshawk (<i>Erythrotriorchis radiatus</i>) Eastern Osprey (<i>Pandion cristatus</i>) White-Bellied Sea-eagle (<i>Haliaeetus leucogaster</i>)	Masked Owl (<i>Tyto novaehollandiae kimberli</i>)
Method	<p>Systematic traverses, no more than 100m apart, to detect nests within 1km of permanent water supporting the following:</p> <ul style="list-style-type: none"> • Riparian gallery forest or paperbark wetland; • Seasonally inundated coastal wetlands; • Seasonal watercourses supporting riparian gallery forest; or • estuary. <p>15-minute bird observation points (preferably in the morning or if not then late afternoon) at a density of 1 per 25ha with focus on detecting active or calling individuals</p> <p>Undertake targeted follow up observations at identified potential nests if needed to confirm ownership or occurrence of breeding activity.</p>	<p>Systematic traverses, no more than 100m apart, to detect nests within 1km of permanent water supporting the following:</p> <ul style="list-style-type: none"> • Riparian gallery forest or paperbark wetland; • Seasonally inundated coastal wetlands; • Seasonal watercourses supporting riparian gallery forest; or • estuary. <p>Call playback surveys at a density of 1 per 25ha within waterway habitats and the adjacent 200m area.</p> <p>Undertake targeted follow up observations at identified potential nests if needed to confirm ownership or occurrence of breeding activity.</p>

2.3 Results

Surveys were conducted across approximately 1,516 ha during the Amrun clearing plan for mining and 3,119 ha during Amrun geological drilling exploration activities during the reporting period which includes all the vegetation specified within the survey methodology (Table 1). The results of all surveys were communicated to the Superintendent Land & Rehabilitation.

There are two red goshawk records below have been included from previous reporting periods to indicate their current active status. Note: These two records are not new records from this reporting period.

All other observations of target fauna species recorded during the Pre-disturbance Program surveys in the reporting period are presented below in (Table 2) in accordance with Condition 25.

Table 2: Pre-disturbance Program- target fauna species observations.

Common Name	Full Latin Name	Date	Easting (m)	Northing (m)	Habitat	EPBC Act Status	Active Nest	Buffer Established	Notes / Comments
Red Goshawk ³	<i>Erythrotriorchis radiatus</i>	24/06/2021	572725	8566700	<i>Eucalyptus tetradonta</i> and <i>Corymbia nesophila</i> woodland open forest	Listed Endangered	Yes	Yes	Pair, Confirmed active nest.
Red Goshawk ⁴	<i>Erythrotriorchis radiatus</i>	7/09/2021	567499	8562997	<i>Eucalyptus tetradonta</i> and <i>Corymbia nesophila</i> woodland open forest	Listed Endangered	Yes	Yes	Pair, Confirmed active nest.
Osprey	<i>Pandion cristatus</i>	6/6/2023	565161	8566694	<i>Eucalyptus tetradonta</i> and <i>Corymbia nesophila</i> woodland open forest	Listed Marine/Migratory	Yes	Yes	Active nest
Osprey	<i>Pandion cristatus</i>	18/9/2023	596393	8583404	<i>Eucalyptus tetradonta</i> and <i>Corymbia nesophila</i> woodland open forest	Listed Marine/Migratory	Yes	Yes	Active nest
Red Goshawk	<i>Erythrotriorchis radiatus</i>	18/10/2023	573475	8565973	<i>Eucalyptus tetradonta</i> and <i>Corymbia nesophila</i>	Listed Endangered	No	No	Individual Incidental sighting

³ Previously reported nest record.⁴ Previously reported nest record.

Common Name	Full Latin Name	Date	Easting (m)	Northing (m)	Habitat	EPBC Act Status	Active Nest	Buffer Established	Notes / Comments
					woodland open forest				
Osprey	<i>Pandion cristatus</i>	20/10/2023	570064	8558810	<i>Eucalyptus tetrodonta</i> and <i>Corymbia nesophila</i> woodland open forest	Listed Marine/Migratory	No	No	Individual Incidental sighting
Osprey	<i>Pandion cristatus</i>	30/10/2023	564844	8564816	<i>Eucalyptus tetrodonta</i> and <i>Corymbia nesophila</i> woodland open forest	Listed Marine/Migratory	No	No	Individual Incidental sighting
Osprey	<i>Pandion cristatus</i>	22/04/2024	596400	8583411	<i>Eucalyptus tetrodonta</i> and <i>Corymbia nesophila</i> woodland open forest	Listed Marine/Migratory	No	No	Individual Incidental sighting
White-bellied Sea-eagle	<i>Haliaeetus leucogaster</i>	23/04/2024	596785	8583539	<i>Eucalyptus tetrodonta</i> and <i>Corymbia nesophila</i> woodland open forest	Listed Marine/Migratory	Yes	Yes	Pair, Confirmed active nest.

3 Weed Management

During the reporting period, the Weed Management Program was implemented by the Amrun operations environmental teams and Traditional Owners through the Land and Sea Management Program (LSMP).

Weed management activities included:

- Washdown and inspection of all vehicles travelling into the Amrun Project area, and verification by wharf security and environmental quality control officers through collection of weed hygiene certificates and cleanliness checks before permitting vehicles to access the project site.
- All wash-down facilities are self-contained, zero discharge facilities.
- Ongoing weed survey by LSMP. The results of the surveys are detailed below.
- Routine inspections are conducted in and around construction areas and access roads in the Amrun Project area including identification and reporting of weed occurrences.
- Routine ongoing weed control was completed by suitably qualified personnel throughout the reporting period using both manual and chemical treatments depending on the locations.
- The weed identification and reporting procedure has been implemented for site and part of employee inductions and is updated through e-days. Ongoing weed management training is completed with our weed management specialist throughout the year.

Weed surveys are completed by both foot and vehicles. The method chosen is dependent on vision and extent of weed infestation in an area. In either event, the vehicle is driven slowly (approx. 10km/h along the access track and team members checking to identify weeds across all access tracks on site and within the mine. When sighted the car is safely stopped and the location is recorded and if available, manual or chemical (herbicide) treatment (pickers or glyphosate) will be applied immediately, or the area will be recorded to be revisited for treatment shortly thereafter. Information is recorded using the ArcGIS application "collector" and then updated into the weed management database by the LSMP team members. In the event a plant is unknown a specimen will be collected and sent to a competent person for further identification.

The main outcomes of the 2023 survey were as follows:

- Previous isolated Class 2 or 3 weed species have been effectively controlled and were not present during the survey indicating the team is on track for successful eradication of the species.
- Isolated occurrences of Gamba grass (*Andropogon gayanus*) were identified as individual plants. These plants were immediately treated, recorded into field data collection system and regularly checked and rechecked for additional growth. Most specimens were found roadside on light vehicle tracks. No broadscale infestations have been recorded.
- Overall distribution and abundance of weeds across the mining lease is reduced by proactive weed control implemented by the LSMP Team.
- The LSMP Team members are exceptionally knowledgeable about the distribution of weeds on site.
- The use of targeted herbicides in 2023 for weed spraying has been helpful to kill isolated plants without killing the native grasses alongside.

The periodic weed survey was completed at Amrun by Ecotone Flora and Fauna Consultants in October 2022 and will be completed again in 2025. This was the third repetition of the survey, and it targeted all operational areas, main lease access points and highly frequented residential and adjacent public areas. The 2016 and 2019 surveys were conducted during July. It is important to note the timing of the survey in the late dry season increased the difficulty of finding and identifying weeds. Seasonal fires and the dried state of many perennial species made identification and abundance assessments challenging. Consequently, the results given an indication of the current weed situation at Amrun however are not directly comparable with the seasons results.

The main summary of the 2023 weed management program and three-yearly periodic survey are as follows:

- Previous isolated Class 2 or 3 weed species have been effectively controlled and were not present during the periodic weed survey.
- Isolated individual gamba grass (*Andropogon gayanus*) plants identified and destroyed along high traffic areas within operational areas, data was recorded and will be monitored in the 2024 reporting period.
- Increase in density of Hyptis (*Mesosphaerum suaveolens*) and Common Stylo (*Stylosanthes scabra*) around Hey River Terminal laydown area and main access road from HRT to Camp facility. Area is recognised as highlighted target area in 2023 weed management program.

4 Fire Management

The fire management program for Amrun (and the greater lease area) aims to reduce the incidence of damaging late dry season fires through 'low intensity' controlled burns. The control program aims to create a mosaic across the site to protect sensitive vegetation types and reduce fuel load. Burns are commenced in early June (early dry season) based on the vegetation condition.

The Amrun fire program has been underway since 2017 supporting construction of the Amrun mining infrastructure. In 2018, it was officially integrated into the Rio Tinto Weipa Operations Management Plan. This program is currently adapting to operations and to support progressive rehabilitation commenced in 2021 and has been designed in consultation with fire management experts, Traditional Owners and from previous site experience. The site-based plan is reviewed and amended at the end of each fire season to ensure seasonal fuel loads are adaptively managed.

The Amrun fire management plan for 2023 aimed to:

- Build on and compliment the previous fire programs to achieve a fine mosaic of burnt / unburnt country throughout the lease area inclusive of the offset area.
- Prevent the east-west movement of late season wildfires through the lease area
- Build the capacity of the LSMP to implement an on-going fire management program.
- Implement targeted aerial incendiary works across the site.

This was achieved through:

- One aerial incendiary campaign in late July.
- Ground based ignition using a combination of single point ignition (match) and drip torch burns commencing in late June.

Figure 2 the fire scar mapping obtained from 2020 to 2023 downloaded from the Northern Australian Fire Information (NAFI) website. The mapping displays a comparison between years to identify how the regime has changed since implementation of the burn program across the Amrun site. Consistent with the fire management program objectives, a mosaic pattern is starting to present through the landscape with reduced late season frequency with the ongoing ignitions programs.

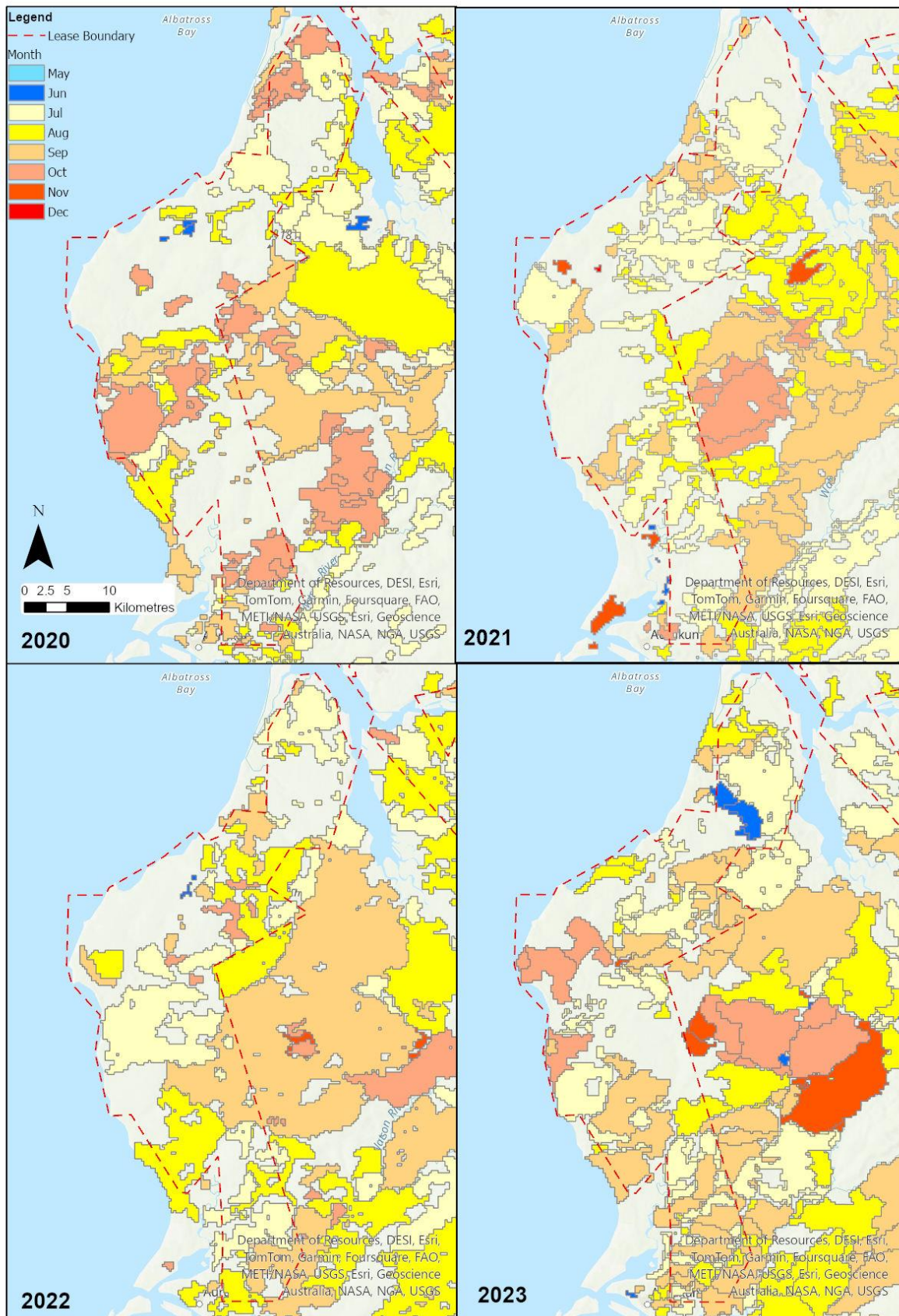


Figure 2: 2020-2023 fire scar comparison of the Amrun site using NAFI mapping data

5 Feral Animal Management

5.1 Feral Pigs

Feral pig eradication is completed via a combined program of aerial shooting, ground-based shooting and pig baiting. Since its inception in 2016, the program has adaptively changed over time to optimise the approach to eradicating feral pigs. This ensures the intended objective of decreasing marine turtle nest predation along the Amrun foreshore.

The initial scope of the program was to focus on boars (male feral pigs) resident along the coastal swamps and beaches. New data from the Commonwealth Scientific and Industrial Research Organisation (CSIRO) demonstrated feral pigs will move much greater distances to forage, especially on protein-rich food sources, including turtle eggs. The program has ultimately been expanded to include most Amrun on-lease areas of ML7024 between the Embley and Ward rivers. The only areas excluded from the program are those in which infrastructure is present. Whilst the program still focuses on the high-biodiversity coastal swamps of the Ward River, Norman Creek, Winda Winda Creek and Triluck Creek, the expanded culling area allows for greater engagement with groups of feral pigs moving outside of these swamp areas.

The 2023 feral pig management activities complied with the requirements outlined in the Feral Pig Offset Strategy. The 2023 campaign consisted of the following:

- 45 nights of scheduled ground-based shooting using a mobile team on foot and in All Terrain Vehicles (ATV). Spread across May to November 2023 and February to May 2024 to eliminate habitual pigs along beach.
- One four day (24 hours) aerial shooting campaign.
- The use of bait stations and trapping was discontinued due to its demonstrated ineffectiveness⁵.
- Feral cats whenever sighted.

During the program, 529 pigs were humanely destroyed. Aerial shooting accounted for 425 pigs whilst ground-based shooting accounted for 104 pigs. A summary of the 2023 aerial and ground-based shooting results is presented in Table 3, and a comparative list of total pigs culled between 2016-2023 is presented in Table 4.

Table 3: Summary of aerial and ground-based shooting results for pigs for 2023

Event	Dates	Animals culled
Ground Shooting Campaign	11 – 16 July 2023	7 x pigs
Aerial Shooting Campaign	18 – 21 July 2023	425 x pigs
Ground Shooting Campaign	20 – 26 August 2023	12 x pigs
Ground Shooting Campaign	27 September – 3 October 2023	10 x pigs
Ground Shooting Campaign	28 October – 1 November 2023	7 x pigs
Ground Shooting Campaign	21 February- 4 March 2024	40 x pigs
Ground Shooting Campaign	8 March – 1 March 2024	28 x pigs
Total		529 pigs

⁵ For further information, please see Amrun Project (EPBC 2010/5642) – Annual Environmental Monitoring Report 2020.

Table 4: List of feral pig annual cull totals since 2016

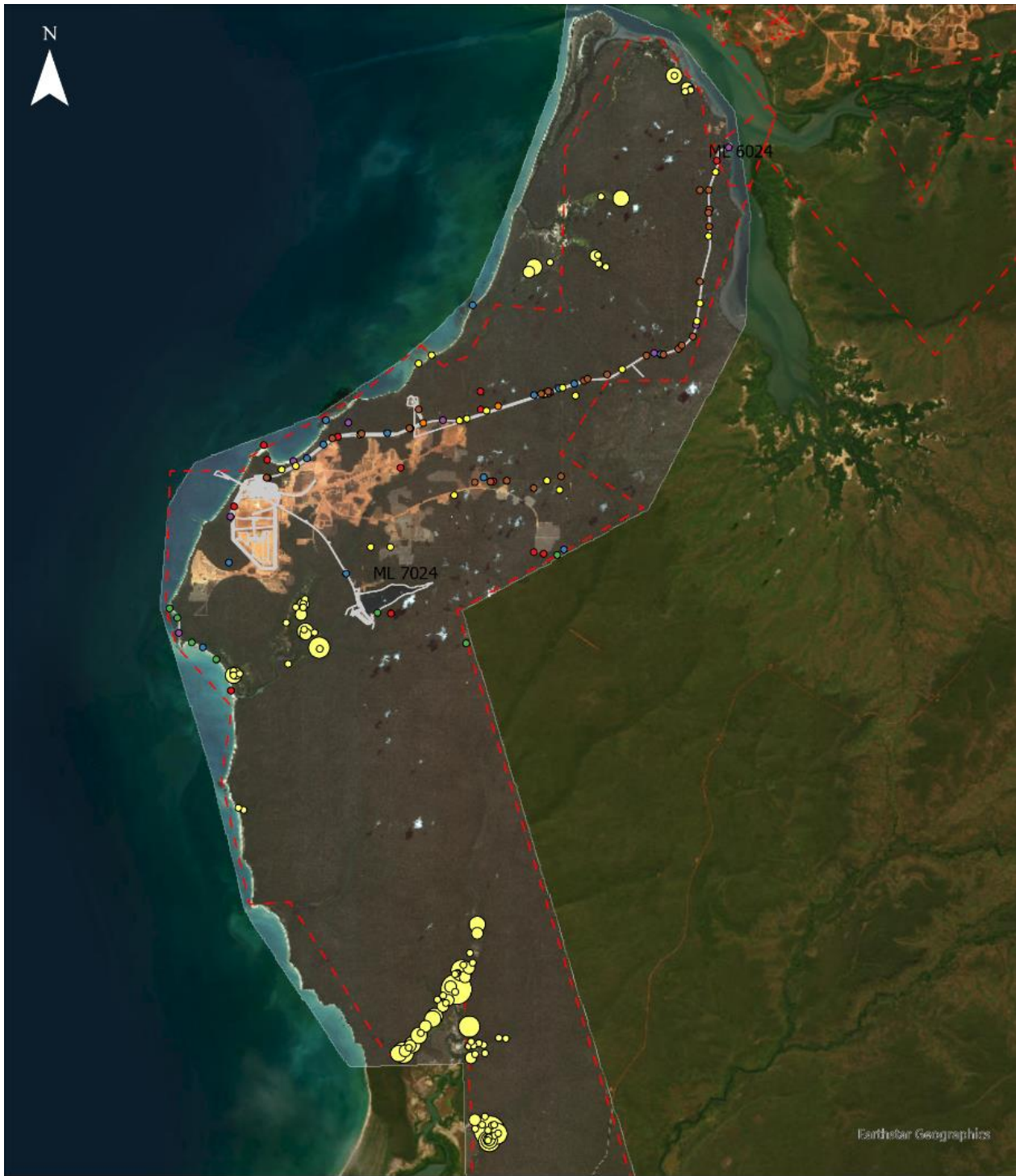
Year	Total Aerial	Pig baiting and ground based shooting⁶
2016	121	1
2017	268	6
2018	300	11
2019 ⁷	824	31
2020	429	37
2021	653	56
2022	578	60
2023	425	104
Total	3598	306

No estimate on pig population has been attempted as this is exceptionally difficult to do with accuracy and changes in the control program do not allow comparisons between years. The effectiveness of the control program is monitored through the turtle predation rates by pigs which is the key threatening process and key objective of the Feral Pig Offset Strategy

As expected, high levels of pig activity were concentrated around Winda Winda Creek, Norman Creek and Ward Creek. A number of pigs destroyed during the ground-based shooting were near the coastline. These individuals were considered important target animals and their removal has directly contributed to reducing the predation of threatened marine turtle species nest across all the Amrun coastline. The distribution of culled pigs across the 2023 ground-based shooting activities is presented in Figure 3.

⁶ Pig baiting was discontinued in 2021 as it was deemed ineffective.

⁷ The 2019 program included 2 aerial culling campaigns for a total of six days.



Legend

Ground Shooting- Pigs

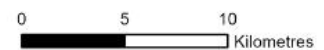
- July
- August
- September
- October
- November
- February
- March

Aerial Engagements

- 1 - 2
- 3 - 5
- 6 - 10
- 11 - 15
- 16 - 25

- Mine Lease Boundary
- Amrun Infrastructure

**Feral Pig Management Activities
2023 - 2024**



Rio Tinto

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Projection: GDA 1994 MGA Zone 54

Figure 3: Feral pig engagement locations and timing during 2023 control activities.

5.2 Feral Cat and Dogs

Feral cat and dogs are required to be managed around camp and mine infrastructure areas to supplement environmental goals of the Terrestrial Management Plan and to reduce undesirable human/wildlife conflicts. These activities are conducted in a manner that is consistent with established animal welfare practices.

Previously, quarterly visual monitoring (spotlighting) surveys and trapping/baiting events were implemented. As described in the 2019 and 2020 Annual Monitoring report these methods are considered ineffective with the information providing limited data and minimal animal captures. Spotlighting/infra-red searches are currently completed when completing ground-based shooting campaign. This has been completed since 2019 and significantly increased the success of eliminating feral animals from site.

In 2023, 25 feral cats and 11 feral dogs were humanely destroyed. A summary of the feral cat and dog management activities are summarised in Table 5 and total feral cat and dog culls between 2016-2023 are presented in Table 6. The distribution of culled feral cat and dogs during 2023 and 2024 ground based shooting activities is represented in Figure 4.

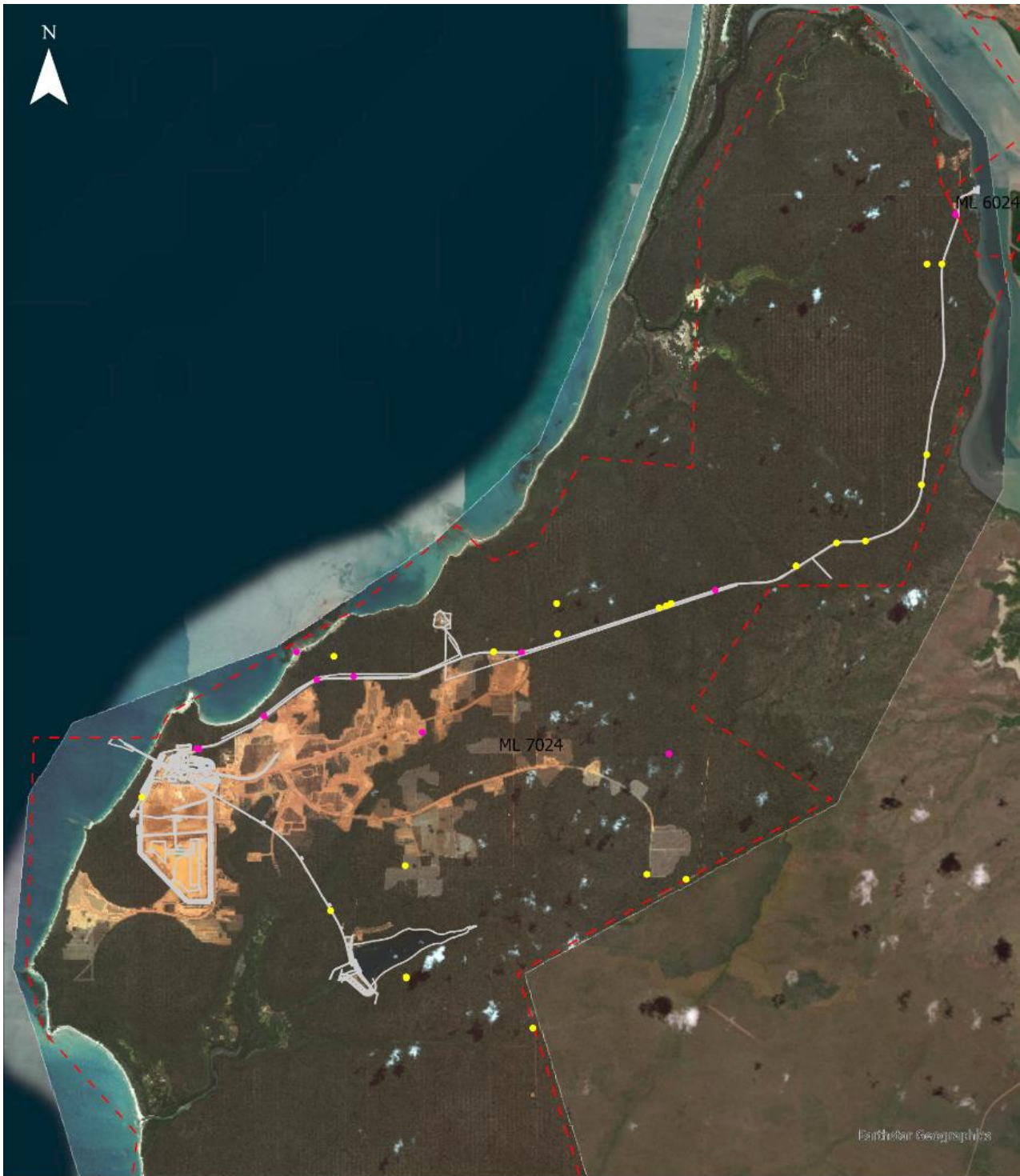
Feral cat number in 2023 doubled historical campaigns. This may be due to the increased drill lines and track systems throughout the mine. A review of specific cat focused control will be completed in 2024.

Table 5: Summary of feral cat and dog management activities.

Event	Dates	Animals
Ground Shooting Campaign	11 – 16 July 2023	7 x cat 3 x dog
Ground Shooting Campaign	20 – 26 August 2023	3 x cat 4 x dog
Ground Shooting Campaign	27 September – 3 October 2023	5 x cat
Ground Shooting Campaign	28 October – 1 November 2023	
Ground Shooting Campaign	21 February- 4 March 2024	6 x cat 4 x dog
Ground Shooting Campaign	8 March – 14 March 20234	4 x cat

Table 6:List of feral cat and dog cull totals since 2016.

Year	2016	2017	2018	2019	2020	2021	2022	2023	Total
Cat	0	0	0	8	9	12	12	25	66
Dog	0	0	3	5	10	11	10	11	50



Legend

Feral Animal Ground Shooting

Animal

- Cat
- Dog

▭ Mine Lease Boundary

— Amrun Infrastructure

Feral Cat and Dog Ground Control 2023 - 2024

0 4.5 9 Kilometres

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Projection: GDA 1994 MGA Zone 54

Figure 4: Feral cat and dog engagement locations during 2023 control activities.

6 Marine Turtle Monitoring

As part of the Amrun project (formerly South of Embley Project) approvals Commonwealth (EPBC 2010/5642 Condition 45) and Queensland (EPML00725113. Condition 42) an annual turtle monitoring program is required. The Queensland Environmental Impact Statement (EIS; RTA 2011), Queensland Supplementary Report (SEIS RTA 2012) and Commonwealth Environmental impact Statement (2013) identified that lighting at the then proposed Amrun Port could potentially have an adverse impact on marine turtle hatchlings (RTA 2011 and RTA 2012).

While the design of lighting has been developed to minimise adverse impacts on turtle hatchlings, a compensatory measure was proposed in the EIS to enhance overall hatchling survivorship by reducing the predation of turtle nests by feral pigs (RTA 2013). The monitoring associated with this project aims to assess the progress of the feral pig control strategy to enable adaptive management and maximise hatchling success.

Marine turtle nesting habitat in proximity to the Amrun project was assessed, including all accessible nesting beaches on the Amrun Project mining lease north (approximately 27 km of nesting beach) and south (approximately 32 km of nesting beach) of the Port.

Marine turtle monitoring was first conducted along the Amrun project beaches in February 2013. It was identified August/September is the peak nesting period for the region. Since 2016, surveys have been conducted annually⁸.

Four nesting turtle species have been identified to date including flatback (*Natator depressus*), hawksbill (*Eretmochelys imbricate*), olive ridley (*Lepidochelys olivacea*) and green (*Chelonia mydas*) turtles. Surveys to date have confirmed low density turtle nesting occurs on the beaches between Winda Winda Creek and Ina Creek (RTA 2013, Guinea 2014, Pendoley Environmental 2017;2018;2019; and unpublished data).

Since the program's inception in 2016, the program has adaptively changed over time to optimise the approach to monitoring and understanding the impact of feral pigs throughout the duration of nesting season. The Feral Pig Offset Strategy (FPOS) required turtle surveys to be completed over a two -week period which provided only snapshot results. Incidental on-ground results observed nests were being predated by pigs after these surveys were conducted thus inferring results obtained during the two-week survey period were not a sufficient representation.

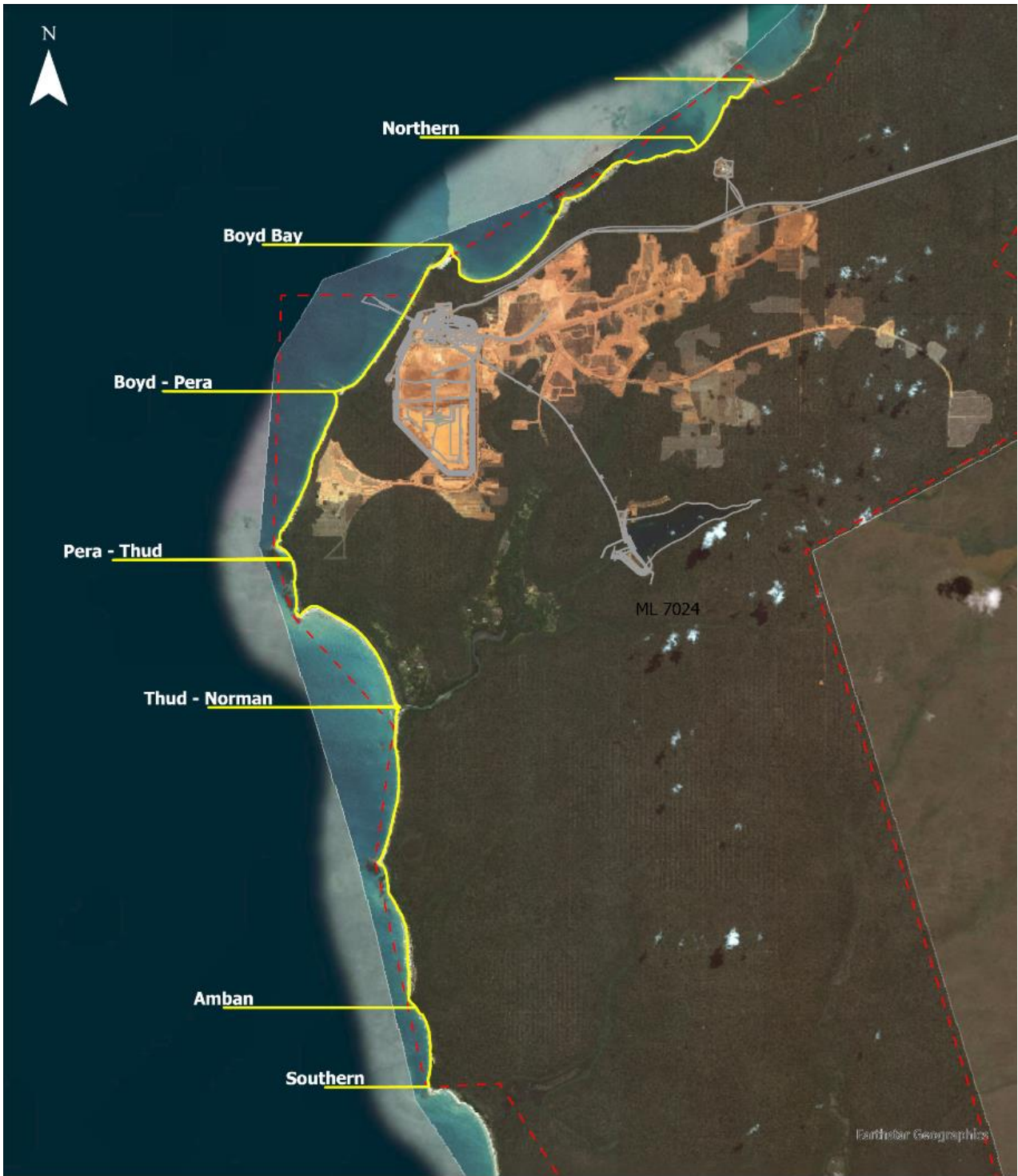
The program continues to be undertaken in-house by the RTW Land and Sea Team, with works completed under appropriate permits from the DES, Permits and Licensing Management and Animal Ethics Committee. Ongoing training and development of staff is undertaken to continue to ensure successful outcomes.

The 2023 the program followed the survey methods implemented since 2013 to ensure consistency with baseline surveys (Guinea 2014) and project surveys (Pendoley 2016, 2017, 2018, 2019).




6.1 Methods

The area was divided into seven discrete survey beach sections and included all accessible nesting beaches between Winda Winda Creek (north) and Ina Creek (south) (Figure 5).

⁸ Surveys conducted by external contractors to date: February and October 2013 (Guinea, 2014), September 2016, August 2017, September 2017, September 2018 and September 2019 (Pendoley Environmental, 2017).



Legend

-  Turtle Survey Areas
-  Mine Lease Boundary
-  Amrun Infrastructure

Amrun Turtle Monitoring Beaches



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Projection: GDA 1994 MGA Zone 54

Figure 5: Amrun turtle nest monitoring beaches.

The surveys were completed in 2023 by the LSMP Team which is comprised of Wik-Waya Traditional Owners. The team members have undergone ongoing training since 2016 which included a verification of competencies. The team continue to undergo regular training each season for ongoing improvement.

RTW is currently engaging with other Land and Sea Ranger groups on Western Cape York through the Western Cape Turtle Threat Abatement Alliance (WCTTAA). There may be some future adjustment to the annual turtle monitoring program to better align our data and effort with the work that is undertaken within the broader Western Cape region.

6.1.1 Schedule

In 2023, the sites from Northern to Thud-Norman Creek were regularly accessed throughout the year with incidental observation at least every two weeks. Any occurrences of predation or hatchlings were recorded throughout the year to confirm successful nest or predation. Throughout October to mid-December at least weekly surveys were completed to understand the success of the season's efforts.

Regular access to Amban and Southern beaches was restricted due to closure of country, sorry business, logistical problems with access, fire activity and ongoing equipment issues. Consequently, only monthly surveys from September through to December were conducted in these areas.

6.1.2 Nest census surveys

Nest identified – census surveys completed using an All-terrain vehicle (ATV) or on foot to identify nests. Data is collected about the nest and associated crawl. Data includes GPS point, likely species, track widths, hatched nests and any signs of predation. Predated nests are reviewed for the type of predator and whether the nest appeared to be partially or completely impacted.

6.1.3 Predation monitoring

Visual surveys are undertaken regularly along target beaches to identify predation events. Where available an infrared motion detection trail camera is placed on a pole adjacent to the nest with signage (species, estimate hatch date etc). The camera is removed when the nest is predated, or the nest has successfully hatched.

6.1.4 Ongoing nest monitoring

Ongoing nest assessment is completed throughout the survey period. At the end of the season each recorded nest is assigned based on the last recorded nest interaction and includes:

- Predated – where the nest has confirmed sign of predation and (species of predation is identified where possible).
- Partial predation – when an attempt at predation has been made and some eggs may be sighted. The nest is reburied and monitored for the season. It is considered a partial predation event if hatchlings are successfully recorded.
- Hatchlings – this is only assigned when confirmed hatchling tracks or a nest excavation has occurred, and the nest has been successful.
- Potential nest – when a potential nest has been identified this is recorded as a potential nest, unless there are confirmed sighting of eggs (e.g. actively recorded laying).
- False crawl – when a track was recorded but no nest signs associated with a nest e.g. mound or covering were recorded.
- Nest washout – when a natural event such as waves or storms wash out the nest. This is recorded but no results are reported. This normally occurs towards the beginning or end of the year.

6.1.5 Nest excavation

Where possible, nest excavation generally occurs 2-3 days after nest emergence. Excavation is completed to confirm species and understand the success of the emergence based on hatched and unhatched eggs.

6.2 Results

A total of 245 events were recorded during the 2023 monitoring period (Table 7). There were 60 hatchling events, 139 potential nests and 39 predated nests (Table 7). Flatback turtles accounted for approximately 45% of events (Table 7). No partial predation events were observed.

A total of 39 predated nests were recorded, most nests had evidence of pig involvement. Predated nests represent 15.9% of observed nesting events. While this is a slight increase on previous years (2021 = 9.2%, 2022 = 10.5%) it remains an indication of the continued positive impact of the feral pig control program (Figure 6). Initial predation rates were 70% and up to 100% on some beach sections when first calculated by Pendoley Environmental in 2016. The 2023 results are still well above the target of a 70% reduction in nest predation across each beach section and demonstrates the ongoing effectiveness of the feral pig reduction program on nesting success.

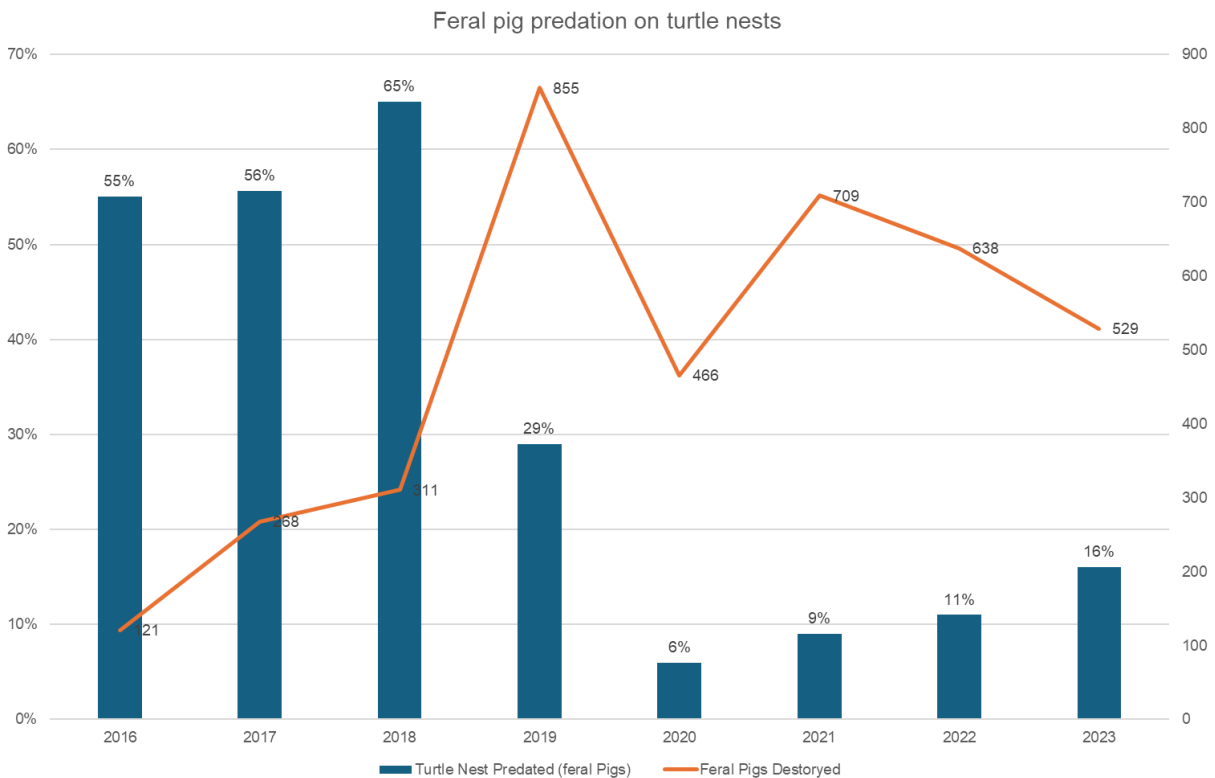


Figure 6: Observed turtle nest predation vs total number of pigs destroyed since 2016

The Pera to Thud Section had the most predation events during 2023. Thud Point beach section also recorded the highest number of feral pigs destroyed throughout the shooting campaign (Figure 3). The increase in pig numbers in this area may be influenced by adjacent mine site expansion, concentrating pigs into localised pockets. Additional control measures, such as cages to protect nests are being considered for these areas.

The 2023 Turtle program saw a marked improvement in data collection on the 2022 program with the total number of monitoring events increasing from 95 (2022) to 245 (2023). The 2023 program was still impacted by several factors including:

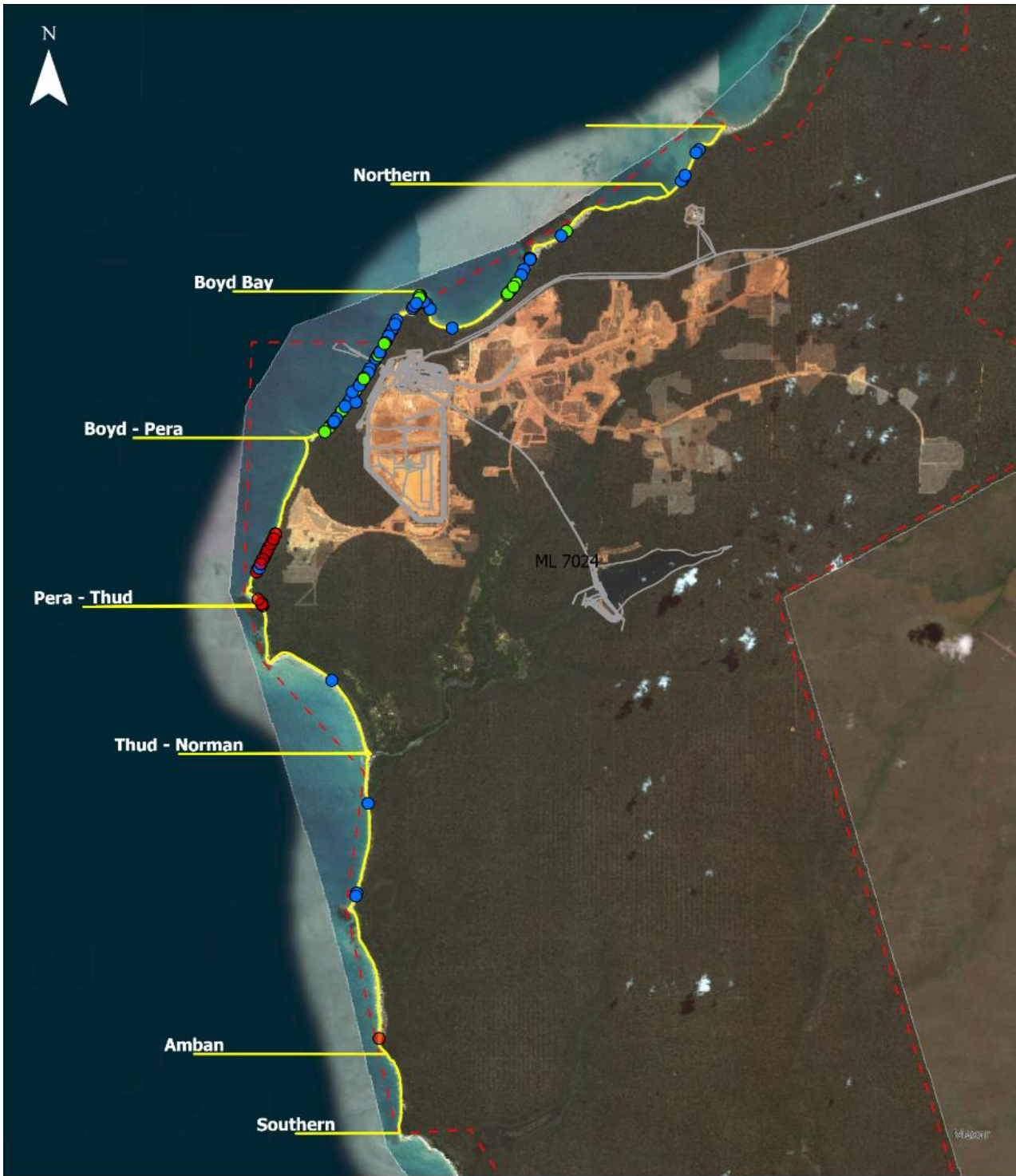
- Delay in receipt of new All-Terrain Vehicles (ATVs) restricting access to survey locations. Hire ATVs were utilised where possible to support the continuation of monitoring activities.
- Sorry Business and related staff shortages.

- Closure of country

While the number of observed nests and successful hatchling events in 2023 was improved from 2022, it still remained reduced from previous years. It is important to note that new or hatched nests are hard to identify less than a week after an event while predated nests can be identified up to six months after the event.

Table 7: Summary of nesting events per species.

Species	Hatchlings	Predated	Partial Predation	Potential Nest	False Crawl	Total
Flatback	42	11	0	57	0	110
Green	3	4	0	4	0	11
Hawksbill	3	0	0	21	2	26
Olive-ridley	11	0	0	31	1	43
Unknown	1	24	0	26	4	55
Total	60	39	0	139	7	245



Legend

Final Turtle Nest Stage

- false crawl
- hatchlings or hatchling tracks
- potential nest
- nest predated

- Turtle Survey Areas
- Mine Lease Boundary
- Amrun Infrastructure

2023 Turtle Events and Final Nest Stages

0 3.5 7
Kilometres

Rio Tinto

RIO TINTO WEIPA, QUEENSLAND 4874
Projection: GDA 1994 MGA Zone 54

Figure 6: Location of 2023 recorded nesting events on Amrun beaches.

7 Marine Pest Monitoring

The Amrun Project (formerly South of Embley Project) involves the construction and operation of a new Port facility (Port of Amrun) located between Boyd Point and Pera Head. The marine works include construction of a jetty, wharf and ship loaders. Construction of the marine aspects of the Port commenced in May 2017.

It has been identified that vessels that may have visited ports of concern⁹ have the potential to translocate marine pests. Should a marine pest be introduced to local marine waters, an increase in artificial structure at the Port has the potential to provide suitable habitat for marine pests to become established. The current risk of translocation to Amrun is low due to the nature of the vessels operating. Vessels (with exception of bauxite carriers which are low risk) have been risk assessed prior to mobilisation to site further reducing the risk of translocation.

Marine pests are marine biota that are translocated into waters outside their natural geographic range and subsequently settle, survive and spread. Translocation and survival of these species in new areas can cause irreversible impacts to the local ecosystem by competing with and/or preying on native species, as well as introducing disease. The consequences can include a combination of environmental, social and economic impacts.

Review of the installation of a marine pest settlement plate program to meet the utilise the Queensland's Seaports eDNA Surveillance (Q-SEAS) Program is underway. Previous installation attempts have identified several safety and operational issues associated with installation. The currents are also identified as impacting the success of the arrays to remain upright. This process is being worked through.

Visual surveys for Asian green mussel (*Perna viridis*; AGM) were made along beach shores and accessible intertidal rocky reef areas. Suspected shells were collected and provided to a marine biologist for identification. Areas explored were limited to between Boyd Bay and Pera Head which is near the export facility. Beach wrack surveys are ongoing through the year while completing turtle surveys and no marine pests were identified on the beach throughout the year.

⁹ Those ports that are recognised as harbouring invasive marine species with risk of translocation to other port areas.