



Ningaloo Turtle Program Annual Report 2023-24



Department of Biodiversity,
Conservation and Attractions



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GLOSSARY

Body pit	A depression dug in the sand by a turtle during a nesting attempt.
Egg chamber	A deep cylindrical hole which a turtle digs into the bottom of a primary body pit with her back flippers only. The eggs are deposited here.
Entire season	All NTP database season dates and subsections. This includes the intensive peak period monitoring and the pre and post peak period monitoring data.
False crawl	An abandoned nesting attempt with no eggs being laid.
GPS unit	Global Positioning System unit: an electronic navigational device which obtains a position on the earth using satellite signals.
Pre and post peak	Monitoring on the weekends either side of the intensive peak monitoring period.
Intensive peak monitoring period	Four-week period centred around the 31 December, during which monitoring takes places every day. Note: the peak was identified by Whiting (2016) as the 7 January but due to having volunteers adequately trained before Christmas, the peak period has been brought forward one week every year.
Nest	A nesting attempt which we suspect has resulted in eggs being deposited.
Nest damage	The nest has been dug up, eggs or fresh empty egg shells are around the nest or eggs are exposed.
Nesting success	The number of suspected nests laid as a percentage of total turtle tracks counted.
New nest	A suspected nest laid during the night before or the morning of monitoring, which has therefore not been previously recorded.
Old nest	A suspected nest laid during the current season (but not laid during the previous night) which has been predated on.
Primary body pit	A depression dug in the sand by a turtle during a nesting attempt with the aim of laying eggs into it. The egg chamber is located here in a successful nest, but a primary body pit can also be left exposed from a false crawl.
Rookery	A significant breeding area for a large number of turtles.
Secondary body pit	The last depression dug during a successful nesting attempt to cover the primary body pit and egg chamber with sand.

Standardised season	A period which only includes the intensive peak monitoring period to make data comparisons possible between seasons that would otherwise have different monitoring timeframes.
Survey effort	Total number of times each subsection was monitored over a specified period of time.
Suspected nest	Nests suspected of containing eggs as a result of assessment using standard monitoring techniques. Eggs were not witnessed being deposited into an egg chamber within the structure, hence the ‘nests’ are referred to as “suspected nests.”
Tracks	The imprint left in the sand by a turtle emerging from and returning to the water.
Turtle activity	Includes both turtle nests and false crawls.
Unidentified species	A turtle activity that cannot be attributed to a green, loggerhead or hawksbill turtle is classed as belonging to an unidentified species. This may occur due to the track being too short in length, obscured by wind or another track, or a volunteer being unsure.
Zoning	Hierarchical spatial classification system of divisions, sections & subsections used for monitoring nesting activity.

LIST OF ABBREVIATIONS

CCG	Cape Conservation Group Inc.
DBCA	Department of Biodiversity, Conservation and Attractions
EPBC Act	<i>Environment Protection and Biodiversity Conservation Act 1999</i>
NMP	Ningaloo Marine Park
NTP	Ningaloo Turtle Program
NW Cape	North West Cape
Parks and Wildlife	Parks and Wildlife Service, Department of Biodiversity, Conservation and Attractions

SUMMARY

The Ningaloo Turtle Program (NTP) was established in 2002 as a collaboration between the Cape Conservation Group Inc., World Wildlife Fund (WWF) Australia, Murdoch University and the Department of Biodiversity, Conservation and Attractions (DBCA), Exmouth District. During the 2023-24 season, Woodside Energy and its joint venture partner made a significant financial contribution to sponsoring NTP. The program is now run by DBCA, and the primary aim of the NTP is to support the conservation of marine turtles along the Ningaloo Coast.

The monitoring design was consistent with previous recent seasons. This included 4 weeks of daily monitoring of turtle activity (nests and false crawls) during the predicted peak period of nesting at both the North West Cape (NW Cape) and Cape Range divisions (referred to as the standardised season) and 3 weekends pre-peak and 3 weekends post-peak at the NW Cape sections only. Coral Bay division was monitored in 2023-24 for 7 days over the peak season. Janes Bay (Ningaloo division) and Gnarraloo Bay were not monitored in 2023-24.

6049 suspected nests and 31,755 false crawls from green, loggerhead and hawksbill turtles were recorded on the Ningaloo Coast over the full 2023-24 season. For all three species combined, average nesting activity during the intensive peak monitoring period this season per subsection per day (which includes both nests and false crawls) was the highest since NTP began in 2002. On average, 109.1 turtle activities were recorded per subsection per day, well above the long-term average of 27.9 nesting activities per subsection per day.

In the NW Cape division, 99.27% of activities were from green turtles. This season was the 2nd busiest out of 22 seasons for the number of green turtle nests per subsection per day. It was the lowest on record for loggerhead nests and 3rd lowest for hawksbill nest. In the Cape Range division (Bungelup), 51.8% of activities were from loggerhead turtles. The number of nests per subsection per day were the lowest on record for loggerheads, lower than average for hawksbills and second highest for green turtles compared to long-term averages.

Nesting success was well below average for all three species in the NW Cape division in 2023-24. For both green and hawksbill turtles, it was the lowest since NTP began. In the Cape Range division, nesting success was also below average for all three species, and lowest on record for loggerhead turtles.

In the NW Cape division standardised season, an average of 15.39 new green turtle nests were recorded per subsection per day, which is above the long-term average of 6.13 nests per day (range from 1.06 to 18.13 since 2002). Nesting success for green turtles was 14.4% (average 26.5%). Loggerhead turtles laid an average of 0.11 nests per subsection per day which is the lowest recorded (average 0.35, range 0.11 to 0.68 since 2002). The nesting success was 34.8% (long-term average of 41.4%). Hawksbill activity remained relatively low (compared to other species), with 0.09 nests on average per subsection per day. The long-term average is 0.15 nests per day and the range since 2002 is 0.06 to 0.38 nests per day. Nesting success for hawksbills was 29.7% (long-term average of 46.7%).

In the Cape Range division standardised season, an average of 1.46 loggerhead nests were recorded per subsection per day which is below the long-term average of 3.68 nests per day and the lowest recorded (range 1.46 to 6.44 nests since 2003). Nesting success was 21.1% (average 41.1%). Green turtles laid an average of 0.93 nests per subsection per day (range of 0 to 1.18 with an average of 0.31), and nesting success was 17.5%, lower than the average of 30.3%. Hawksbill activity remained relatively small as expected, with 0.27 nests per subsection per day, lower than the average of 0.39 (range of 0.03 to 1.53 since 2003). Nesting success (25%) was well below average (50.6%). Note the low number of nests for green and hawksbill turtles when interpreting nesting success.

The density of nesting varied throughout subsections. The highest density of green nests (nests per kilometre per day) was in the Burrows to Jurabi Point subsection in the NW Cape division. The Bungelup South to Bungelup North subsection (in the Cape Range division) had the highest density of both loggerhead and hawksbill nests.

Two hundred and eighty six nests (all species combined) were assessed as being disturbed, which was 4.7% of the total recorded nests. Two hundred and sixty six were attributed to ghost crabs. Six nest disturbances were attributed to introduced predators (dog) or dingo.

During 2023-24, volunteers rescued 52 stranded turtles, contributing to at least 412 recorded rescues since 2002. 22 mortalities and 8 tagged turtles were also reported.

Forty eight volunteers contributed 3892 hours to the Ningaloo Turtle Program in 2023-24. Since commencement of the program, volunteers have contributed over 87,902 hours. These hours demonstrate the effort and essential value of the volunteers over the life of the program. The Communications Internship position contributed to an increased social media following on Facebook, Instagram and YouTube and produced excellent promotional material, photography, short videos, and educational experiences for children.

1. INTRODUCTION

The Ningaloo Turtle Program (NTP) was established in 2002, as a collaboration between the predecessors of the Parks and Wildlife Service at the Department of Biodiversity, Conservation and Attractions Exmouth District (DBCA), Cape Conservation Group Inc. (CCG), Murdoch University and the World Wildlife Fund – Australia (WWF). The primary aim of the program is to support the conservation of marine turtles along the Ningaloo coast, within the Ningaloo Marine Park and Ningaloo Coast World Heritage Area. This is accomplished through the collection of information to support an understanding of key aspects of turtle conservation including nesting abundance, distribution, disturbance and the effectiveness of management actions. This understanding helps inform management by DBCA including reducing disturbance to nesting turtles, management of introduced predators and managing coastal access and visitation to support effective conservation of sea turtles along the Ningaloo Coast.

Ningaloo Marine Park has regionally and globally significant nesting for ‘endangered’ loggerhead and ‘vulnerable’ green and hawksbill turtles, as listed under the *Environment Protection and Biodiversity Conservation Act 1999* (Commonwealth) and *Biodiversity Conservation Act 2016* (WA) (Commonwealth of Australia 2017). The loggerhead rookery in Cape Range National Park is regarded as the largest mainland rookery for the Western Australian loggerhead genetic stock (Rob et al 2019).

Volunteers are essential to the success of the program. Based in Exmouth, Western Australia, the NTP provides opportunities for volunteers from the local community, Western Australia, interstate and overseas to take part in turtle conservation. Participating volunteers gain training and practical experience with track monitoring, turtle rescues and other related activities.

Woodside Energy Ltd and its joint venture partner has been the main external sponsor of the program, contributing to the program’s operational costs since 2012. The funding has contributed to volunteer costs, website maintenance, community activities, monitoring equipment and education.

In 2008 the monitoring design for NTP was consolidated from 60 days after it was determined that long-term trends in turtle populations could be detected with an acceptable level of confidence when survey effort was reduced (Whiting, 2008). Monitoring in the NW Cape and Cape Range divisions now occurs daily over the 28 days of the peak nesting period. Three weekends of monitoring during each of the pre and post peak nesting periods also occurs at the NW Cape division.

Trend analyses of the NTP data have been undertaken to understand longer-term changes in patterns of nesting at Ningaloo. The most recent trend analysis was completed in 2024 and will be available online at www.ningalooturtles.org.au.

The goals and objectives listed below have been developed through a community-based steering committee (with DBCA and volunteer community representatives) and are updated as required.

NTP Overarching Goals

- Contribute to the understanding of turtle nesting and threats along the Ningaloo Coast to support informed evidence-based conservation and local on-ground management
- Continue to develop a rigorous, peer-reviewed and reliable scientific monitoring programme supported by trained volunteers
- Maintain the only long-term monitoring of green turtles for the Western Australian green turtle genetic stock
- Provide key information to inform the Australian Marine Turtle Recovery Plan
- Build a culture of awareness and stewardship for marine turtle conservation.

NTP Primary Objectives

- Work with Traditional Owners to enhance the promotion of cultural connections to turtles and share knowledge to build a broader understanding of turtle conservation
- Estimate the abundance, distribution and species of turtle nests on key sections of beach over specified time intervals
- Identify the relative significance of specific nesting beaches for each species
- Identify temporal changes in nesting season and spatial changes in nesting distribution for each species
- Identify long-term trends in nesting and populations
- Quantify predation and disturbance as part of NTP monitoring and through supporting external research
- Record observations of tagged turtles, strandings and mortalities
- Rescue stranded turtles when appropriate
- Support external research relevant to the goals of the program
- Encourage active community and wider involvement through education and the recruitment of volunteers to build interest, skills and knowledge to assist with turtle conservation.

2. METHODS

Activities of turtles are recorded by observing fresh tracks from the previous night to determine species and identify suspected nests¹. Volunteers use standard procedures to determine if the activity has resulted in a successful nest or a false crawl. Nest positions are recorded using GPS. Signs of predation at nests are also recorded, along with sightings of tagged turtles, the presence of introduced animals, mortalities of turtles and rescues of stranded turtles.

For more detailed information on the current NTP monitoring methodologies please see Section 5.0 of the NTP Annual Report 2012-13 (Coote et al 2013), or the NTP Turtle Monitoring Field Guide Edition 7 (McKinna et al 2015), both of which are available at www.ningalooturtles.org.au.

In the 2018-19 season, the NTP changed from recording data on paper data sheets to collecting data using the ODK Collect app, installed on Lenovo tablets (<https://getodk.org/>). This change was part of a state-wide initiative across DBCA to standardise and coordinate the collection of data among turtle monitoring programs throughout WA. The app enables the location to be automatically saved when recording a turtle activity and has the benefit of eliminating human error in transcribing GPS coordinates from a GPS to a data sheet. The data from the app are uploaded via WIFI to a centralised database in Perth. This was the sixth NTP season using tablets. To support the reliable collection of data and use of the ODK app, staff and volunteers were provided with either new or refresher training in the use of the tablets prior to the season commencing.

2.1 Monitoring zones & dates

Important nesting beaches were identified through past aerial and ground surveys during the development of the NTP. For the purpose of the program, the Ningaloo Region is divided into four divisions. A fifth division was added in 2018-19 (Gnarraloo), but not monitored in 2023-24. Divisions are further divided into sections and subsections. Subsections are on average 2-3kms long so that they are practical to survey on foot (with the exception of Janes Bay). The start and end points of subsections were determined by either natural barriers that separate beaches or positions of car parks to facilitate access by volunteers. Volunteers identify subsections with a GPS location and NTP totems located at the start and finish points.

¹ The term 'nest' is used in this report to indicate an activity that appeared to be a nest based on a consistent set of criteria. Nests however cannot be confirmed unless egg-laying is witnessed. Uncertainty can be expected as turtles can sometimes create the appearance of nests without depositing any eggs into them (Whiting pers. comm. 2012) or may deposit eggs without creating the appearance of a nest. Any uncertainty, however, was not considered to be a significant source of bias nor would likely affect the confidence in the interpretation of results.

North West Cape division

The NW Cape division includes the Lighthouse Bay, Hunters, Graveyards and Tantabiddi sections, which are further divided into 11 subsections (Appendix 1). In 2023-24, the NW Cape division was monitored daily during the intensive peak period from the 15 December 2023 to 11 January 2024 (with the exception of 1 January). All 11 subsections were covered on each day in this period. Before the peak period, monitoring occurred on the weekends of the 4 and 5, 18 and 19 November and 2 and 3 December 2023 and after the peak period on the weekends of the 27 and 28 January, 10 and 11 February, 3 and 4 March 2024. Some subsections were not monitored on these weekends depending on the availability of volunteers. The final monitoring weekend was scheduled for 24 & 25 February but was postponed until the long weekend in March due to a cyclone warning.

Cape Range division

The Cape Range division includes the Bungelup section (divided into three subsections) and the South Mandu section (Appendix 2). South Mandu was not monitored in 2023-24. Each subsection of the Bungelup section was monitored for 27 days during the intensive peak period from the 15 December 2023 to 11 January 2024 (with the exception of 1 Jan).

Bundera/Ningaloo division

The Bundera/Ningaloo division includes six sections each divided into subsections. DBCA staff opportunistically monitor these subsections during monthly baiting operations for management of introduced predators including foxes and cats, but for the purpose of this report the data have not been included.

Coral Bay division

The Coral Bay division includes three sections: Lagoon, Bateman Bay and Turtle Beach, each divided into one or more subsections (Appendix 3). This division had not been routinely monitored by NTP since the 2008-09 season. In 2023-24, Bateman South to Bateman North (in the Bateman Bay section) and Lagoon South to Lagoon North (in the Lagoon section) were monitored for 7 days over the peak of the season, 5 – 11 January 2024. DBCA staff may also opportunistically monitor these subsections during monthly baiting operations for management of introduced predators including foxes and cats, but for the purpose of this report the data have not been included.

Gnarraloo division

The Ningaloo Turtle Program was expanded in 2018-19 to include a minor loggerhead rookery in Gnarraloo Bay (Gnarraloo Bay section)². This was previously monitored by the Gnarraloo Turtle Conservation Program from 2008-09 to 2017-18 (Hattingh *et al.* 2018). The NTP commenced monitoring in Gnarraloo Bay in 2018-19 using a sampling regime recommended

² Gnarraloo Bay follows the traditional Baiyungu spelling of Ngarralu (double 'r'). Gnarraloo Station and the Gnarraloo Turtle Conservation Program use one 'r'.

by Whiting (2018) based on assessment of available data from previous surveys at Gnarraloo Bay. Turtle nesting was not monitored in Gnarraloo Bay in 2023-24.

For specific survey dates for each subsection, including dates missed due to lack of volunteers or untrustworthy data, see Appendix 4.

3. RESULTS

3.1 Nesting Activity 2023/24

3.1.1 North West Cape division

There were 5827 nests and 30874 false crawls recorded in the NW Cape division during the full 2023-24 season (Table 1). Green turtles were the most active species (nests and false crawls) in the NW Cape division with 99.27% of total turtle activity, followed by hawksbills (0.37%) and loggerheads (0.31%). Unidentified species accounted for 0.05% of all nesting activities. There were 2 flatback turtle activities recorded.

Table 1: Total activities (nests and false crawls) recorded for each species within the NW Cape division, NTP 2023-24 full season.

Activity	Turtle Species					Total
	Green	Hawksbill	Loggerhead	Flatback	Unidentified	
New nests	5734	47	41	0	5	5827
False crawls	30699	89	72	2	12	30874
Total activity	36433 (99.27%)	136 (0.37%)	113 (0.31%)	2 (0.01%)	17 (0.05%)	36701 (100%)

Nesting success is defined as the number of nests laid as a percentage of total turtle activities. On the NW Cape in 2023-24 (full season), green turtles had a nesting success of 15.7%, loggerheads 36.3% and hawksbills 34.6%. For a comparison with long-term averages, see section 3.2.1.

Green turtles were the most abundant species throughout all 11 subsections on the NW Cape (Figure 1). The most loggerhead nests were in the Hunters to Mauritius subsection and the most hawksbill nests were in the Surf Beach to Hunters subsection.

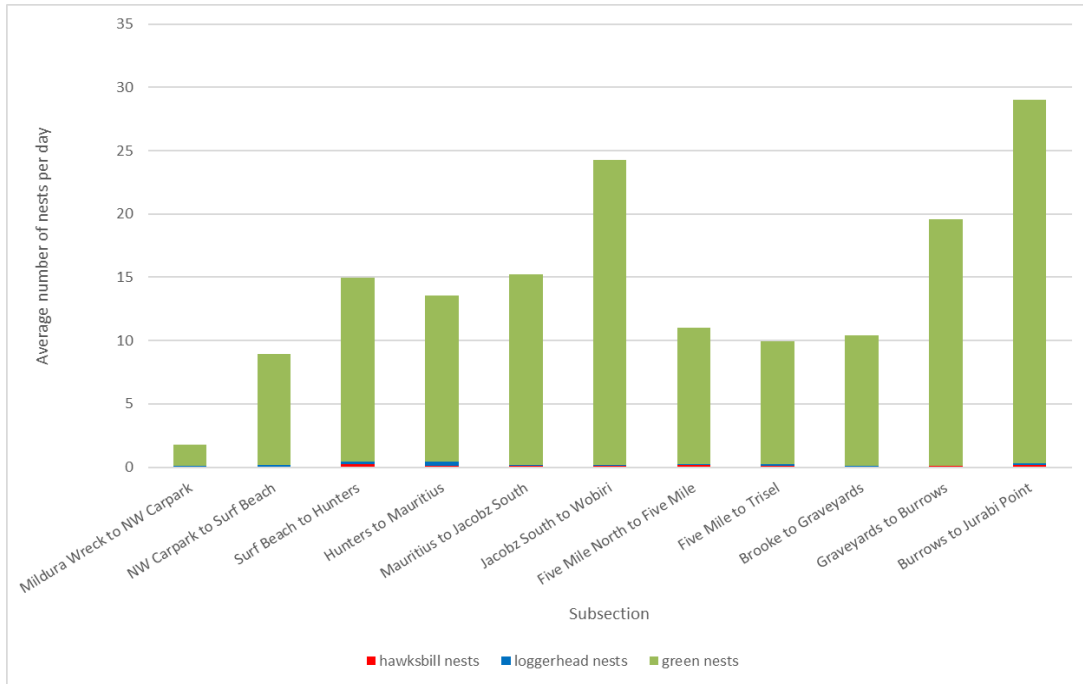


Figure 1: Average number of nests per day for each species for each subsection within the NW Cape division, NTP 2023-24 full season.

Average nests per day (as a measure of total nests) should be considered along with density of nests (nests per day per kilometre) to account for both survey effort and variations in subsection length, noting subsections varied in length from 800m to 3.5km (Appendix 1).

The greatest number of green turtle nests were in the Burrows to Jurabi Point subsection (average of 28.7 nests per day) and the densest nesting was also in this subsection (15.9 nests per kilometre per day) (Figure 2). Both the least amount (1.67 nests per day) and the lowest density (1.11 nests per kilometre per day) of green turtle nests was in the northern most subsection, Mildura Wreck to NW Carpark.

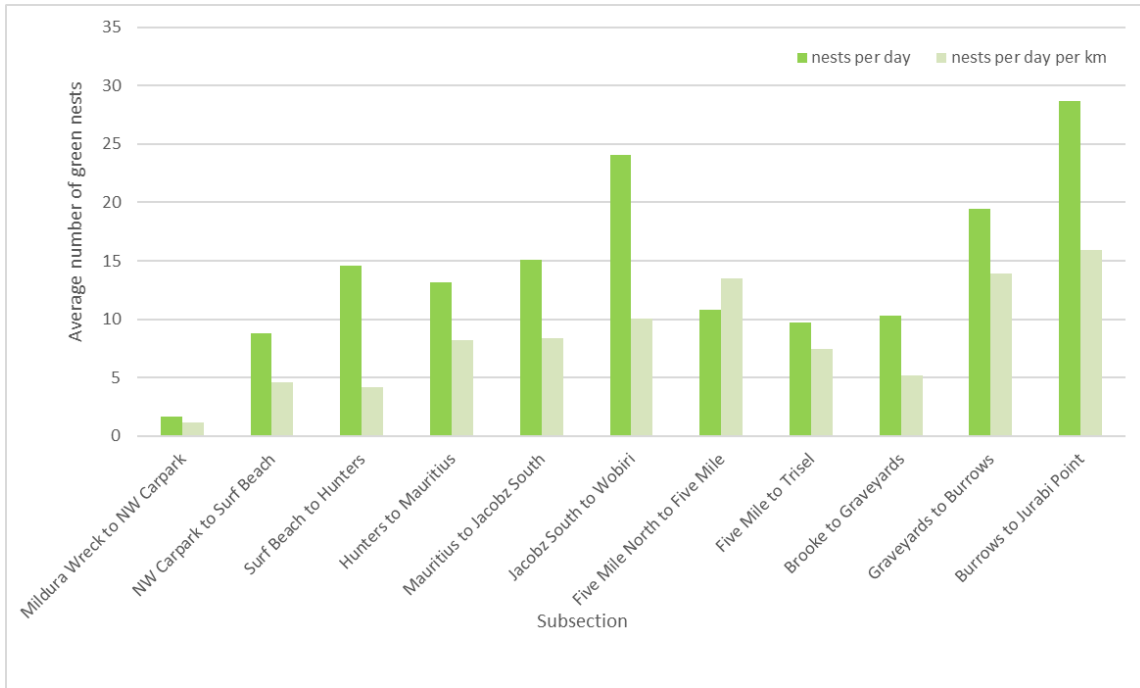


Figure 2: Average number of green turtle nests per day, and density of nests (nests per day per km) for each subsection within the NW Cape division, NTP 2023-24 full season.

Loggerhead nests were more abundant in the northern subsections of NW Cape, with the most at Hunters to Mauritius, an average of 0.3 nests per day (Figure 3). The densest loggerhead nesting was also at Hunters to Mauritius, an average of 0.19 nests per kilometre per day.

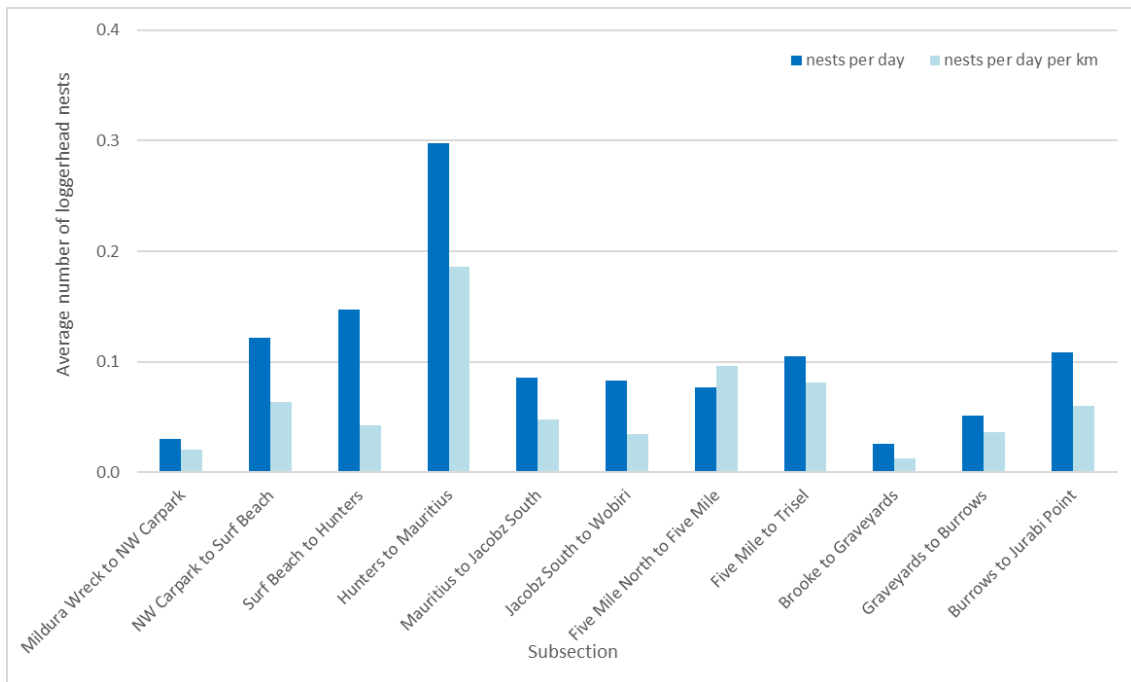


Figure 3: Average number of loggerhead turtle nests per day, and density of nests (nests per day per km) for each subsection within the NW Cape division, NTP 2023-24 full season.

The greatest number of hawksbill nests was in the Surf Beach to Hunters subsection, an average of 0.26 nests per day (Figure 4). The densest nesting was at Five Mile North to Five Mile, an average of 0.19 nests per kilometre per day.

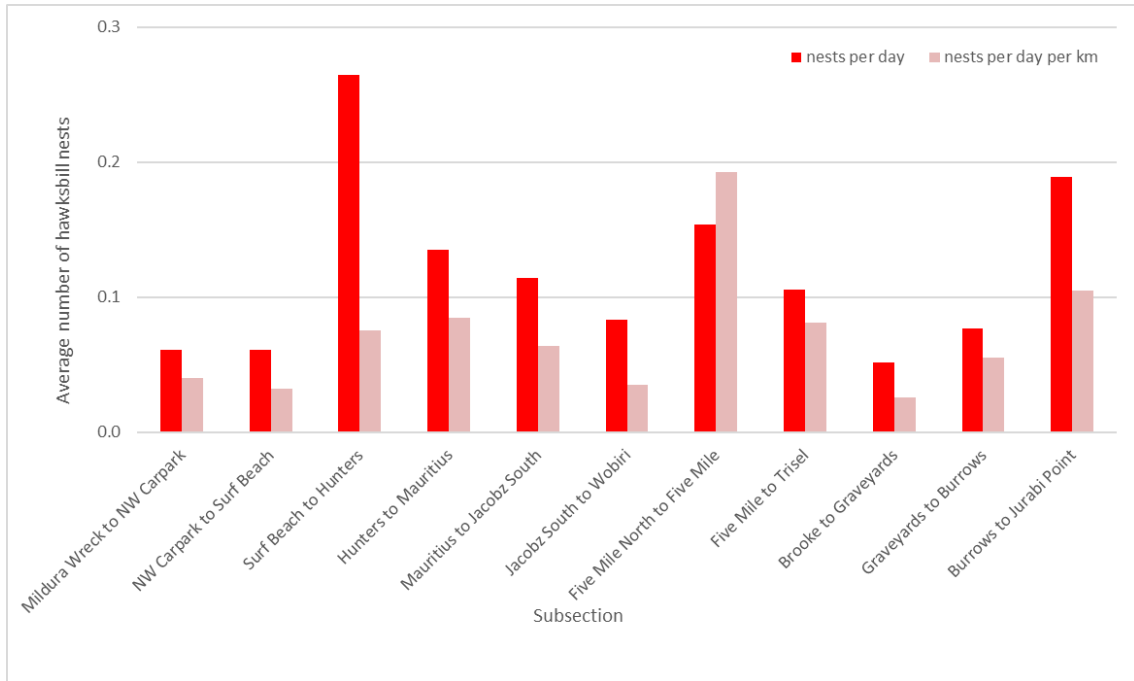


Figure 4: Average number of hawksbill turtle nests per day, and density of nests (nests per day per km) for each subsection within the NW Cape division, NTP 2023-24 full season.

For individual nest locations see maps in Appendix 5 - Appendix 8.

The numbers of nests recorded per day for each species varied during the season in the NW Cape division (Figure 5 - green turtles, Figure 6 - loggerhead turtles, Figure 7 - hawksbill turtles). The peak timing for green turtles appeared to be during the period of mid - late December. The peak period for loggerheads was late December to mid-January. The period of peak nesting for hawksbills appears to be slightly earlier in the season, early to mid-December.

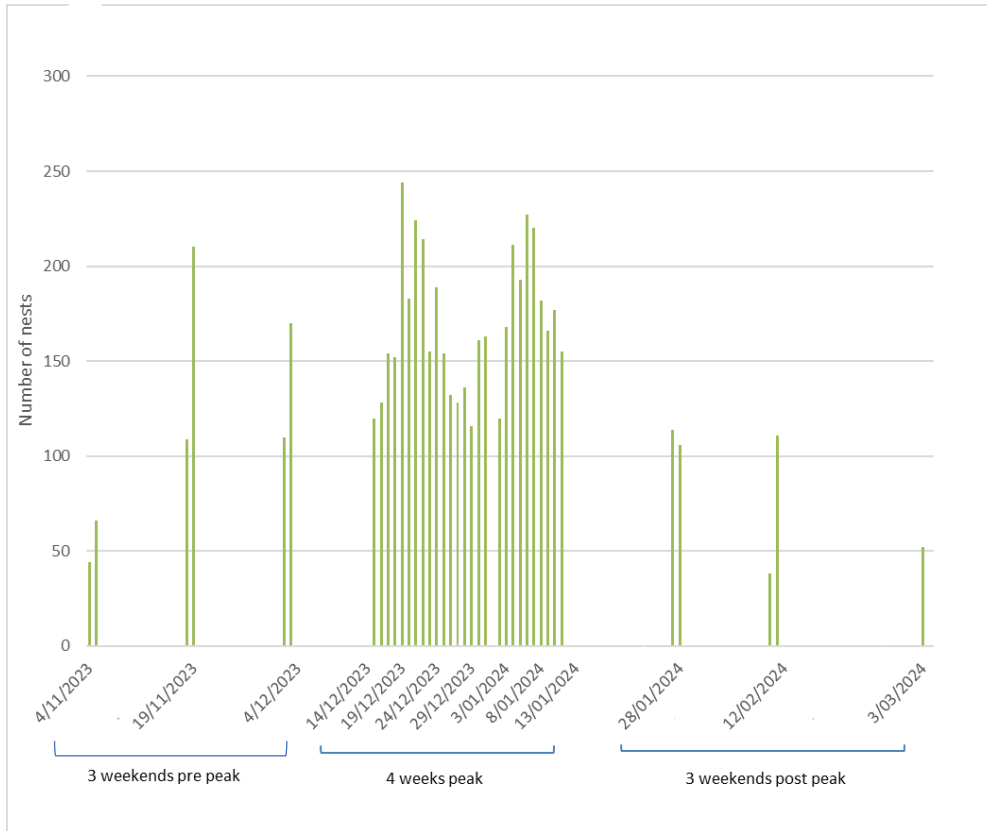


Figure 5: Number of green turtle nests recorded in the NW Cape division per day in the 2023-24 season. Note, no monitoring occurred on 1 January.

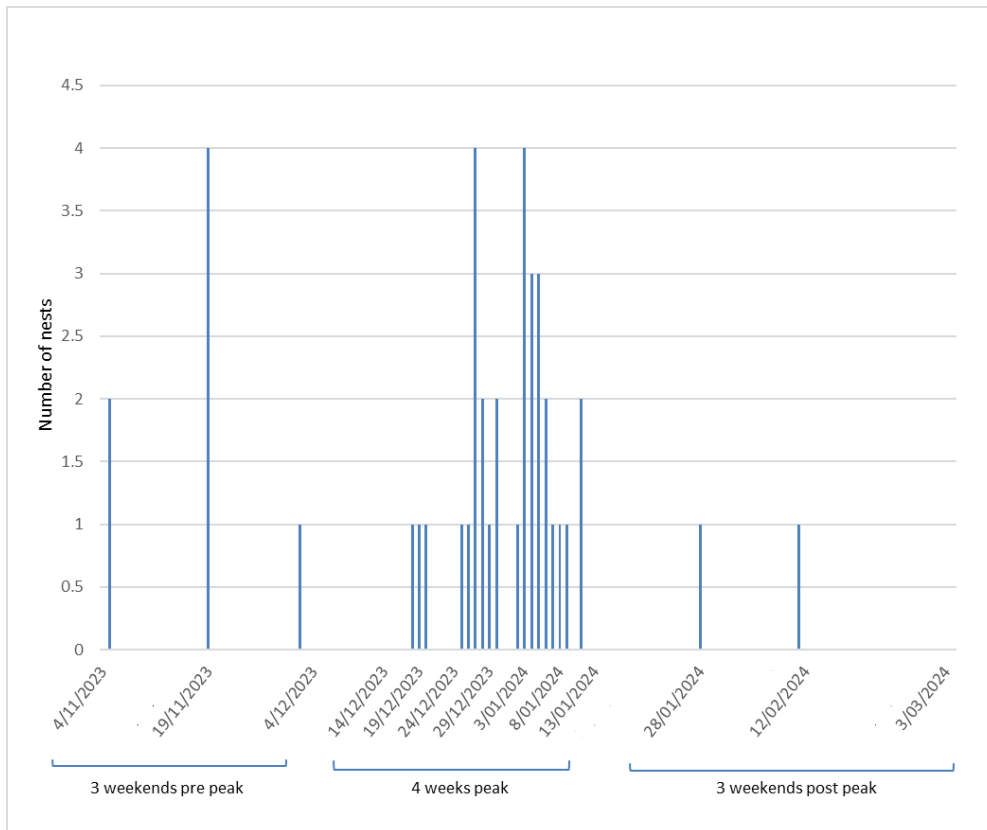


Figure 6: Number of loggerhead turtle nests recorded in the NW Cape division per day in the 2023-24 season. Note, no monitoring occurred on 1 January.

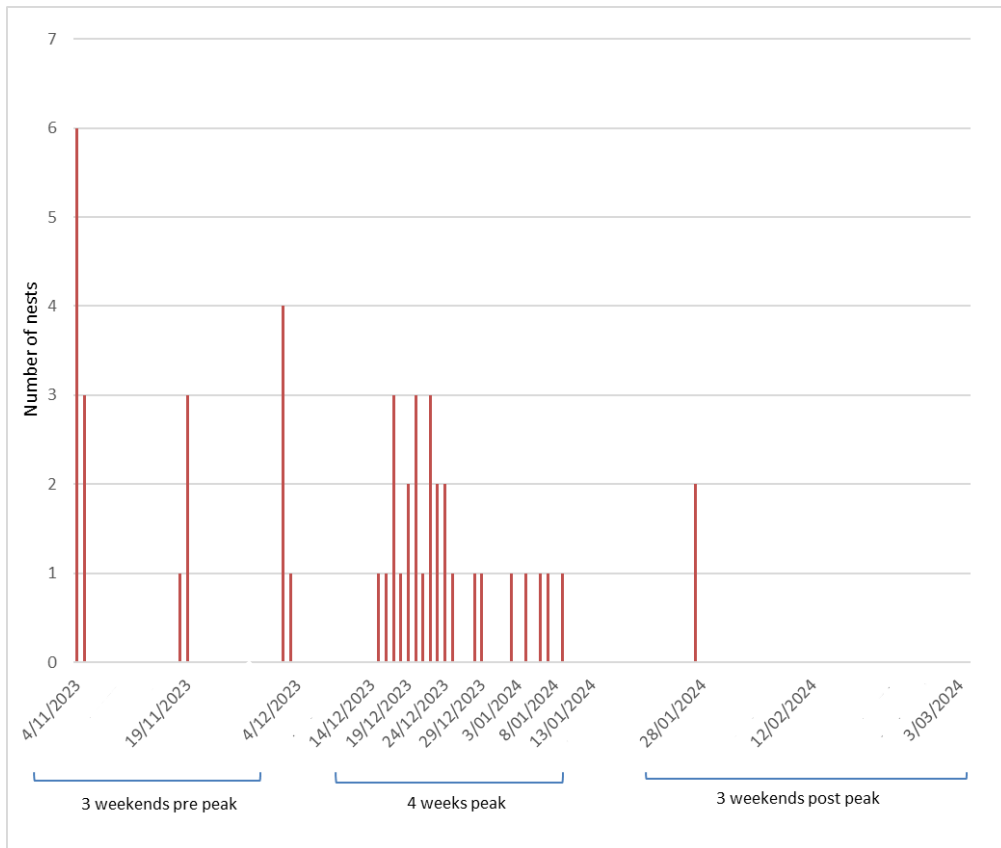


Figure 7: Number of hawksbill turtle nests recorded in the NW Cape division per day in the 2023-24 season. Note, no monitoring occurred on 1 January.

3.1.2 Cape Range division (Bungelup section)

In the Bungelup section, 216 suspected nests and 866 false crawls were recorded during the peak 2023-2024 NTP season (Table 2). Loggerhead turtle activities were the most common species (51.8%), followed by green (39.6%) and hawksbill (8.1%). 0.6% of activities could not be assigned to a species.

Table 2: Total activities (nests and false crawls) recorded for each species within the Bungelup section of Cape Range division, NTP 2023-24 peak season.

Activity	Turtle Species				Total
	Green	Hawksbill	Loggerhead	Unidentified	
New nests	75	22	118	1	216
False crawls	353	66	442	5	866
Total activity	428 (39.6%)	88 (8.1%)	560 (51.8%)	6 (0.6%)	1082 (100%)

Nesting success (the number of nests laid as a percentage of total turtle activities) in the Bungelup section for loggerhead turtles was 21.1%, green turtles 17.5% and hawksbill turtles 25%. For comparison to long term averages, see section 3.2.2.

Nests from loggerhead turtles were the most abundant throughout all subsections within the Bungelup section (Figure 8), highlighting this area as primarily a loggerhead rookery.

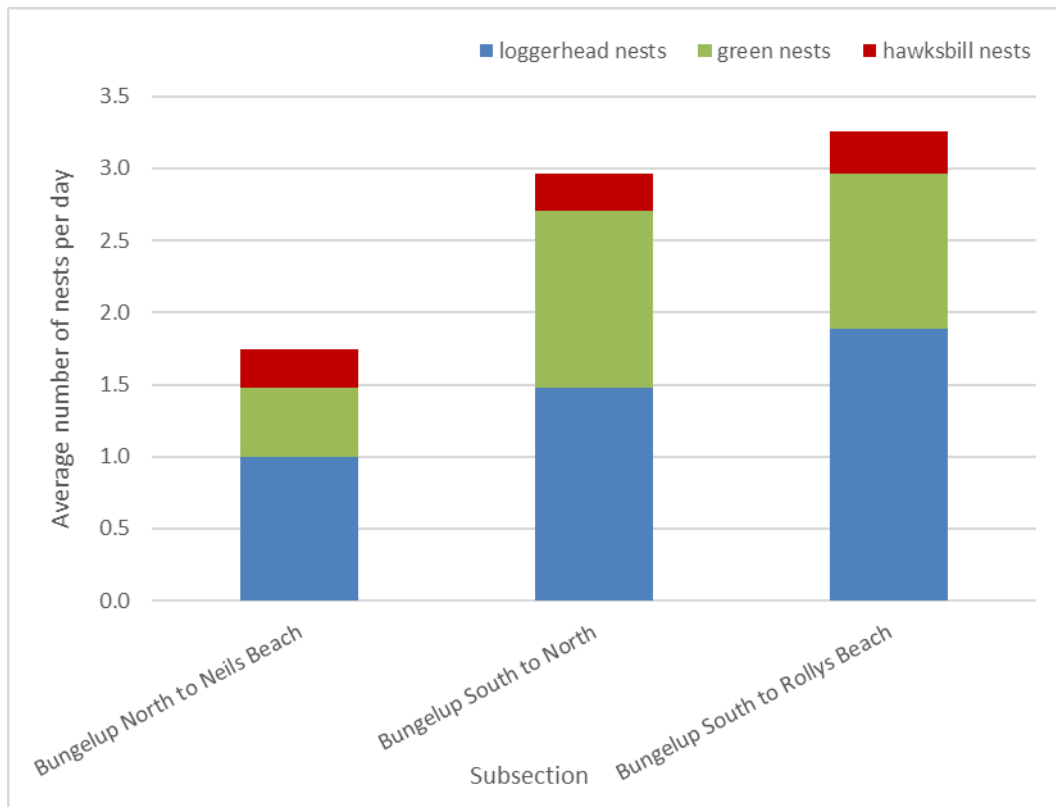


Figure 8: Average numbers of nests per day for each species for each subsection within the Cape Range division, NTP 2023-24 peak season.

Average nests per day, (as a measure of total nests) should be considered along with density of nests (nests per day per kilometre) to account for both survey effort and variations in subsection length, noting subsections varied in length from 1.05km to 2.55km (Appendix 2). Given the low number of hawksbill nests, only green and loggerhead nests are considered from here.

The average number of loggerhead turtle nests per day were similar across the three subsections of the Bungelup section (Figure 9). The southernmost subsection, Bungelup South to Rollys Beach had the most number of nests per day on average (1.9). Bungelup South to North had the highest density (1.4 nests per km per day).

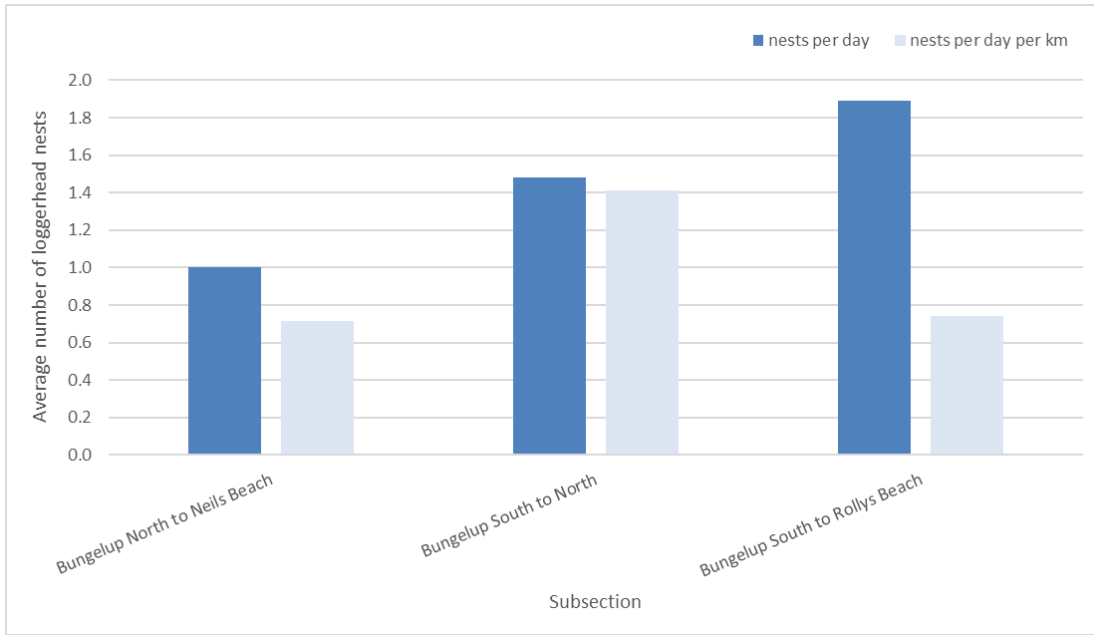


Figure 9: Average number of loggerhead turtle nests per day, and density of nests (estimated by nests per day per km) for each subsection within the Cape Range division, NTP 2023-24 peak season.

The average number of green turtle nests per day varied across the three subsections (Figure 10). Bungelup South to North had the most number of nests per day on average (1.2), and the densest nesting (1.16 nests per km per day). The least amount and lowest density of green turtle nesting was in the northernmost subsection, Bungelup North to Neils Beach.

For individual nest locations see maps in Appendix 9.

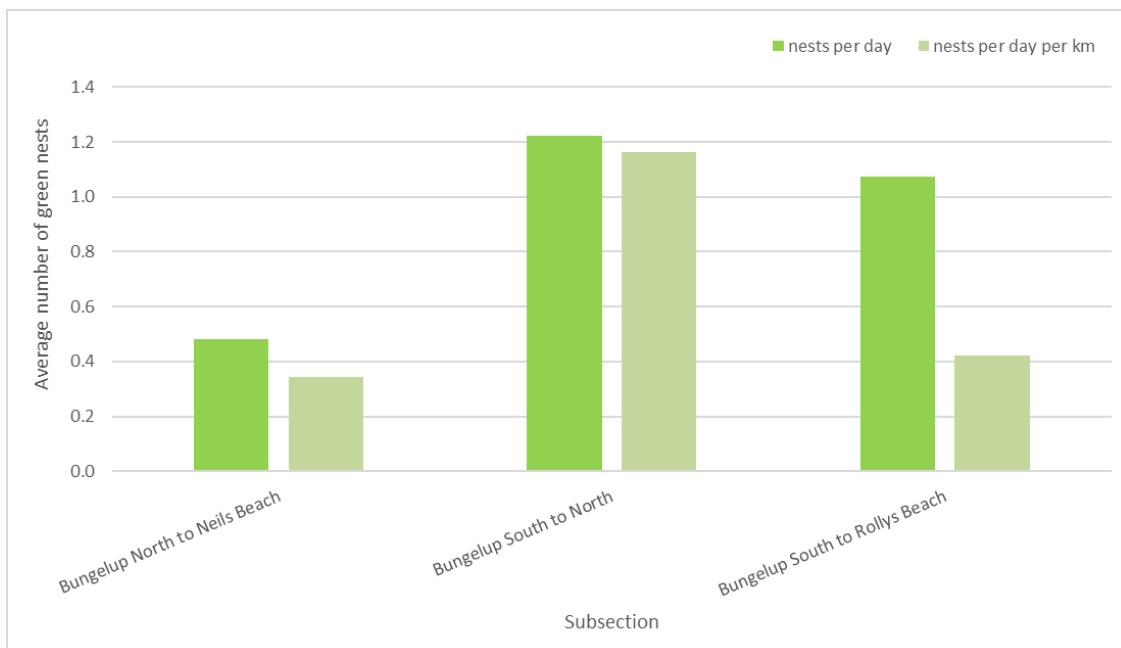


Figure 10: Average number of green turtle nests per day, and density of nests (estimated by nests per day per km) for each subsection within the Cape Range division, NTP 2023-24 full season.

Numbers of loggerhead nests each day varied through the season in the Bungelup section (Figure 11). There was a peak in nesting in mid-December, with a smaller peak around the new year, which correlates with the inter-nesting interval of loggerhead turtles being approximately 14 days (Limpus, 2009).

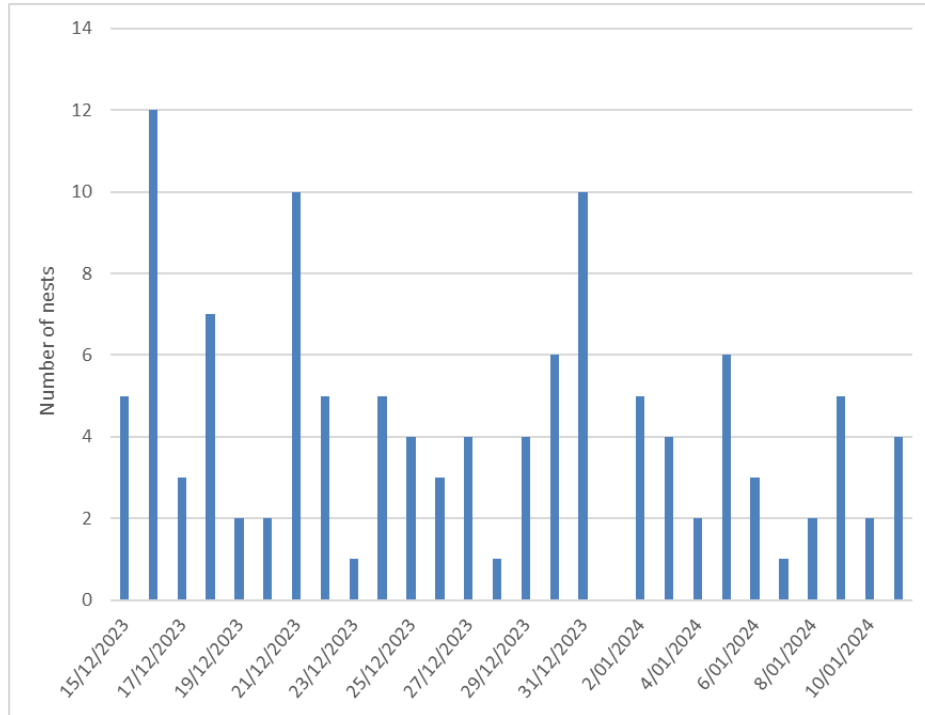


Figure 11: Number of loggerhead turtle nests recorded in the Bungelup section (Cape Range division) each day in the 2023-24 season. Note, no monitoring occurred on 1 January 2024.

3.1.3 Comparison of NW Cape and Bungelup rookeries

The beaches of the NW Cape division are primarily green turtle nesting beaches, as shown in Figure 1, whereas the Bungelup section in the Cape Range division is primarily a loggerhead rookery (Figure 8). To understand the relative importance of each subsection within both rookeries, for each species, the average density of nests per kilometre per day was compared.

The highest density of green turtle nests was recorded at the Burrows to Jurabi Point subsection in the NW Cape division, with an average of 15.96 green turtle nests per kilometre per day (Figure 12) and the lowest density was recorded in the Bungelup subsections. The highest density of hawksbill nesting (Figure 13) was recorded at the middle subsection at Bungelup (Bungelup south to north), with an average of 0.25 hawksbill turtle nests per kilometre per day. The lowest density was at the Brooke to Graveyards subsection. The highest density of loggerhead nests was recorded in the three Bungelup subsections (Figure 14), with 1.41 nests per kilometre per day at Bungelup south to north. The NW Cape subsections recorded comparatively low densities at all subsections. Nests from all three species were recorded in all 14 subsections.

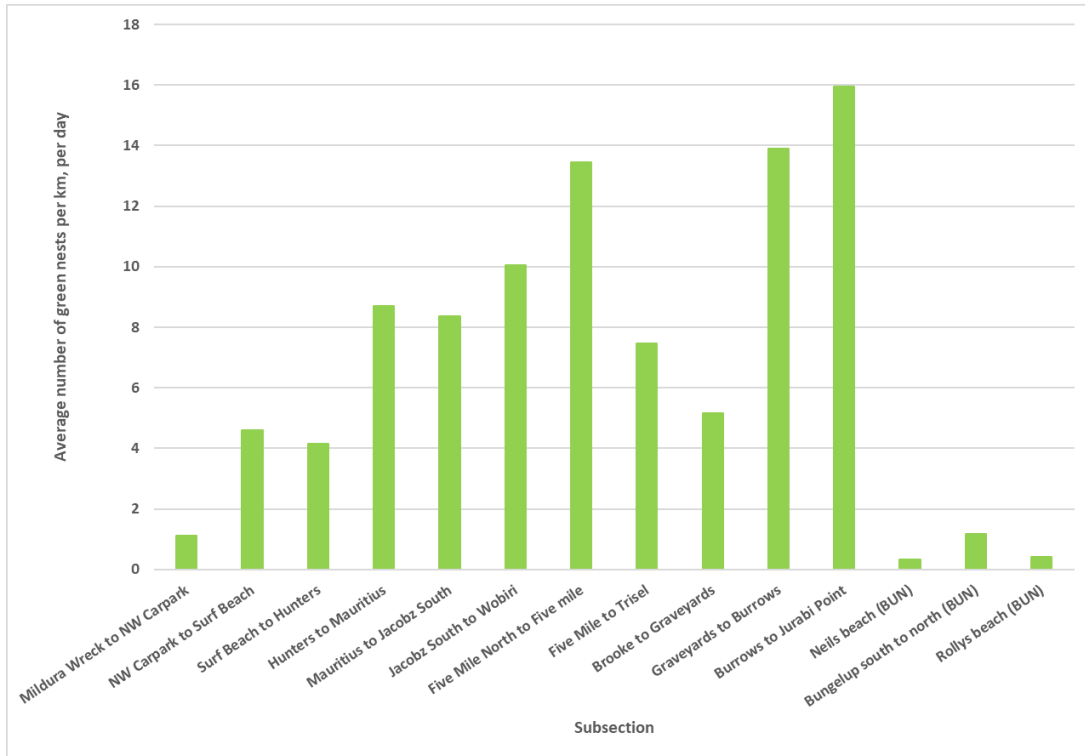


Figure 12: Green turtle nesting density (average number of nests per km per day) for each subsection within both the NW Cape and Cape Range (Bungelup section) divisions, NTP 2023-24 full season. Subsections within the Bungelup section are indicated with (BUN).

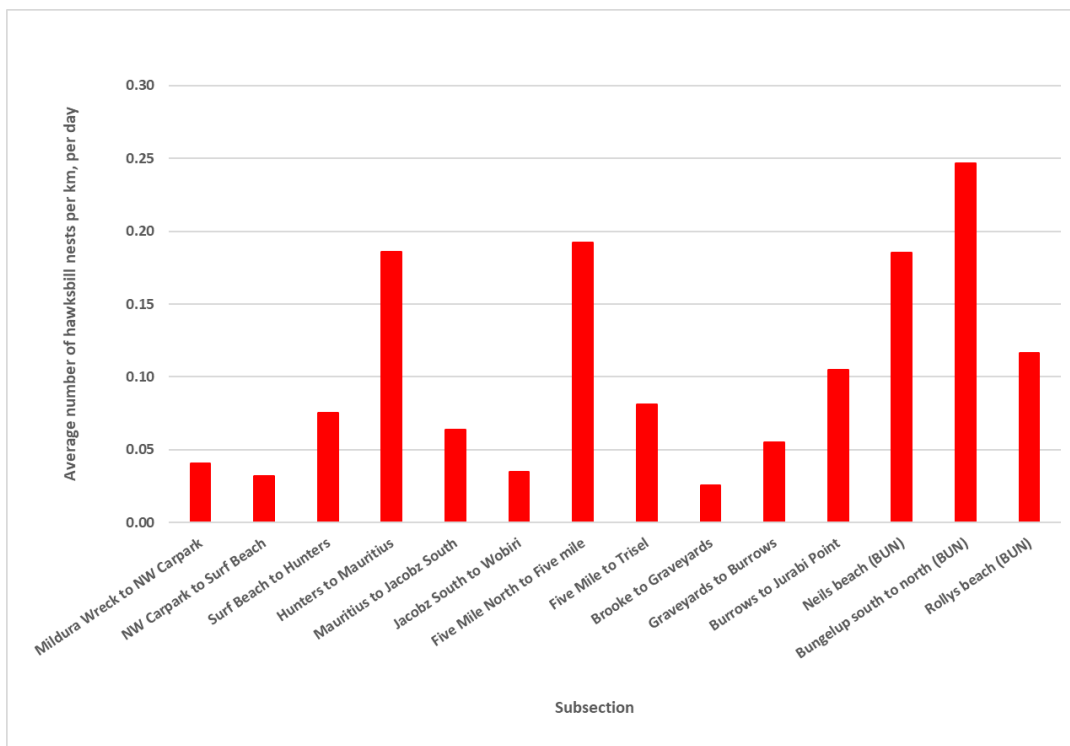


Figure 13: Hawksbill turtle nesting density (average number of nests per km per day) for each subsection within both the NW Cape and Cape Range (Bungelup section) divisions, NTP 2023-24 full season. Subsections within the Bungelup section are indicated with (BUN).

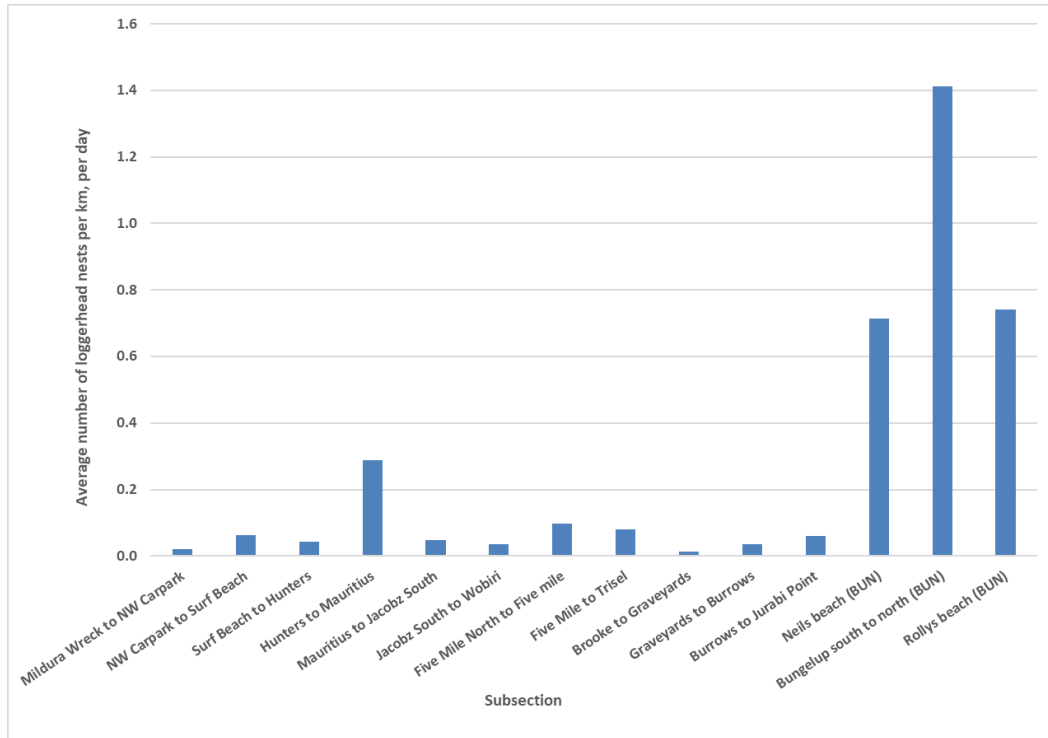


Figure 14: Loggerhead turtle nesting density (average number of nests per km per day) for each subsection within both the NW Cape and Cape Range (Bungelup section) divisions, NTP 2023-24 full season. Subsections within the Bungelup section are indicated with (BUN).

3.1.4 Coral Bay division

6 nests and 17 false crawls were recorded in the Lagoon and Bateman Bay sections in the 7 days of monitoring in 2023-24 (Table 3). 69.6% of the activity observed was from hawksbill turtles, and 30.4% was from loggerhead turtles.

Table 3: Total number of activities (nests and false crawls) recorded for each species within the Coral Bay division, 2023-24.

Coral Bay Division	Turtle Species				Total
	Green	Hawksbill	Loggerhead	Unidentified	
New nests	0	3	3	0	6
False crawls	0	13	4	0	17
Total activity	0	16	7	0	23

All of the activities were recorded in the southernmost subsection (Bateman Bay South to Bateman Bay North), with no tracks reported in the Lagoon South to Lagoon North subsection (Appendix 10).

3.2 Long-term patterns of nesting

The NTP has recorded 75,185 suspected nests and 205,908 false crawls since commencement of the program in 2002 (full season data and all subsections, Appendix 4). Green turtles have consistently been the most abundant species in the (NW) Cape division with 95.9% of recorded turtle activities. Loggerhead turtles are the most abundant species in the Cape Range division (Bungelup) with 79.9% of activities.

Turtle activity for each season and subsection has been standardised using survey effort to compare activity among seasons. Survey effort is defined as the number of times each subsection was monitored. Not all subsections were monitored on the same days or for the same total number of days within or among seasons (Appendix 4). Long-term patterns for each division are compared separately due to NW Cape division being primarily a green turtle rookery, and Cape Range division a loggerhead rookery.

3.2.1 North West Cape division

Green turtles

The number of green turtle nests has varied largely among years (range of 1.06 to 18.13 nests per subsection per day) with an average of 6.13. There have been three clear peaks (2011-12, 2020-21 and 2023-24) in activity since the beginning of NTP where activity has been approximately 2.5 to 11 times greater than other seasons (Figure 15). The average number of green turtle nests in the 2023-24 peak season was the 2nd highest out of 22 seasons, with an average of 15.39 nests per subsection per day.

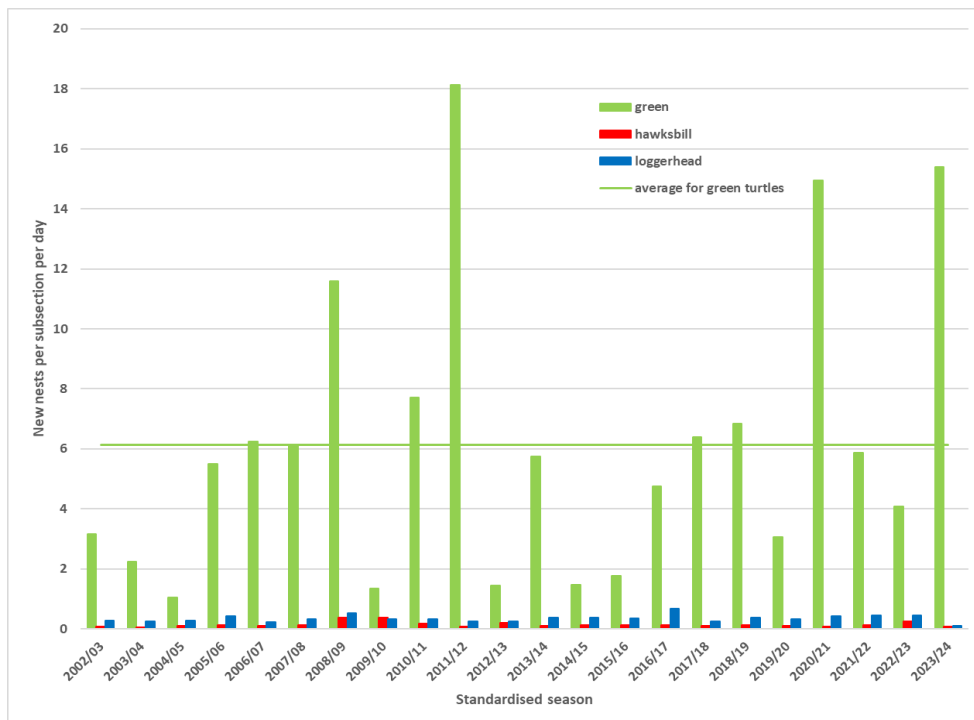


Figure 15: Average number of new nests (each species, per subsection per day) for each season standardised by survey effort during the intensive peak monitoring period at NW Cape division, 2002-03 to 2023-24. See Figure 16 for more detailed information on hawksbill and loggerhead nests.

Loggerhead turtles

The standardised level of loggerhead turtle nesting along the NW Cape over the last 22 seasons has ranged from 0.11 to 0.68 nests per subsection per day (average 0.35) during the peak monitoring period. The 2023-24 season was the lowest (0.11 nests per subsection per day) since the program began (Figure 16).

Hawksbill turtles

Hawksbill turtle nesting remains lower than green and loggerhead turtle nesting on the NW Cape, ranging from 0.06 to 0.38 nests per subsection per day since 2002-03 (Figure 16). The standardised level of hawksbill turtle nesting during the 2023-24 peak season (0.09 nests per subsection per day) was below the long-term average (0.15), ranking the season equal third lowest since the NTP began.

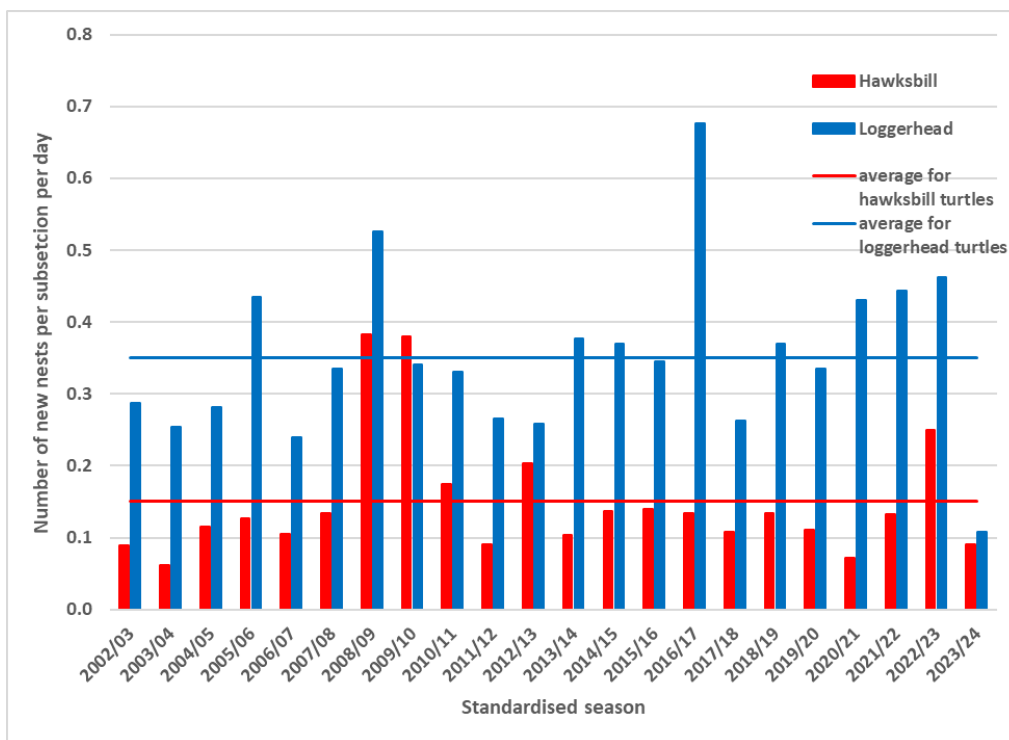


Figure 16: Average number of new nests (per subsection per day) for hawksbill and loggerhead turtles for each season standardised by survey effort during the intensive peak monitoring period at NW Cape division, 2002-03 to 2023-24 (from Figure 14).

For all three species combined, average nesting activity during the intensive peak monitoring period this season per subsection per day (which includes both nests and false crawls) was the highest since NTP began in 2002 (Figure 17). On average, 109.1 turtle activities were recorded per subsection per day, well above the long-term average of 27.9 nesting activities per subsection per day.

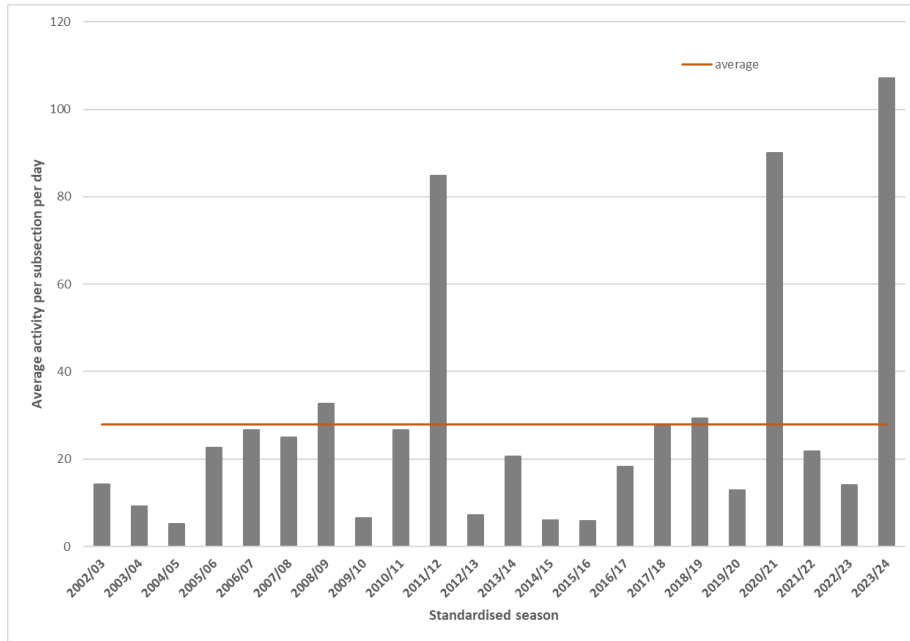


Figure 17: Average number of new activities (nests and false crawls) per subsection per day for all species combined for each season standardised by survey effort during the intensive peak monitoring period at NW Cape division, 2002-03 to 2023-24.

Nesting success

Patterns of nesting success of the three species have fluctuated in synchrony among seasons (Whiting 2016), as shown in long-term patterns of standardised seasons below (Figure 18). In general, when nesting success peaked for green turtles, it also peaked for loggerhead and hawksbill turtles. When nesting success declined for green turtles, it was also lower for loggerhead and hawksbill turtles. In the 2023-24 intensive peak season at NW Cape, nesting success decreased substantially from the previous season for all three species. Nesting success was well below the long-term average for all three species.

Nesting success for green turtles has generally been lower than for loggerhead and hawksbill turtles. Nesting success of 14.4% in the 2023-24 standardised season was below average (26.5%), and the lowest since NTP began. It has ranged from 14.4% (current season) to 37.2% since 2002-03.

Nesting success for loggerhead turtles in the 2023-24 standardised season was the third lowest since the NTP began (34.8%). The long-term average is 41.4% with a range of 27.5% to 56.2% since 2002-03.

Hawksbill turtles have generally had the highest nesting success of the three species. Nesting success of 29.7% in the 2023-24 season was well below the average (46.7%) and the lowest recorded since NTP began. Nesting success has ranged from 29.7% (current season) to 61.2% since 2002-03.

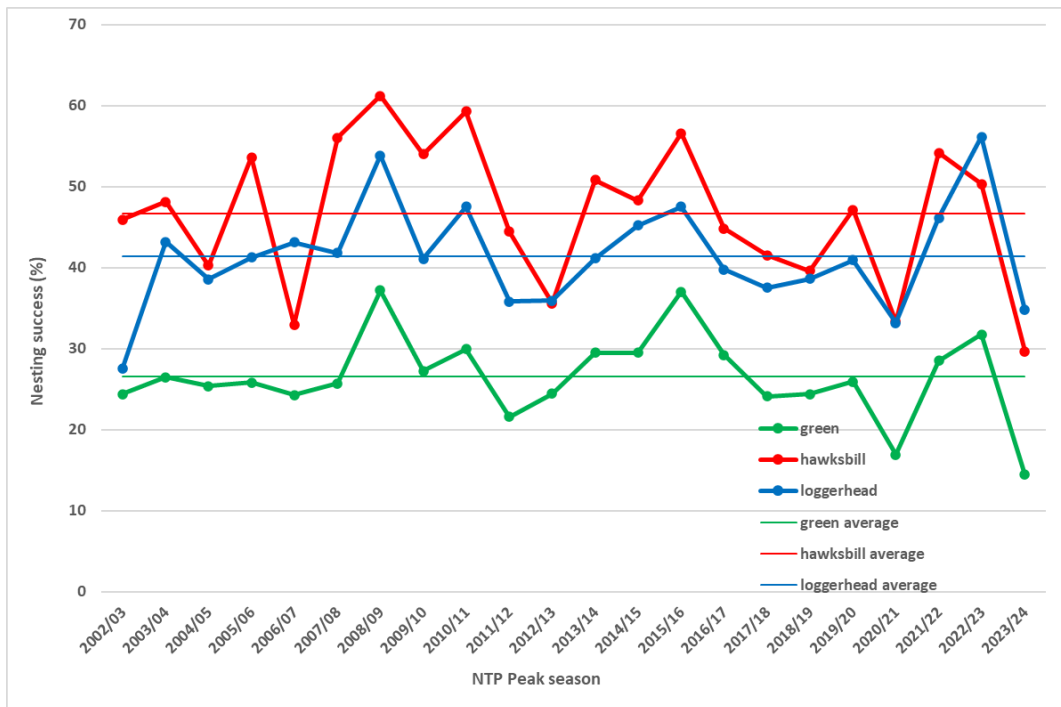


Figure 18: Nesting success (and long-term average) at NW Cape for all three species during the peak period of NTP seasons 2002-03 to 2023-24.

3.2.2 Cape Range division

From 2003-04 to 2023-24 (21 seasons) during the intensive peak monitoring period, NTP has recorded 6497 nests and 10478 false crawls at Bungelup section (total activity 16,975). Levels of activity have been fairly consistent (and less variable compared to the NW Cape division (Figure 19)).

Loggerhead turtles

The standardised level of loggerhead turtle nesting at Bungelup in the 2023-24 season was the lowest recorded (1.46 nests per subsection per day). The long-term average is 3.68 nests per subsection per day, with a range of 1.46 (current season) to 6.44 over the 21 seasons (Figure 19).

Green turtles

The number of green turtle nests at Bungelup section has ranged from zero to 1.18 nests per subsection per day, with an average of 0.31 (Figure 19). Green turtle nests in 2023-24 were the second highest since NTP began, 0.93 nests per subsection per day, which correlates with the above average green turtle activity recorded in the NW Cape division.

Hawksbill turtles

Hawksbill turtle nesting at Bungelup section ranged from 0.03 to 1.53 nests per subsection per day since 2003-04 (Figure 19). The standardised level of hawksbill turtle nesting during the 2023-24 season (0.27 nests per subsection per day) was below the long-term average (0.39).

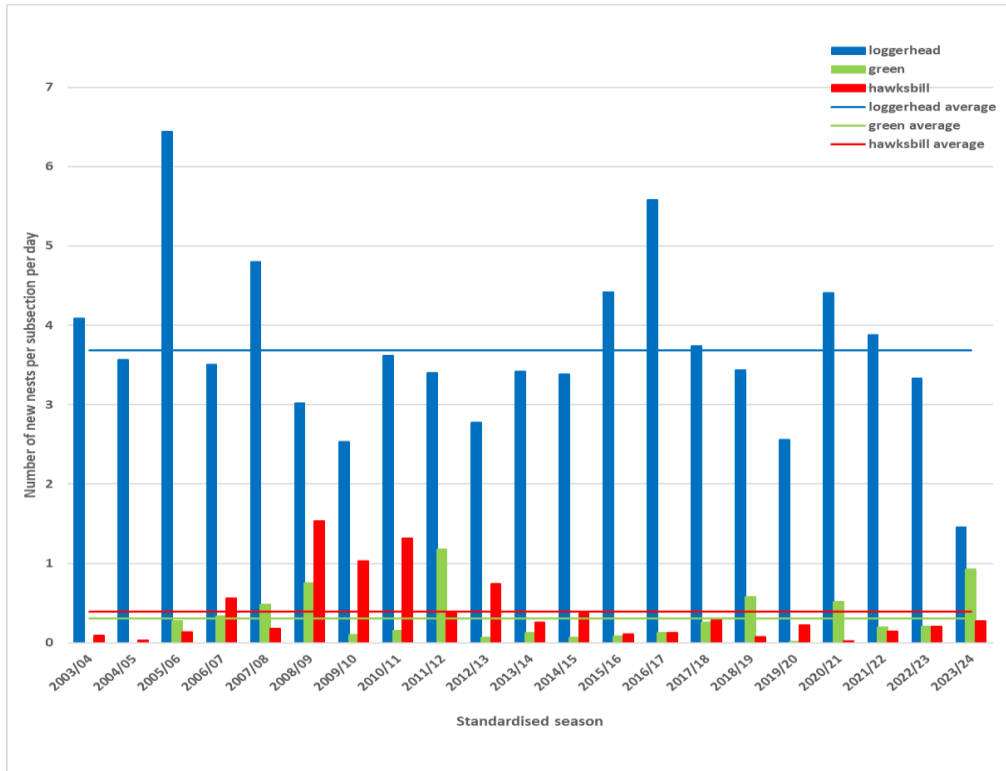


Figure 19: Average number of new nests (each species, per subsection per day) for each season standardised by survey effort during the intensive peak monitoring period at Bungelup section, 2003-04 to 2023-24.

Nesting success

Patterns of nesting success of the three species at the Bungelup section have not fluctuated in synchrony among seasons like they do in the NW Cape division. Long-term patterns of standardised seasons (Figure 20) show that when nesting success peaked for one species, it didn't generally correlate with a peak for the other species. However, in the 2023-24 season, nesting success for all three species declined from the previous season. For all three species, nesting success was well below the long-term average.

During the 2023-24 season, nesting success for loggerhead turtles was 21.1% and the lowest since 2003-04 (long-term average of 41.1%). Nesting success for green turtles and hawksbill turtles should be interpreted with caution given the relatively small number of activities for these species in the Bungelup section. Green turtles had a nesting success of 17.5% (long-term average 30.3%). Hawksbill turtles had a nesting success of 25% (long-term average 50.6%).

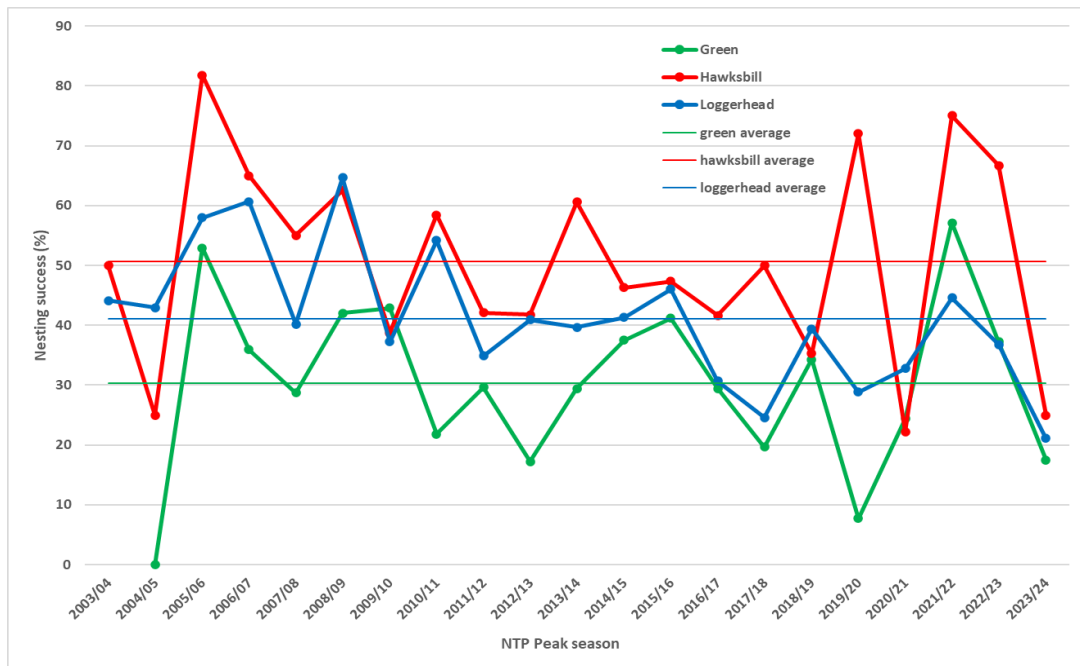


Figure 20: Nesting success (and long-term average) at Bungelup section for all three species during the peak period of NTP seasons 2003-04 to 2023-24.

3.3 Nest damage and predation

286 nests were recorded with damage in the 2023-24 full season in the NW Cape and Cape Range divisions (equating to 4.7% of total recorded nests)³. 275 of these nests were in the North West Cape division and 11 were within the Cape Range division. No damaged nests were observed in the Coral Bay division. Ghost crabs damaged the majority of these nests (266 nests). Other causes were another turtle accidentally uncovering another turtles’ clutch (10), and birds taking eggs as a turtle was laying (8). Six nests were damaged by either a dingo or an introduced predator (possibly a dog other than a dingo)⁴. Some nests had more than one cause of disturbance, for example a dingo digging up a clutch followed by ghost crabs eating the eggs.

A reduction in predation of nests by introduced predators has been recorded since 2009-10 as a result of a rigorous introduced predator control program by DBCA’s Parks and Wildlife Service including aerial and ground baiting and trapping (Figure 21).

³ Only new nests (i.e. on first day of incubation period) are methodically checked for signs of disturbance. Damage to old nests (i.e. after the first day of the incubation period until hatching) is only recorded opportunistically if it is encountered whilst monitoring new nests. Therefore, it is likely that some incidences of damaged nests go undetected.

⁴ The term 'dog' used throughout this report refers to wild dog, domestic dog or dingo as species cannot be differentiated from prints. A wild or domestic dog is considered an introduced species whereas a dingo is not.

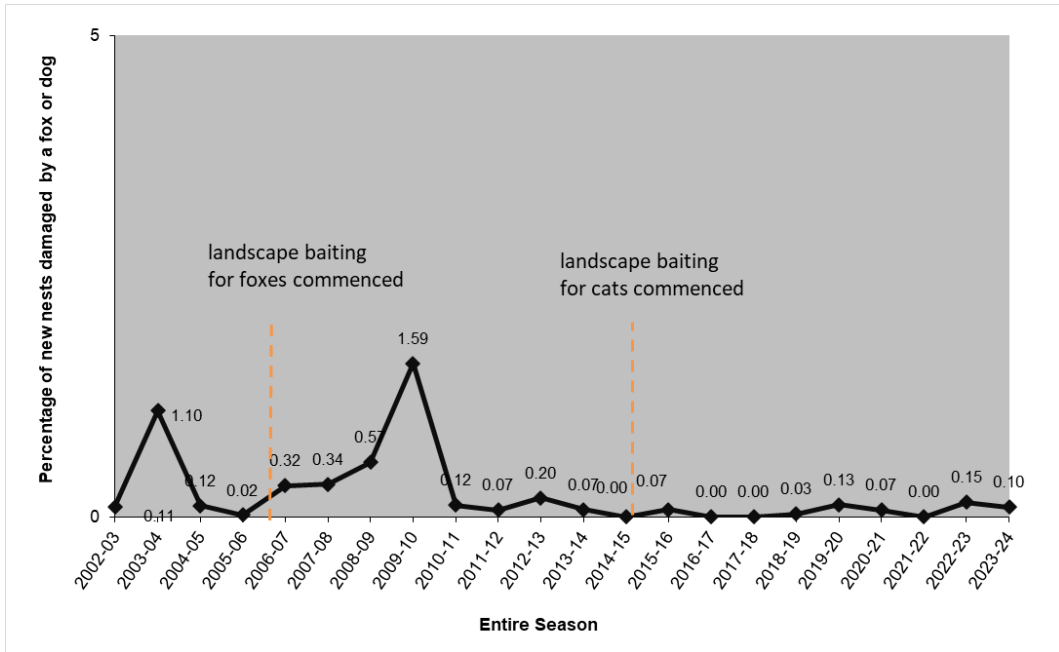


Figure 21: Percentage of new nests damaged by fox or dog per season, NW Cape and Cape Range divisions, 2002-03 to 2023-24.

3.3.1 Presence of introduced species

Dogs and foxes are known to dig up turtle nests and eat the eggs. While feral cats will prey upon turtle hatchlings, they have not been observed nor are suspected to dig up nests (based on long-term opportunistic observations by experienced DBCA staff and supported by NTP nest predation data). NTP volunteers routinely record the presence of prints and tracks from introduced species and dingoes to help inform targeted management of introduced species.

In 2023-24, volunteers recorded the tracks of dogs in all eleven subsections in NW Cape division, all three subsections in the Cape Range division and in one of the two subsections in the Coral Bay division. Dog tracks were observed in the NW Cape division on all 39 monitoring days, 4 of the 27 monitoring days in the Cape Range division and 3 of the 7 monitoring days in the Coral Bay division.

Cat tracks were observed in five of the eleven subsections in the NW Cape division, all three subsections in the Cape Range division and both subsections in the Coral Bay division. Cat tracks were observed on 16 of the 39 days in the NW Cape division while in the Cape Range division they were seen on 8 of the 27 monitoring days. In the Coral Bay division, they were seen on 4 of the 7 monitoring days.

No fox tracks were observed.

3.4 Other observations and data

3.4.1 Turtle mortalities

Turtle mortalities have been recorded as part of NTP since 2007-08 (Figure 22). Twenty-two dead turtles were recorded by NTP volunteers during the 2023-24 season in the NW Cape and Cape Range divisions.

Turtle mortalities have fluctuated greatly over the seasons, with the most coinciding with years of higher level of turtle nesting activity (e.g. 2011-12, 2020-21, and 2023-24). Mortalities recorded by DBCA staff outside of the NTP season, or on beaches not monitored as part of NTP are not reported here.

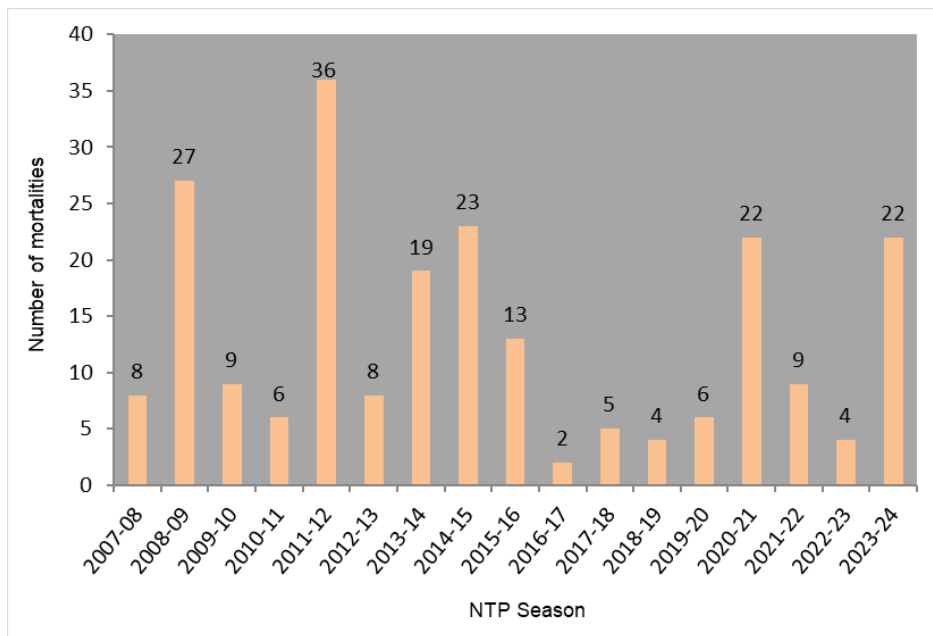


Figure 22: Turtle mortalities recorded during the NTP per season, from NW Cape and Cape Range divisions, 2007-08 to 2023-24.

3.4.2 Rescues of stranded turtles

Fifty-two turtles were rescued during the 2023-24 season by NTP volunteers and staff. All were in the NW Cape division. Eleven of the turtles became lost or disorientated behind the sand dunes, 31 turtles were wedged or stuck in the rocks on the shoreline, and 10 were flipped onto their backs after falling off a small rocky cliff edge or sand embankment (Table 4).

Table 4: Location, number and predicament for turtles rescued during 2023-24 NTP season.

Subsection	Lost in dunes	Trapped in rocks	Upside down after falling	Total
Mildura Wreck to North West Carpark		1	1	2
Surf Beach to Hunters		1	4	5
Hunters to Mauritius		7	2	9
Mauritius to Jacobz South		3		3
Jacobz South to Wobiri	5	2		7
South of Wobiri totem		2		2
Five Mile North to Five Mile Carpark	1	2		3
Five Mile Carpark to Trisel		9	2	11
Brooke to Graveyards	2	4		6
Graveyards to Burrows	2		1	3
Jurabi Point to Jurabi Point South	1			1
Totals:	11	31	10	52

At least 412 stranded marine turtles, mainly of nesting age, have been rescued since the program began in 2002-03 (Figure 23). Large numbers of rescues correlate with the busiest nesting seasons, such as 2011-12, 2020-21 and 2023-24. Rescues outside of the NTP monitoring dates are not reported here. For example, after the peak monitoring period where volunteers are no longer visiting the beaches daily, DBCA staff are called upon to do the rescues. Also, while patrolling more remote beaches, DBCA staff routinely “flip” stranded turtles that have been turned over by the waves on the shoreline.

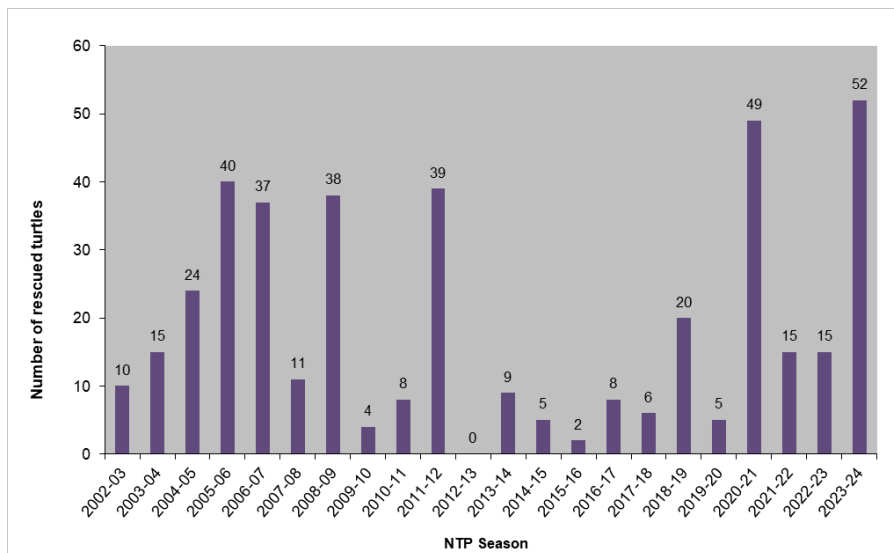


Figure 23: Turtles rescued during the NTP per season, from NW Cape and Cape Range divisions.

3.4.3 Re-sightings of flipper tagged turtles

Marking individual turtles in a population (using titanium tags applied to the trailing edge of the front flipper, close to the body) provides information useful in the management of marine

turtles including migration patterns, nesting and feeding site fidelity, growth rates and changes in nesting population numbers (Eckert *et al* 1999).

Turtles were tagged at the North West Cape from the 1988/89 season through to the 1999/2000 season as part of the WA Marine Turtle Program (Prince RIT 2000). Flipper-tagging of turtles is not currently a part of the NTP, however flipper tags have been deployed sporadically as part of associated research programs such as satellite tagging. Tagged turtles are resighted in most years.

Eight flipper-tagged green turtles were re-sighted during the 2023-24 season, seven by members of the public and one by an NTP volunteer (Table 5). Four of these turtles were originally tagged over 30 years ago. Four of the turtles were resighted at the same beach as they were tagged.

Table 5: Re-sightings of tagged turtles during 2023-24 nesting season.

Tag	Species	Gender	When tagged	Location tagged	CCL when tagged	Date resighted	Location resighted	CCL when resighted
WA4757	G	F	4/12/1998	Wobiri	930mm	13/11/2023	Five mile	-
WA43351	G	F	5/01/2000	Five mile	-	15/11/2023	Five mile	-
WA21165	G	F	1/02/1993	Baudin	870mm	23/11/2023	Baudin	-
WA21170	G	F	31/01/1993	Trisel	1000mm	3/12/2023	Burrows	-
WA9369	G	F	17/12/1989	Baudin	960mm	24/01/2024	Baudin	-
WA18764 & WA18765	G	F	7/12/1992	Baudin	930mm	30/01/2024	Baudin	-
WB4809	G	F	11/01/2016	Jansz	955mm	19/02/2024	Graveyards	-
WB29818	G	F	22/10/2022	Neds Camp		14/03/2024	Five mile	

3.4.4 Weather events

Beaches surveyed in the NTP are susceptible to seasonal weather events such as cyclones, storm surges and flooding. These can significantly affect turtle nests and available nesting habitat and the program's ability to monitor. During the 2023-24 NTP season there were no significant weather events, however the final weekend of post-peak monitoring in February (24th & 25th) was delayed until the following long weekend (Sunday 3rd & Monday 4th March) due to a cyclone yellow alert warning.

4. VOLUNTEER ENGAGEMENT AND COORDINATION

Forty eight volunteers contributed 3892 hours to the Ningaloo Turtle Program in 2023-24. Volunteers were coordinated, supervised and trained by DBCA staff. Local Exmouth volunteers contributed 699 hours mainly through the pre-peak and post-peak monitoring weekends and external (visiting) volunteers contributed 3193 hours during the peak monitoring period.

Since commencement of the program in 2002, 87,902 volunteer hours have contributed to the program. Volunteer time was primarily to undertake turtle monitoring and also included data uploading, training, education, school visits, turtle rescues, and weekend monitoring coordination.

4.1 Media and communications

Since the 2015-16 NTP season, a dedicated Communications Internship volunteer position has been filled. This role focuses on expanding public education, engagement and promotion of the NTP. The focus in the 2023-24 season was trialling the short video format on the NTP YouTube and social media channels, and educational visits in the community. The following outcomes were achieved:

- Regular engaging Facebook and Instagram posts.
- Establishing TikTok as a new outlet for NTP social media, with over 4200 views of videos by the end of the season.
- A school holiday activity held at Exmouth Public Library for local and visiting families. Library staff provided positive feedback and have asked NTP to continue this in future years.
- School holiday education activities at Ningaloo Caravan & Holiday Resort and Exmouth Cape Holiday Park, a first for these venues.
- 12 short videos on YouTube amassing over 24,000 views (by end of February).

By the end of the 2023-24 season, the NTP had 5.9% more reach⁵ on Facebook (and over 4100 followers) and 12,300% more reach on Instagram (and over 3100 followers). The most popular post was a short form skit about why people shouldn't touch hatchlings, reaching over 181,000 people and being shared over 1,000 times.

4.2 Educational activities

A key goal of the NTP is to build a culture of awareness and stewardship regarding marine turtle conservation at Ningaloo. In addition to the communications role discussed in 4.1, DBCA staff conduct routine beach education patrols throughout the nesting season. Patrols were

⁵ In social media, 'reach' is the number of unique users who saw any content from your Page or about your Page.

mainly in the evenings throughout December to March, however some were during the day in the peak turtle mating aggregation time of September and October. The purpose of these patrols is to educate locals and visitors to the beaches on the most appropriate way to view mating, nesting and hatching turtles to minimise disturbances. In 2023-24, several local NTP volunteers were given the opportunity to assist DBCA staff with these patrols, as needed. Staff led patrols to the beaches where most people were visiting with the intent to view turtles, and talked to locals and visitors, raising awareness of the Turtle Watching Code of Conduct.

Other educational activities by DBCA staff not reported here include Turtle Education Tours at the Jurabi Turtle Centre, school holiday activities held throughout the year and distribution of Code of Conduct posters and handouts to local businesses and accommodation providers.

5. ACKNOWLEDGEMENTS

The NTP is conducted on the traditional lands of the Baiyungu, West Coastal Thalanyji and Yinikurtura People. DBCA recognise their traditional custodial role and continued support for majun (turtle) conservation. *Bujurrba nhuna majunjarri nyinggulubarndi* – looking after turtles in Nyinggulu.

Thank you to the local NTP volunteers from the Exmouth community, the 12 external volunteers recruited nationally, the team leaders (Samuel Keller, Lucy Wood, Charlotte Hogan) and communications intern (Zara Handscomb). The program would not be able to function without the significant contribution of time, effort, passion and enthusiasm the volunteers contribute.

A special thank you to Susie Bedford for continuing to return to Exmouth and be an integral part of the NTP each summer to help train new volunteers and provide guidance and support to the program.

Thank you to DBCA Exmouth staff for their support in training new volunteers and assisting in the day-to-day running of the NTP.

Thanks to the Cape Conservation Group Inc. for their support for the first twenty years of the program, and Roland Mau, Susie Bedford and David Waayers, for the development and implementation of the original 2001-2002 NTP pilot program.

Thank you to the DBCA Community Involvement Unit for the volunteer recognition funding which was used to appropriately thank our volunteers.

Thank you to Woodside Energy Ltd and their Joint Venture partner Mitsui for the ongoing contribution to funding the operational costs of the Ningaloo Turtle Program.

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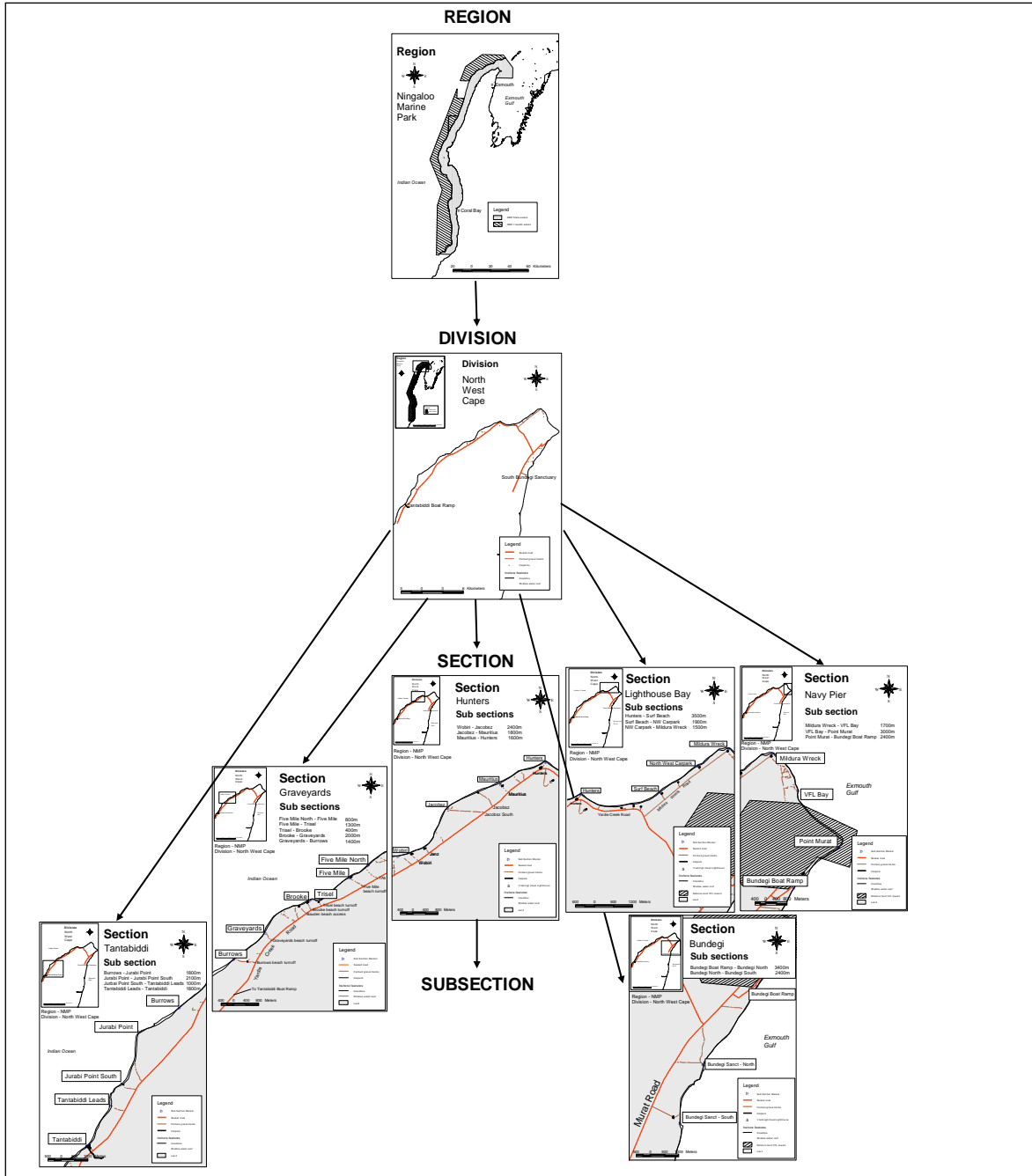
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Personal communications

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7. APPENDICES

Appendix 1: Zoning and subsection details NW Cape division.

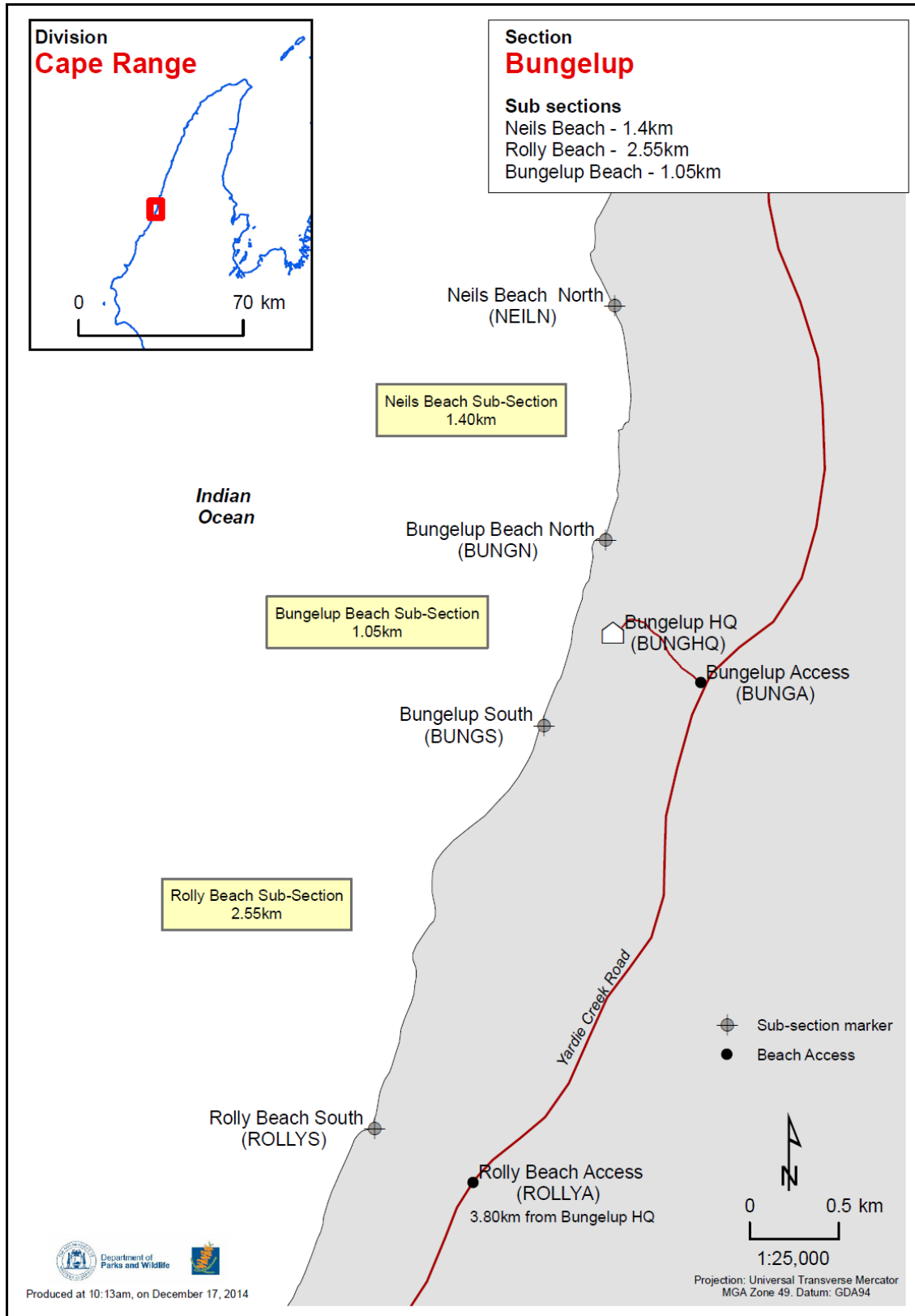


Note – the Bundegi section, including beaches south of the Bundegi boat ramp to the southern edge of the Bundegi sanctuary zone has never been included in NTP monitoring due to very low levels of nesting activity. The Navy Pier section incorporating the beaches from the Bundegi boat ramp north to the Mildura Wreck has not been monitored since 2003/04 for the same reason.

Location and distance of each subsection within NW Cape division.

Subsection	Location of northern totem	Location of southern totem	Distance (m)
Mildura Wreck - North West car park	21.78568 S; 114.16518 E	21.79174 S; 114.15402 E	1500
North West car park - Surf Beach	21.79174 S; 114.15402 E	21.80159 S; 114.13930 E	1900
Surf Beach - Hunters	21.80159 S; 114.13930 E	21.80287 S; 114.10873 E	3500
Hunters - Mauritius	21.80287 S; 114.10873 E	21.80938 S; 114.09532 E	1600
Mauritius - Jacobsz South	21.80938 S; 114.09532 E	21.81638 S; 114.07927 E	1800
Jacobsz South - Wobiri	21.81638 S; 114.07927 E	21.83038 S; 114.06505 E	2400
Five Mile North - Five Mile	21.83485 S; 114.05431 E	21.83928 S; 114.04766 E	800
Five Mile - Trisel	21.83928 S; 114.04766 E	21.84658 S; 114.03836 E	1300
Brooke - Graveyards	21.84733 S; 114.03389 E	21.85660 S; 114.02085 E	2000
Graveyards - Burrows	21.85660 S; 114.02085 E	21.86595 S; 114.01052 E	1400
Burrows - Jurabi Point	21.86595 S; 114.01052 E	21.87348 S; 113.99803 E	1800

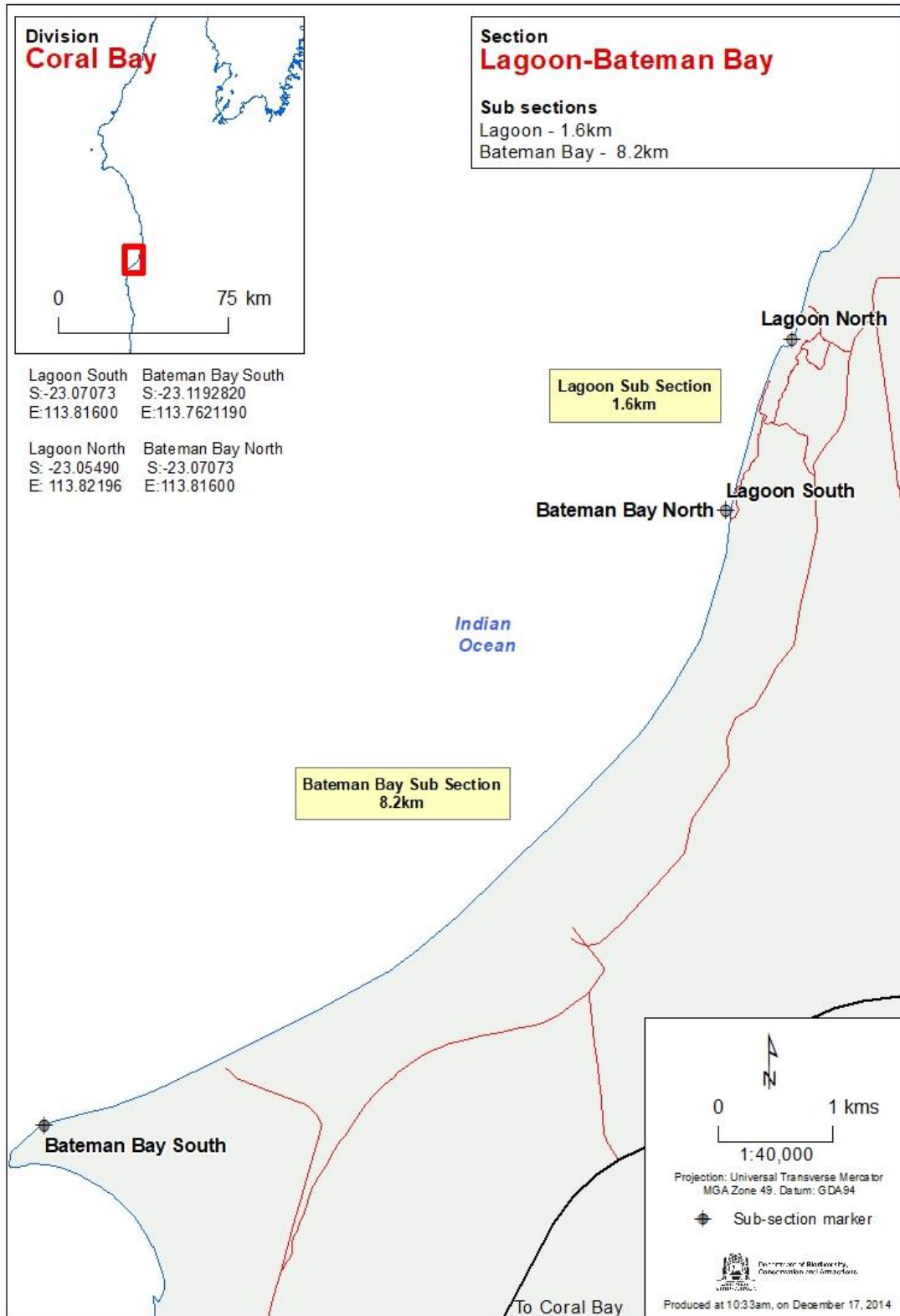
Appendix 2: Zoning and subsection details Cape Range division.



Location and distance of each subsection within Cape Range division.

Subsection	Location of northern totem	Location of southern totem	Distance (m)
Neils Beach North - Bungelup Beach North	22.26489 S; 113.83277 E	22.27674 S; 113.83231 E	1400
Bungelup Beach North - Bungelup South	22.27674 S; 113.83231 E	22.28613 S; 113.8292 E	1050
Bungelup South - Rolly's Beach South	22.28613 S; 113.8292 E	22.30650 S; 113.82062 E	2550

Appendix 3: Zoning and subsection details Coral Bay division



Location and distance of each subsection within the Coral Bay division.

Subsection	Location of northern totem	Location of southern totem	Distance (m)
Lagoon North to Lagoon South	23.05490 S; 113.82196 E	23.07073 S; 113.81600 E	1600
Bateman Bay North - Bateman Bay South	23.07100 S; 113.81604 E	23.11937 S; 113.76220 E	8200

Appendix 4: Survey effort and summaries of turtle activity

Survey effort 2023/24

Division	Section	Subsection	Number of days monitored standardised season (should be 27)	Number of days monitored pre and post peak (should be 12)	Number of days monitored entire season	Dates subsection wasn't monitored or data was lost or untrustworthy	
North West Cape	Lighthouse	Mildura Wreck – North West Carpark	27	6	33	4 Nov, 28 Jan, 10 Feb, 11 Feb, 3 Mar, 4 Mar	
		North West Carpark - Surf Beach	27	6	33	4 Nov, 28 Jan, 10 Feb, 11 Feb, 3 Mar, 4 Mar	
		Surf Beach – Hunters	27	7	34	28 Jan, 10 Feb, 11 Feb, 3 Mar, 4 Mar	
	Hunters	Hunters – Mauritius	27	10	37	27 Jan, 3 Mar	
		Mauritius – Jacobsz South	27	8	35	5 Nov, 2 Dec, 10 Feb, 11 Feb	
		Jacobsz South - Wobiri	27	9	36	5 Nov, 10 Feb, 11 Feb	
	Graveyards	Five Mile - Five Mile North	27	12	39		
		Five Mile - Trisel	27	11	38	10 Feb	
		Brooke - Graveyards	27	12	39		
		Graveyards - Burrows	27	12	39		
	Tantabiddi	Burrows - Jurabi Point	27	10	37	28 Jan, 10 Feb	
			SUBTOTAL:	297	103	400	
	Cape Range	Bungelup	Bungelup North - Neils Beach	27	0	27	
Bungelup South - Bungelup North			27	0	27		
Bungelup South - Rollys beach			27	0	27		
			SUBTOTAL:	81		81	
Coral Bay	Lagoon-Bateman Bay	Bateman Bay	7	0	7		
		Lagoon	6	0	6	10 Jan	
			SUBTOTAL:	13		13	
TOTAL			391	103	494		

Survey effort* 2002/03 – 2023/24 entire season (all data and subsections)

Full Season	2002/03	2003-04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24	TOTAL		
Survey Dates for entire season	18/11/02-16/04/03	11/11/03-30/03/04	3/11/04-18/03/05	21/11/05-28/02/06	1/12/06-28/02/07	1/12/07-28/02/08	7/12/08-1/03/09	7/11/09-27/03/10	6/11/10-27/03/11	12/11/11-10/03/12	10/11/12-10/03/13	28/10/13-2/3/14	3/11/14-1/3/15	31/10/15-7/03/16	27/10/16-26/02/2017	11/11/17-2/03/18	10/11/18-24/02/2019	9/11/2019-23/02/2020	7/11/2020-28/02/2021	6/11/2021-27/02/2022	5/11/2022-26/02/2023	4/11/2023-4/03/2024			
Survey Effort																									
Division	Section																								
North West Cape	Graveyards	165	375	374	368	341	336	234	160	153	144	162	172	185	193	174	171	154	154	156	156	152	155	4634	
	Hunters	248	263	271	271	256	252	173	117	114	109	111	117	120	123	111	121	116	117	116	116	114	108	3464	
	Lighthouse Bay	127	137	215	260	222	251	147	83	93	97	106	113	113	119	106	100	115	115	117	115	110	100	2961	
	Navy Pier	-	86	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	86
	Tantabiddi	115	3	-	85	86	84	58	38	37	36	41	38	43	41	39	41	39	39	39	39	39	38	37	1016
Cape Range	Bloodwood	-	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4	
	Bungelup	1	49	152	114	120	140	124	72	87	91	78	114	91	85	82	81	81	80	79	81	78	81	1961	
	Turquoise Bay	-	16	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	16
	Boat Harbour	-	-	203	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	203
Bundera/ Ningaloo	Carbaddaman	7	-	204	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	211	
	Janes Bay	13	24	12	29	22	4	-	-	-	-	-	-	-	-	-	-	51	51	48	-	-	-	254	
	Norwegian Bay	2	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	
	Whaleback Beach	-	7	8	-	-	-	-	-	-	-	-	-	-	-	-	-	17	17	16	-	-	-	65	
Coral Bay	Batemans Bay	103	100	117	51	76	47	34	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7	535	
	Lagoon	103	100	116	51	76	47	34	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6	533	
	Turtle Beach	56	100	66	49	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	271	
Gnaraloo	Gnarraloo Bay	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	51	51	-	-	-	-	102	
Total survey effort	940	1265	1738	1278	1199	1161	804	470	484	477	498	554	552	561	512	514	624	624	571	507	492	494	16319		
Number subsections monitored	22	29	28	20	19	19	18	14	14	14	14	14	14	14	14	14	21	21	18	14	14	16			

* Survey effort is defined as the number of times each subsection was monitored. These are totalled for each section.

Turtle activity 2002/03 – 2023/24 entire season (all data and subsections)

Full Season	2002/03	2003-04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24	TOTAL or AVERAGE
Survey Dates for entire season	18/11/02-16/04/03	11/11/03-30/03/04	3/11/04-18/03/05	21/11/05-28/02/06	1/12/06-28/02/07	1/12/07-28/02/08	7/12/08-1/03/09	7/11/09-27/03/10	6/11/10-27/03/11	12/11/11-11/03/12	10/11/12-10/03/13	28/10/13-2/3/14	3/11/14-1/3/15	31/10/15-7/03/16	27/10/16-26/02/2017	11/11/17-2/03/18	10/11/18-24/02/2019	9/11/2019-23/02/2020	7/11/2020-28/02/2021	6/11/2021-27/02/2022	5/11/2022-26/02/2023	4/11/2023-4/04/2024	
Green nests	1539	1552	788	4695	4349	5254	6297	571	2732	6594	585	2276	628	759	1856	2518	2733	1184	5212	2182	1462	5809	61575
Green false crawls	5404	3086	2533	9948	14395	13156	12608	1451	6507	22865	1769	4960	1465	1357	4243	7306	8082	3216	23945	5420	3197	31052	187965
Green activity	6943	4638	3321	14643	18744	18410	18905	2022	9239	29459	2354	7236	2093	2116	6099	9824	10815	4400	29157	7602	4659	36861	249540
Green activity adjusted by survey effort per day	7.39	3.67	1.91	11.46	15.63	15.86	23.51	4.30	19.09	61.76	4.73	13.06	3.79	3.77	11.91	19.11	18.33	7.46	51.06	14.99	9.47	74.62	18.04
Green nesting success %	22.2%	33.5%	23.7%	32.1%	23.2%	28.5%	33.3%	28.2%	29.6%	22.4%	24.9%	31.5%	30.0%	35.9%	30.4%	25.6%	25.3%	26.9%	17.9%	28.7%	31.4%	15.8%	27.3%
Hawksbill nests	48	81	100	108	157	156	336	202	189	65	125	69	91	75	67	70	63	74	28	62	110	72	2348
Hawksbill false crawls	49	60	139	71	153	145	207	202	132	84	192	51	108	65	89	99	104	60	64	52	92	168	2386
Hawksbill activity	97	141	239	179	310	301	543	404	321	149	317	120	199	140	156	169	167	134	92	114	202	240	4734
Hawksbill activity adjusted by survey effort per day	0.10	0.11	0.14	0.14	0.26	0.26	0.68	0.86	0.66	0.31	0.64	0.22	0.36	0.25	0.30	0.33	0.28	0.23	0.16	0.22	0.41	0.49	0.34
Hawksbill nest success %	49.5%	57.4%	41.8%	60.3%	50.6%	51.8%	61.9%	50.0%	58.9%	43.6%	39.4%	57.5%	45.7%	53.6%	42.9%	41.4%	37.7%	55.2%	30.4%	54.4%	54.5%	30.0%	48.6%
Loggerhead nests	288	387	777	1068	540	795	580	288	405	382	304	430	436	519	696	392	481	379	540	456	402	162	10707
Loggerhead false crawls	429	359	1040	925	477	954	486	471	388	715	466	595	580	583	1395	1086	730	725	1065	554	561	518	15102
Loggerhead activity	717	746	1817	1993	1017	1749	1066	759	793	1097	770	1025	1016	1102	2091	1478	1211	1104	1605	1010	963	680	25809
Loggerhead activity adjusted by survey effort per day	0.76	0.59	1.05	1.56	0.85	1.51	1.33	1.61	1.64	2.30	1.55	1.85	1.84	1.96	4.08	2.88	2.05	1.87	2.81	1.99	1.96	1.38	1.79
Loggerhead nesting success	40.2%	51.9%	42.8%	53.6%	53.1%	45.5%	54.4%	37.9%	51.1%	34.8%	39.5%	42.0%	42.9%	47.1%	33.3%	26.5%	39.7%	34.3%	33.6%	45.1%	41.7%	23.8%	41.6%
Unidentified nests	29	123	59	42	33	61	38	8	18	7	7	20	19	4	7	6	12	8	28	15	5	6	555
Unidentified false crawls	44	20	82	45	19	29	12	8	9	4	12	17	14	3	3	7	17	14	56	11	12	17	455
Unidentified activity	73	143	141	87	52	90	50	16	27	11	19	37	33	7	10	13	29	22	84	26	17	23	1010
Total all species nests	1904	2143	1724	5913	5079	6266	7251	1069	3344	7048	1021	2795	1174	1357	2626	2986	3289	1645	5808	2715	1979	6049	75185
Total new nests (all three species) adjusted by survey effort per day	2.03	1.69	0.99	4.63	4.40	5.40	9.02	2.27	6.91	14.78	2.05	5.05	2.13	2.42	5.13	5.81	5.57	2.79	10.17	5.36	4.02	12.24	5.22
Total all species false crawls	5926	3525	3794	10989	15044	14284	13313	2132	7036	23668	2439	5623	2167	2008	5730	8498	8933	4015	25130	6037	3862	31755	205908
Total activity	7830	5668	5518	16902	20123	20550	20564	3201	10380	30716	3460	8418	3341	3365	8356	11484	12222	5660	30938	8752	5841	37804	281093
Total turtle activity adjusted by survey effort per day	8.3	4.5	3.2	13.2	16.9	17.7	25.6	5.4	21.4	64.4	7.0	15.2	6.1	6.0	16.3	22.3	20.7	9.6	54.2	17.3	11.9	76.5	20.2

Survey effort* 2002/03 – 2023/24 standardised season

Standardised season		2002/03	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24	TOTAL
Survey Dates intensive peak period monitoring dates		16/12/02 - 12/01/03	15/12/03 - 11/01/04	20/12/04 - 16/01/05	19/12/05 - 15/01/06	18/12/06 - 14/01/07	17/12/07 - 13/01/08	15/12/08 - 11/01/09	14/12/09 - 10/01/10	20/12/10 - 16/01/11	19/12/11 - 15/01/12	17/12/12 - 11/01/13	16/12/13 - 12/01/14	15/12/14 - 11/1/15	14/12/15 - 10/1/16	12/12/16 - 8/1/17	18/12/17 - 14/01/18	17/12/18 - 13/01/19	16/12/19 - 12/01/20	17/12/20 - 13/01/21	17/12/21 - 13/01/22	16/12/22 - 12/01/23	15/12/23 - 11/01/24	
Survey Effort																								
Division	Section																							
North West Cape	Graveyards	57	100	112	107	100	100	96	70	108	112	104	108	112	112	107	108	108	107	107	108	108	108	2259
	Hunters	72	78	84	81	75	75	72	50	81	84	78	81	84	84	78	81	81	81	80	80	81	81	1722
	Lighthouse Bay	53	34	56	77	75	75	72	39	77	84	78	81	84	83	78	80	81	81	81	80	80	81	1610
	Tantabiddi	9	-	-	27	25	25	24	17	27	28	26	27	28	28	28	27	27	27	27	27	27	27	508
Cape Range	Bungelup	0	11	71	66	69	60	60	30	79	84	75	78	84	82	79	80	81	80	79	81	78	81	1488
Total survey effort*		191	223	323	358	344	335	324	206	372	392	361	375	392	389	370	376	378	376	374	376	374	378	7587
Number subsections monitored		11	12	12	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	

* Survey effort is defined as the number of times each subsection was monitored. These are totalled for each section.

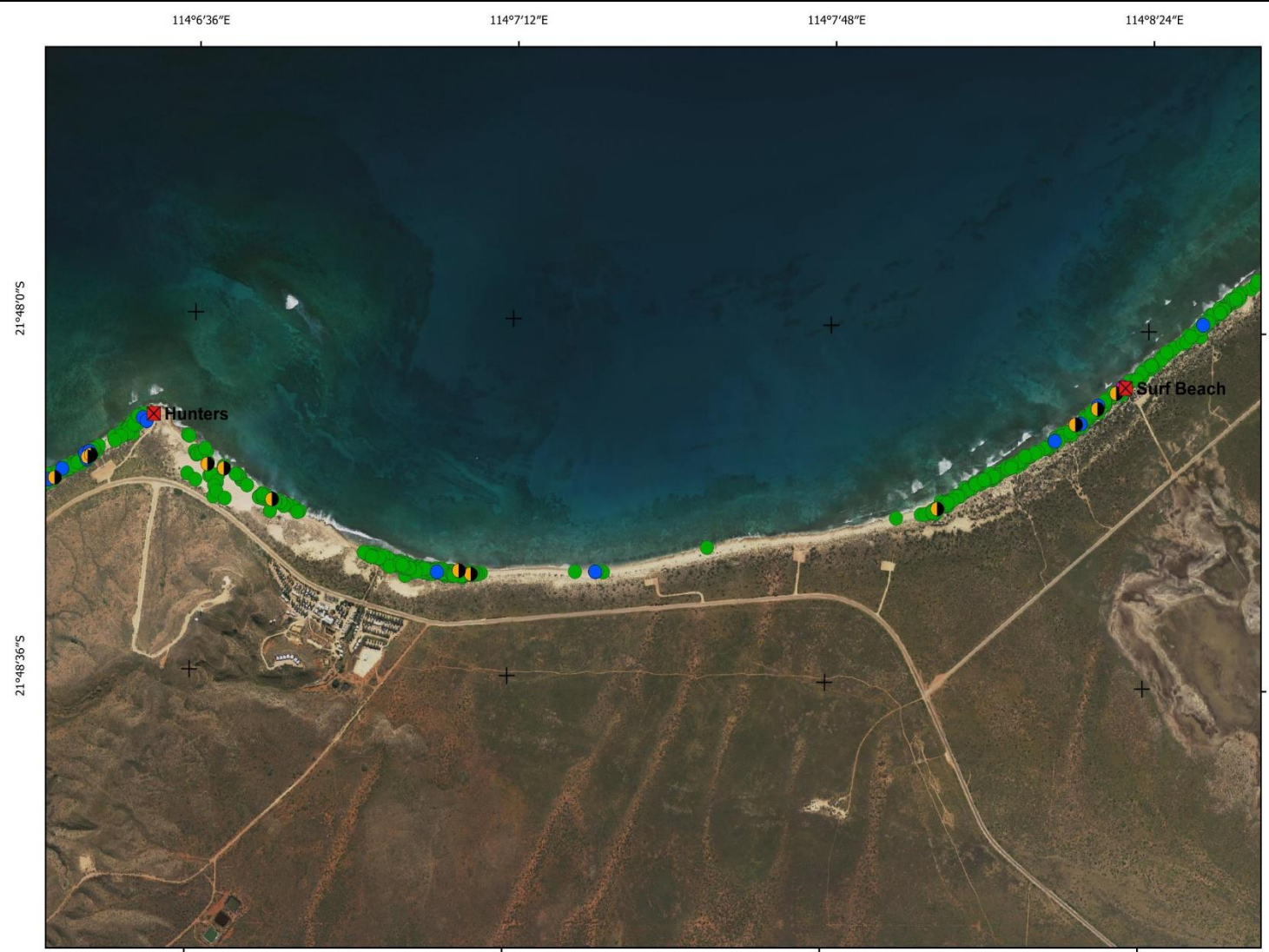
Turtle activity 2002/03 – 2023/24 standardised season

Standardised season	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24	TOTAL or AVERAGE
Survey Dates intensive peak period monitoring dates	16/12/02-12/01/03	15/12/03-11/01/04	20/12/04-16/01/05	19/12/05-15/01/06	18/12/06-14/01/07	17/12/07-13/01/08	15/12/08-11/01/09	14/12/09-10/01/10	20/12/10-16/01/11	19/12/11-15/01/12	17/12/12-11/01/13	16/12/13-12/01/14	15/12/14-11/1/15	14/12/15-10/1/16	12/12/16-8/1/17	18/12/17-14/01/18	17/12/18-13/01/19	16/12/19-12/01/20	17/12/20-13/01/21	17/12/21-13/01/22	16/12/22-12/01/23	15/12/23-11/01/24	
Green new nests	587	475	266	1548	1650	1721	3103	239	2270	5683	422	1714	459	554	1449	1919	2082	896	4452	1747	1222	4647	39105
Green new nests adjusted by survey effort per day	3.07	2.13	0.82	4.32	4.80	5.14	9.58	1.16	6.10	14.50	1.17	4.57	1.17	1.42	3.92	5.10	5.51	2.38	11.90	4.60	3.30	12.30	4.95
Green false crawls	1821	1328	785	4217	5138	4959	5226	634	5322	20501	1314	4098	1092	939	3495	6051	6397	2582	21843	4353	2618	27404	132117
Green activity	2408	1803	1051	5765	6788	6680	8329	873	7592	26184	1736	5812	1551	1493	4944	7970	8479	3478	26295	6100	3840	32051	171222
Green activity adjusted by survey effort per day	12.61	8.09	3.25	16.10	19.73	19.94	25.71	4.24	20.41	66.80	4.81	15.50	3.96	3.84	13.36	21.20	22.43	9.25	70.31	16.22	10.30	84.80	21.49
Green nesting success %	24.4%	26.3%	25.3%	26.9%	24.3%	25.8%	37.3%	27.4%	29.9%	21.7%	24.3%	29.5%	29.6%	37.1%	29.3%	24.1%	24.6%	25.8%	16.9%	28.6%	31.8%	14.5%	26.6%
Hawksbill new nests	17	14	31	45	67	48	193	98	155	60	114	51	73	52	50	56	46	50	23	51	90	49	1433
Hawksbill new nests adjusted by survey effort per day	0.09	0.06	0.10	0.13	0.19	0.14	0.60	0.48	0.42	0.15	0.32	0.14	0.19	0.13	0.14	0.15	0.12	0.13	0.06	0.14	0.24	0.13	0.19
Hawksbill false crawls	20	14	49	33	80	38	119	106	109	79	183	43	81	43	63	69	72	42	49	37	81	130	1540
Hawksbill activity	37	28	80	78	147	86	312	204	264	139	297	94	154	95	113	125	118	92	72	88	171	179	2973
Hawksbill activity adjusted by survey effort per day	0.19	0.13	0.25	0.22	0.43	0.26	0.96	0.99	0.71	0.35	0.82	0.25	0.39	0.24	0.31	0.33	0.31	0.24	0.19	0.23	0.46	0.47	0.40
Hawksbill nesting success	45.9%	50.0%	38.8%	57.7%	45.6%	55.8%	61.9%	48.0%	58.7%	43.2%	38.4%	54.3%	47.4%	54.7%	44.2%	44.8%	39.0%	54.3%	31.9%	58.0%	52.6%	27.4%	47.8%
Loggerhead new nests	52	78	324	544	306	380	320	136	383	368	282	379	398	462	668	375	388	307	475	445	397	150	7617
Loggerhead new nests adjusted by survey effort per day	0.27	0.35	1.00	1.52	0.89	1.13	0.99	0.66	1.03	0.94	0.78	1.01	1.02	1.19	1.81	1.00	1.03	0.82	1.27	1.18	1.06	0.40	0.97
Loggerhead false crawls	141	128	449	484	244	557	218	214	349	681	432	566	541	530	1350	1042	603	649	969	543	554	502	11746
Loggerhead activity	193	206	773	1028	550	937	538	350	732	1049	714	945	939	992	2018	1417	991	956	1444	988	951	652	19363
Loggerhead activity adjusted by survey effort per day	1.01	0.92	2.39	2.87	1.60	2.80	1.66	1.70	1.97	2.68	1.98	2.52	2.40	2.55	5.45	3.77	2.62	2.54	3.86	2.63	2.54	1.72	2.46
Loggerhead nesting success	26.9%	37.9%	41.9%	52.9%	55.6%	40.6%	59.5%	38.9%	52.3%	35.1%	39.5%	40.1%	42.4%	46.6%	33.1%	26.5%	39.2%	32.1%	32.9%	45.0%	41.7%	23.0%	40.2%
Unidentified new nests	1	10	14	21	13	17	21	3	15	3	6	16	19	4	6	5	7	5	18	12	5	4	225
Unidentified new nests adjusted by survey effort per day	0.01	0.04	0.04	0.06	0.04	0.05	0.06	0.01	0.04	0.01	0.02	0.04	0.05	0.01	0.02	0.01	0.02	0.01	0.05	0.03	0.01	0.01	0.03
Unidentified false crawls	2	7	36	18	9	12	7	3	9	4	9	17	11	1	3	4	4	11	39	6	7	12	231
Unidentified activity	3	17	50	39	22	29	28	6	24	7	15	33	30	5	9	9	11	16	57	18	12	16	456
Unidentified activity adjusted by survey effort per day	0.02	0.08	0.15	0.11	0.06	0.09	0.09	0.03	0.06	0.02	0.04	0.09	0.08	0.01	0.02	0.02	0.03	0.04	0.15	0.05	0.03	0.04	0.06
Flatback new nests	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	2	1	0	0	0	0	5
Flatback false crawls	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	4	1	1	0	0	1	8
Flatback activity	0	0	0	0	0	0	1	0	0	0	2	0	0	0	0	0	6	2	1	0	0	1	13
Flatback activity adjusted by survey effort	0	0	0	0	0	0	0.00	0	0	0	0.01	0	0	0	0	0	0.02	0.01	0.00	0.00	0.00	0.003	0.002
Flatback nesting success	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	100.0%	n/a	n/a	n/a	n/a	n/a	33.3%	50.0%	0.0%	n/a	0.0%	0.0%	45.8
Total new nests (all species)	657	577	635	2158	2036	2166	3637	476	2823	6114	826	2160	949	1072	2173	2355	2525	1259	4968	2255	1714	4850	48385
Total new nests (all species) adjusted by survey effort per day	3.44	2.59	1.97	6.03	5.92	6.47	11.23	2.31	7.59	15.60	2.29	5.76	2.42	2.76	5.87	6.26	6.67	3.35	13.30	6.00	4.60	12.80	6.15
Total false crawls (all species)	1984	1477	1319	4752	5471	5566	5571	957	5789	21265	1938	4724	1725	1513	4911	7166	7080	3285	22901	4939	3260	28049	145642
Total activity	2641	2054	1954	6910	7507	7732	9208	1433	8612	27379	2764	6884	2674	2585	7084	9521	9599	4542	27869	7194	4974	32899	194019
Total turtle activity adjusted by survey effort per day	13.8	9.2	6.0	19.3	21.8	23.1	28.4	7.0	23.2	69.8	7.7	18.4	6.8	6.6	19.1	25.3	25.4	12.1	74.5	19.1	13.3	87.0	24.41

Appendix 5: Lighthouse Bay section - New nests (NTP 2023-24) Map 1 & 2



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**Ningaloo Turtle Program
2023-2024 (new nests)**

**LIGHTHOUSE SECTION
Map 2 of 2**

Legend

- Turtle Monitoring Sections
- Subsection location
- Turtle Nests 2023 - 2024
- Chelonia mydas (Green turtle)
- Eretmochelys imbricata (Hawksbill turtle)
- Caretta caretta (Loggerhead turtle)
- Cheloniidae (Unidentified turtle)

N
(A4)
1:17,500

Projection: MGA Zone 49
Datum: GDA94



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Conservation and Attractions

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Conservation and Attractions

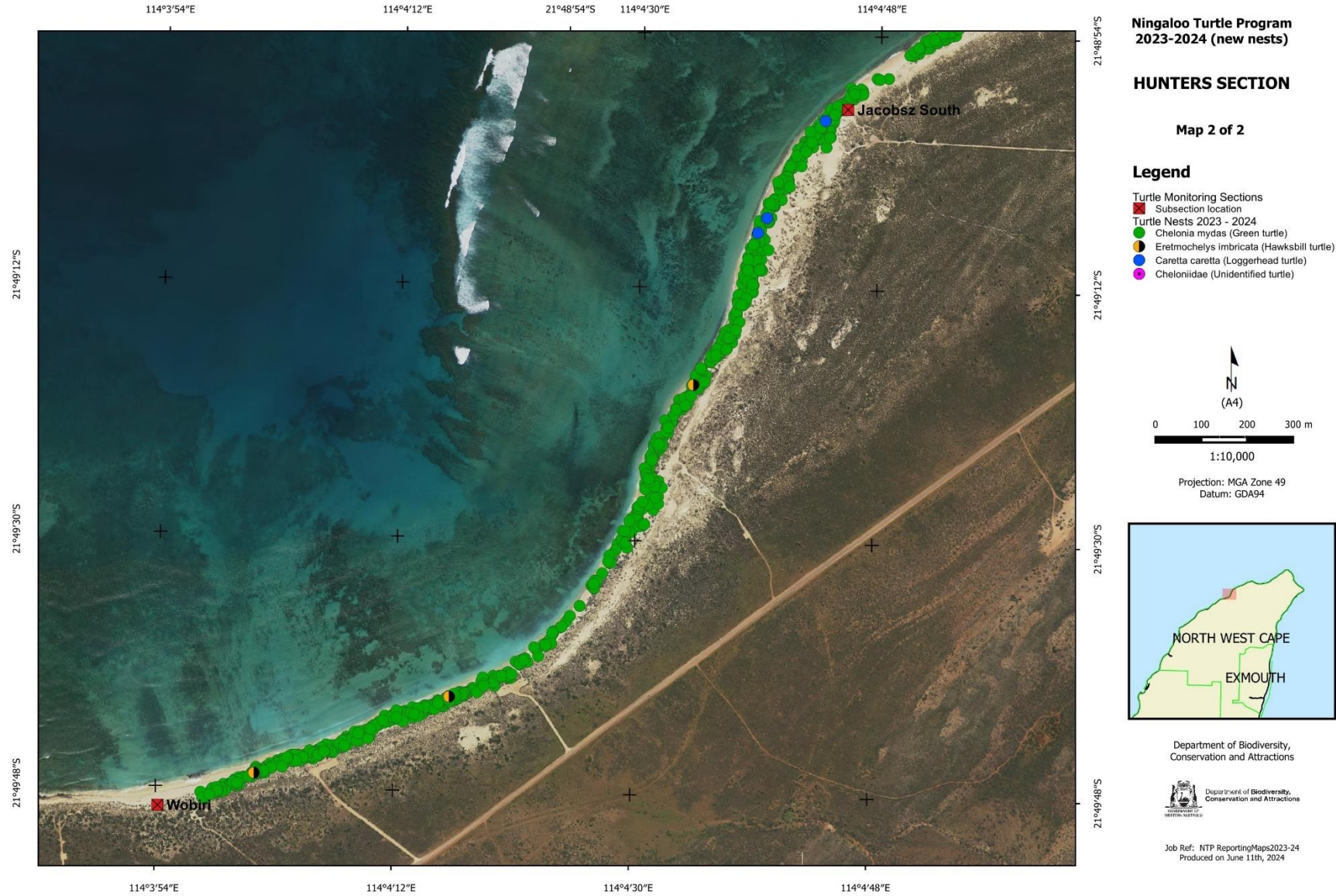
Job Ref: NTP Reporting Maps2023-24
Produced June 11, 2024

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Appendix 6: Hunters section - New nests (NTP 2023-24) Map 1 & 2



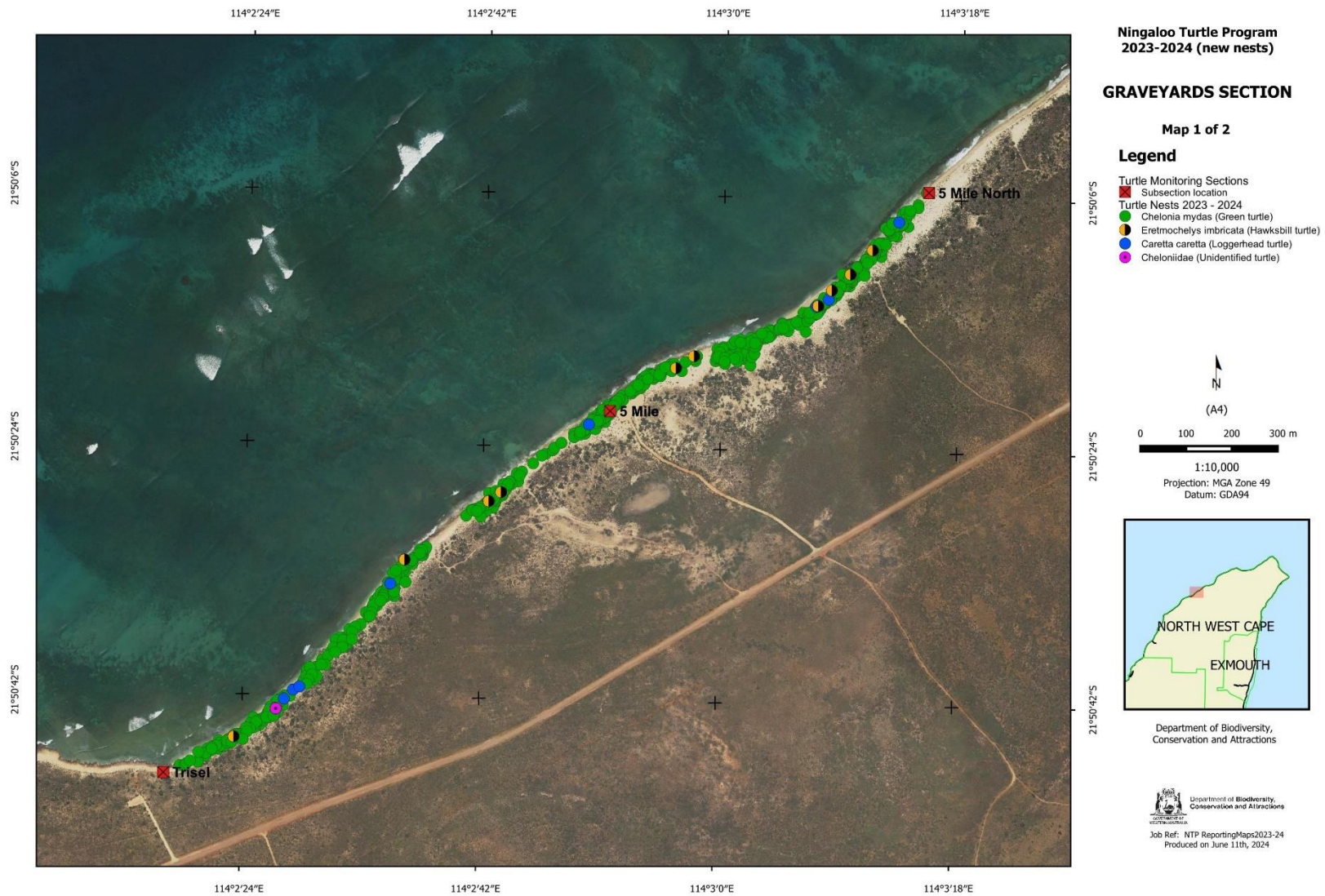
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114°3'54"E 114°4'12"E 114°4'30"E 114°4'48"E
 21°49'12"S 21°49'30"S 21°49'48"S

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Appendix 7: Graveyards section - New nests (NTP 2023-24) Map 1 & 2

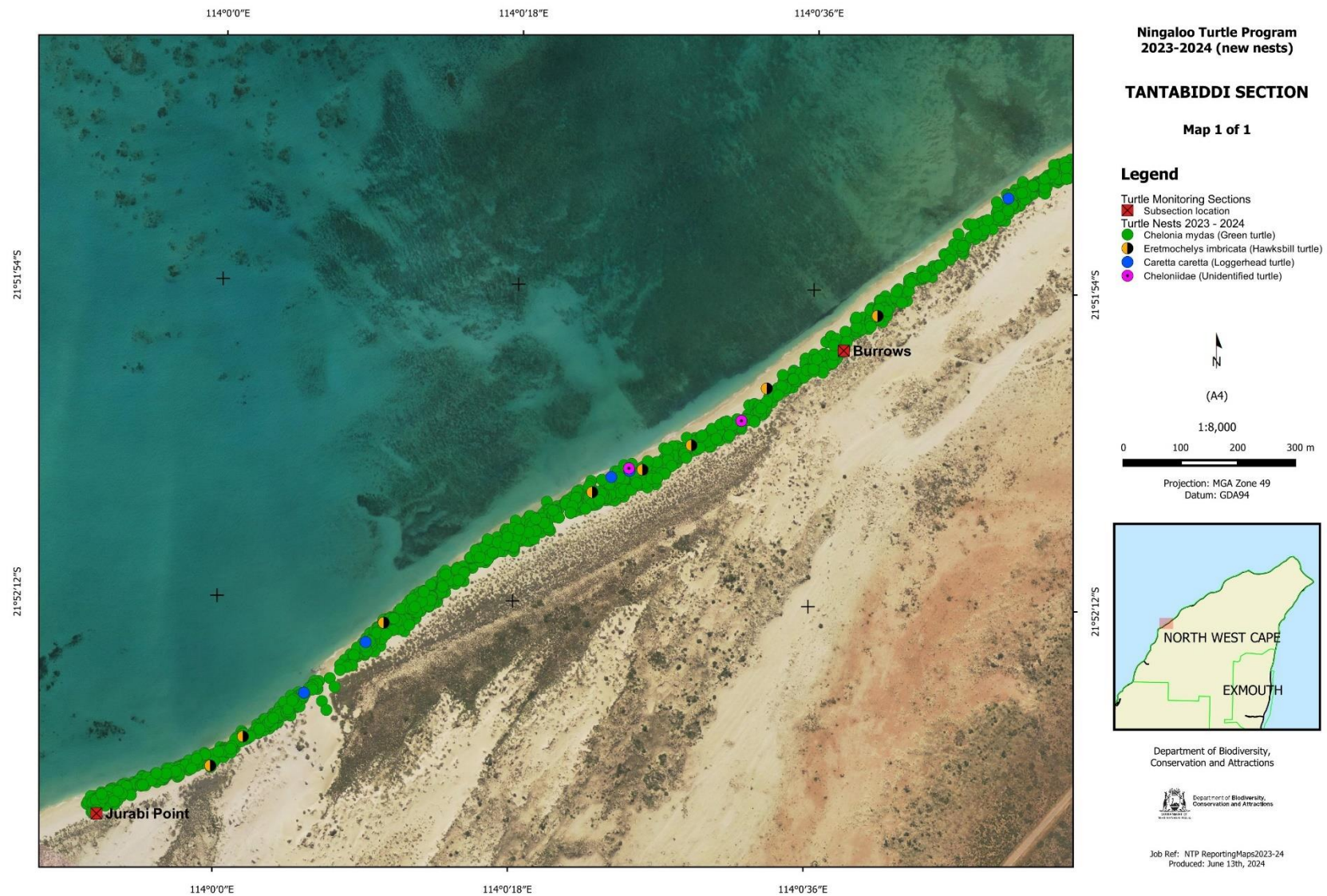


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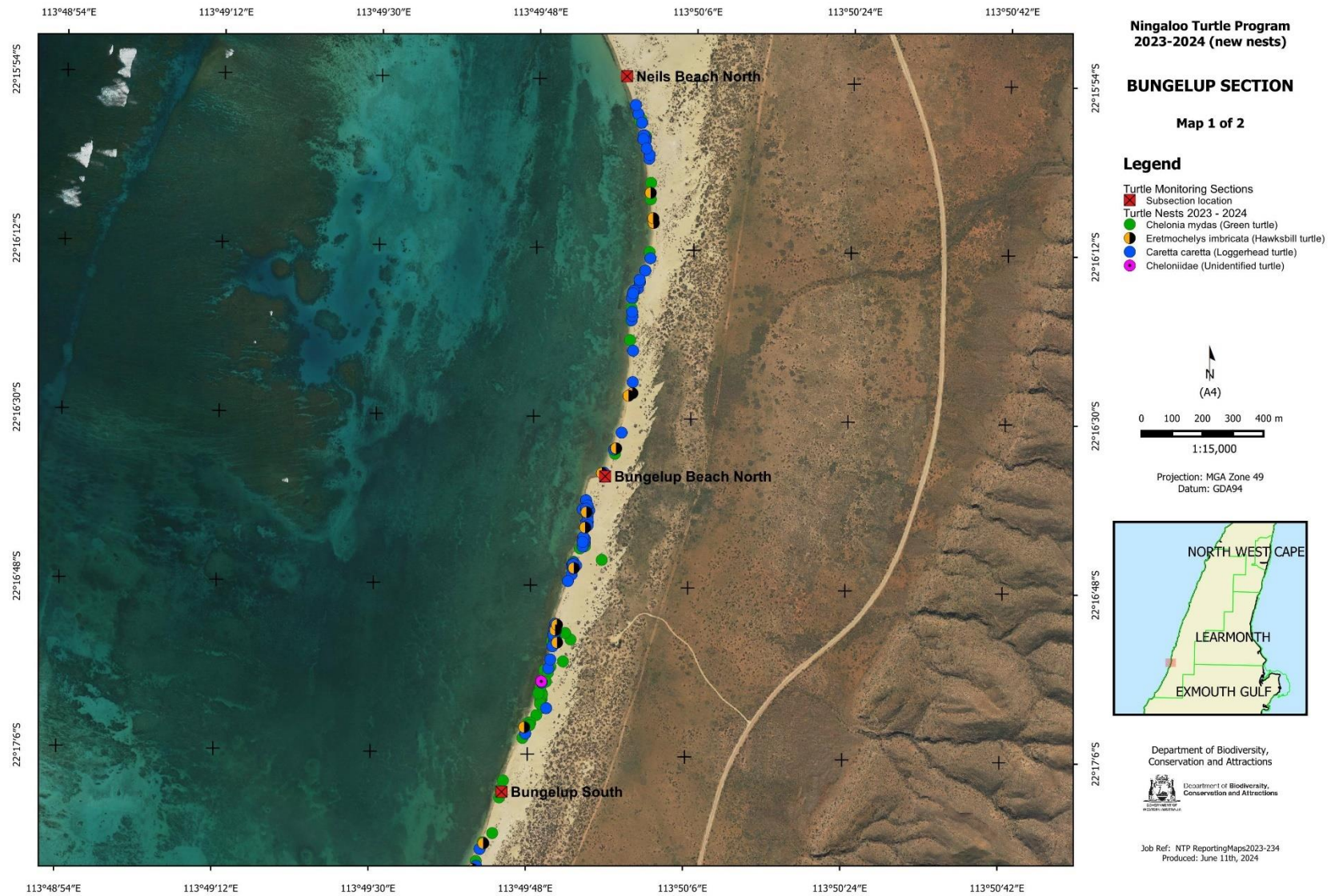
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Appendix 8: Tantabiddi section - New nests (NTP 2023-24) Map 1

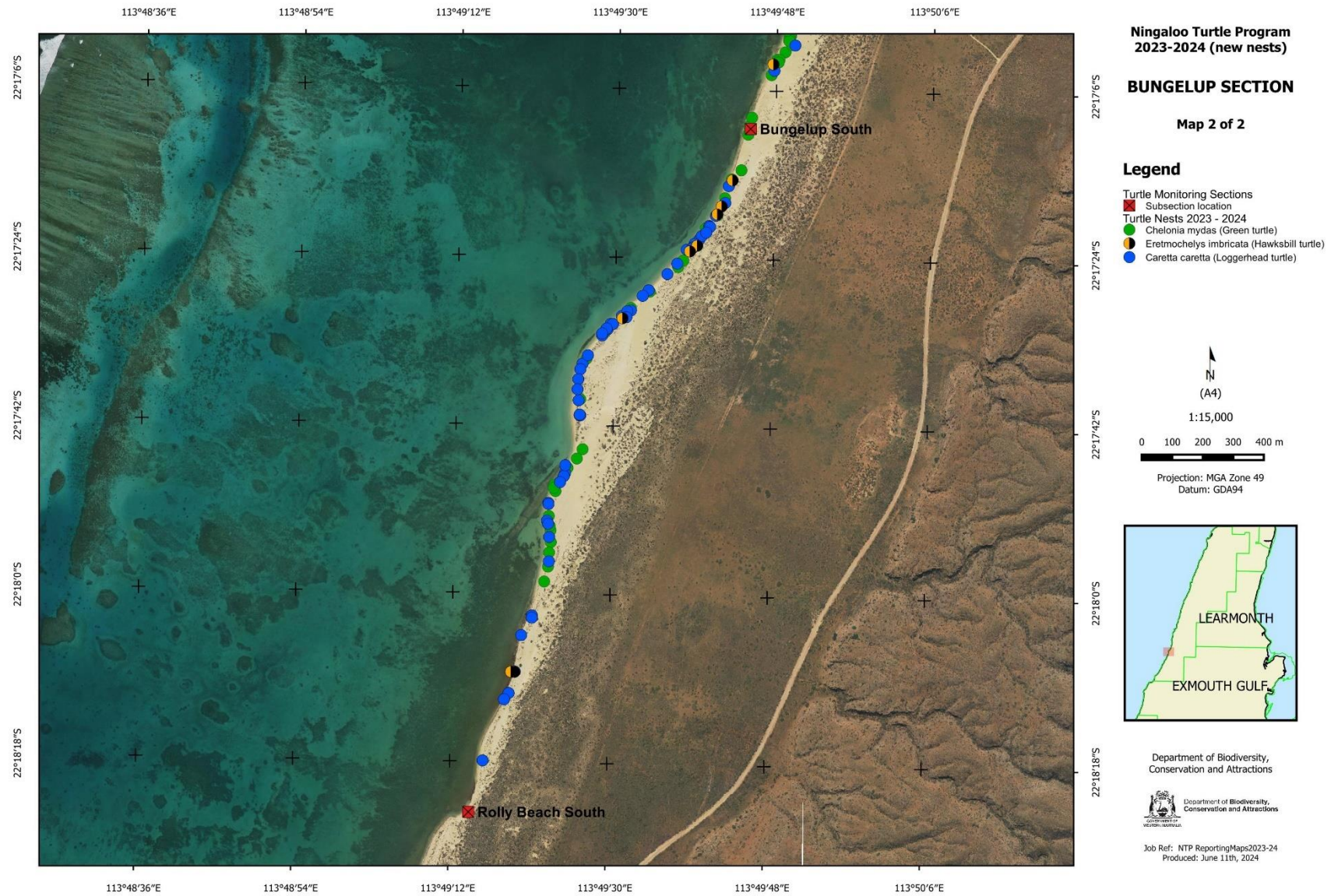


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Appendix 9: Bungelup section - New nests (NTP 2023-24) Map 1 & 2



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Appendix 10: Bateman's – Lagoon section – New nests (NTP 2023-24) Map 1



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Appendix 11: 2023/24 NTP Infographic



**Ningaloo
TURTLE
PROGRAM**

2023–24 Season

Ngarnurra nhuna nhugurarrima Baiyungu, West Coastal Thalanyji and Yinikurtura ganyarajarri thanardi ngarrari.

We acknowledge Baiyungu, West Coastal Thalanyji and Yinikurtura People as the original custodians of the land and water we manage.

The Ningaloo Turtle Program is run by the Department of Biodiversity, Conservation and Attractions, Parks and Wildlife Service.

Ningaloo Turtle Program is a track monitoring program





Overarching goals of the program

- Contribute to the understanding of turtle nesting and threats along the Ningaloo Coast to support informed evidence-based conservation and management
- Continue to develop a rigorous, peer-reviewed and reliable scientific monitoring program supported by trained volunteers
- Build a culture of awareness and stewardship for marine turtle conservation

Volunteers are crucial, without them we wouldn't have a program.

Season 22 of the Ningaloo Turtle Program

3892 hours 

contributed by **48 volunteers** in 2023–24



Volunteers came from Vic, NSW, Qld, WA and SA, with **32 from Exmouth**

Over 87,902 hours volunteered since 2002!

Thank you




Woodside and its joint venture partner supported NTP in 2023–24




3 areas of Ningaloo Coast monitored:

- North West Cape (20km)
- Bungelup (5km)
- Coral Bay (10km)

= 35km total

2023-24
season ranked
the busiest
since 2002!
(all species combined)

50
stranded turtles
rescued in 2023-24!

8 tagged turtles
resighted; one was tagged in 1989!

412 turtles rescued
since 2002

3 school holiday presentations
given at the library and caravan parks

6091 nests from 3 species

Green turtle

Loggerhead turtle

Hawksbill turtle

2nd busiest season for greens – well above average number of nests!

North West Cape beach activity

99.2% Green turtles
0.4% Hawksbill turtles
0.3% Loggerhead turtles

99.2%

Bungelup beach activity

58.1% Loggerhead turtles
Bungelup is the largest mainland loggerhead turtle rookery in WA

58.1%

Daily surveys

North West Cape	Bungelup	Coral Bay	Total
39	27	7	73

4100 Facebook followers
3100 Instagram followers
12 YouTube short videos seen over **24,000 times!**

@ningalooturtleprogram

6 nests disturbed by an introduced predator

2024_402_08 PDF