

2024

# ANNUAL REPORT

CHAKAR HUTAN PROJECT SITE  
JANUARY - DECEMBER



PULIHARA



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## PERSATUAN PEMULIHARAAN DAN KAJIAN MARIN MALAYSIA (PULIHARA)

[www.puliharamalaysia.org](http://www.puliharamalaysia.org)

Prepared by:

Wan Zuriana Binti Wan Sulaiman | Project Manager  
Muhammad Mustaqim Bin Adzimul' Asri | Research Assistant

# ACKNOWLEDGEMENTS

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A special shout-out goes to the Habitat Foundation, CIMB Foundation and Yayasan Sime Darby for believing in us and funding this project, turning our vision into a reality. We truly appreciate your trust and commitment.

We are incredibly thankful to all our collaborators, partners, and stakeholders, including WWF-Malaysia, TCS Malaysia, Geng Plastik Ija, Universiti Malaysia Terengganu, Su Yin & Steve Hagger, ecoCare-MNS, Turtle Conservation and Information Centre (TCIC), and of course, MEKAR (Persatuan Khazanah Rakyat Ma'Daerah). Our sincere thanks also go to the licensed egg collectors who handled the turtle eggs with such care, ensuring they safely reached the hatchery.

The hard work and dedication you see here wouldn't have been possible without the amazing individuals who gave it their all: Wan Zuriana Wan Sulaiman, Muhammad Afiq Karim, Muhammad Mustaqim Adzimul' Asri, Hasim Ismail, Hamezei Abdullah, and the DoF Rangers. We also want to give a big thank you to our interns this season - Mukhriz, Izzah, Najwa, Rohil, Afiqah, Hakim, Zulaikha, and Yani - your energy and enthusiasm have been a huge asset. Plus, our local community volunteers have been there every step of the way, and we couldn't do this without their constant support.

A special note of gratitude to our Chief Executive Officer, Rahayu Zulkifli, and our Accounts and Administrative Coordinator, Mary Lowe. Their unwavering support of our team on the ground has been essential to our progress.

Last but certainly not least, we want to extend our heartfelt thanks to everyone, who has helped us directly or indirectly throughout the season. Your contributions, Thank you all, from the bottom of our hearts.

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# INTRODUCTION

**Chakar Hutan Beach**, located in Kerteh, Terengganu, is one of the most important nesting beaches on the mainland. Our team has been leading conservation efforts at this site since 2022 in collaboration with the Department of Fisheries (DOF). One of our key objectives is to establish the beach as an ecotourism destination while simultaneously educating visitors, local communities, schoolchildren, and local tourism operators about the importance of sea turtle conservation.

As part of our ongoing efforts, we conducted regular patrols alongside DOF rangers to collect nesting population data, as well as monitor and gather biometric information on the nesting green turtles. This data is vital in understanding the health and trends of the turtle population at Chakar Hutan Beach.

The 1.4-kilometer stretch of beach consistently records up to 300 green sea turtle nests annually. In March 2023, our team set up a hatchery at Chakar Hutan to incubate and safeguard the nests laid on the beach. Additionally, the hatchery received green turtle and painted terrapin eggs from licensed egg collectors operating at nearby beaches, further supporting conservation efforts.

In 2024, our team intensified conservation work by conducting additional outreach programs to engage the public more actively in sea turtle conservation. We provided opportunities for visitors to participate in hands-on activities such as joining our "Turtle Outdoor Classroom" and taking part in nest excavation inside the hatchery. These activities helped raise awareness about the conservation initiatives at Chakar Hutan and encouraged more community involvement.

As the beach gains popularity, particularly among local communities as a recreational spot on weekends, more visitors are becoming aware of our ongoing conservation efforts.

# INTRODUCTION

This year marks our second year operating at Chakar Hutan Beach with our Information Hut ready for the public to visit. We have significantly increased engagement efforts. Our team has organized and conducted numerous educational activities with schoolchildren and local communities, fostering a deeper understanding of the importance of sea turtle conservation. We are committed to developing Pantai Chakar Hutan into an edu-tourism destination while at the same time supporting the local community through low-impact, sustainable, turtle-based tourism.

In summary, Chakar Hutan Beach continues to thrive as a hub for both sea turtle conservation and public education. With increasing local awareness and engagement, we are optimistic about the continued success of our conservation efforts at this vital nesting site.



*PULIHARA Team in front of the signboard at our project site.*



# OBJECTIVES

This project aims at capacity building of local communities and supporting their livelihoods through turtle conservation and tourism, while expanding sea turtle conservation efforts.

The **objectives** are:

1. To create awareness, build capacity and engage local communities - including the younger generation - in conservation and research.
2. To support community livelihoods through the creation of employment and income through turtle conservation and tourism.
3. To save more turtle eggs to conserve the turtle populations from extinction through long-term monitoring and research as well as their habitats.

The Chakar Hutan project also contributes to the **United Nations Sustainable Development Goals**:



# OUR TEAM

## **Wan Zuriana Wan Sulaiman** *Project Manager*

Wid has lived in Kerteh and has been involved in conservation work since 2015. She joined our team as the Project Manager at Chakar Hutan in June 2022. Before that, she worked with the Perhentian Turtle Project and the Malaysian Nature Society - ecoCare (MNS).



## **Muhammad Afiq Karim** *Asst. Project Manager*

Afiq joined the team in February 2023 as the Assistant Project Manager and was an intern in 2022. He was a graduate of Universiti Malaysia Terengganu in Marine Science. He was responsible for monitoring the nesting activities and hatchery management.



## **Muhammad Mustaqim** *Research Assistant*

Mus joined as a Research Assistant in 2024 and was an intern in 2023. Graduated from Universiti Malaysia Terengganu in Marine Science. He falls in love with Terengganu beaches and passion in marine conservation.



## **Hasim Ismail** *Hatchery Ranger*

Pok Hasim is a local from Kerteh who has experience in sea turtle conservation efforts since 2011. He used to work with egg collectors in Kijal and Kerteh. He is our caretaker for our hatchery and visitor hut.



# INTERNS

The project provides a valuable learning platform for young individuals passionate about conservation. We have had the privilege of training and offering field experience to students from Universiti Malaysia Terengganu (UMT), Universiti Sains Malaysia (UMS), and Universiti Putra Malaysia (UPM).



**Najwa**  
**UNI.MALAYSIA**  
**TERENGGANU**



**Izzah**  
**UNI. PUTRA**  
**MALAYSIA**



**Mukhriz**  
**UNI. MALAYSIA**  
**TERENGGANU**



**Afiqah**  
**UNI.MALAYSIA**  
**TERENGGANU**



**Izzah**  
**UNI. SAINS**  
**MALAYSIA**



**Amirul**  
**UNI. MALAYSIA**  
**TERENGGANU**



**Zulaikha**  
**UNI.MALAYSIA**  
**TERENGGANU**

# SEA TURTLE MONITORING

From March to October, nightly beach patrols are conducted along the 1.4 km stretch of Pantai Chakar Hutan in collaboration with two rangers from the Department of Fisheries (DoF). The monitoring team arrives at the beach by 6:30 PM and remains on site until 7:30 AM. Patrols are carried out in shifts every 1 to 1.5 hours, commencing at 8:00 PM and concluding by 7:00 AM.

In order for effective coordination among the patrolling team, the 1.4 km beach is divided into 28 sections, each measuring 50 meters in length. This segmentation facilitates the identification of nesting density and preferred nesting locations, thereby enabling more accurate and efficient monitoring.

In addition to nightly patrols and egg retrieval, biometric data are systematically collected from nesting females. These data include facial photographs, tag numbers, curved carapace length, and curved carapace width. Newly encountered individuals are tagged by Department of Fisheries (DoF) rangers using redhead torches, which are used only after the turtles have completed egg-laying to minimise disturbance.

To supplement the tagging method, a photo-identification technique is used. This involves photographing the facial scute patterns on both the left and right sides of each turtle's face. Identification is performed through manual visual comparison by differentiating facial scale patterns, following the methodology described by Long & Azmi (2017). These two methods are complementary; in the event of tag loss, individuals can still be identified through photo-identification.

Upon completion of egg-laying, the eggs are carefully retrieved from the egg chamber. Once collected, the eggs will be relocated into our hatchery as soon as possible to ensure optimal incubation conditions and to increase hatching success.



*Retrieving turtle eggs from the egg chamber, after the mother has laid the eggs.*

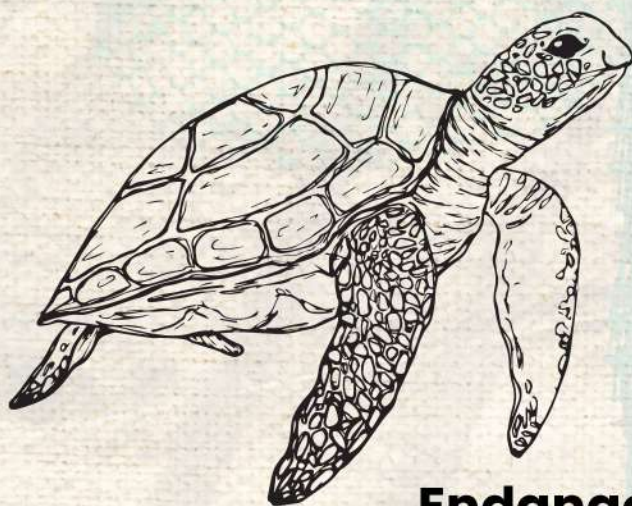


*Relocating sea turtle eggs into our hatchery right after retrieving the eggs from nest.*

# NESTING DATA

During the 2024 nesting season, a total of 28,628 green turtle (*Chelonia mydas sp.*) eggs were collected from 312 nests along the 1.4 km stretch of monitored beach. These eggs were relocated to our in-situ hatchery, and some of them were relocated to a beach section near our visitors' hut to optimise hatching success and minimise predation risks.

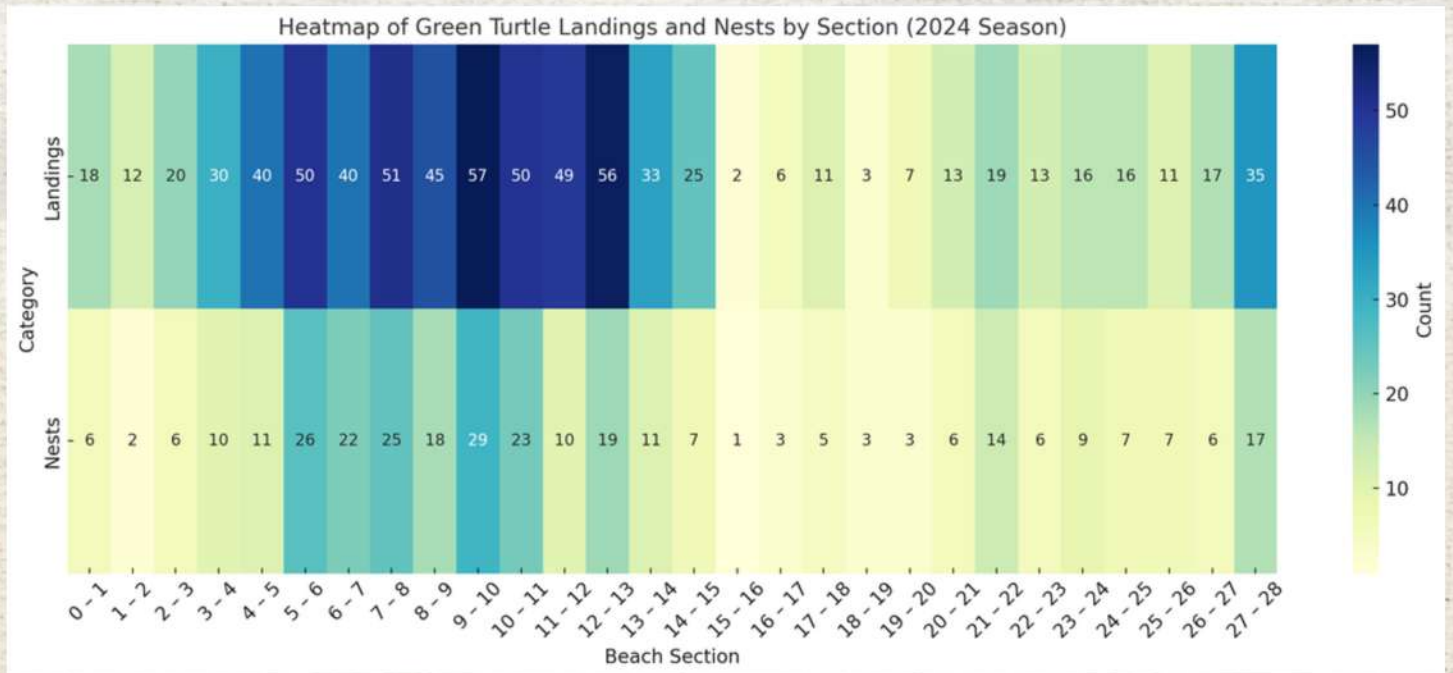
In contrast to previous years, no painted terrapin (*Batagur borneoensis sp.*) eggs were incubated in our hatchery in 2024. All painted terrapin nests, especially from Kerteh were managed and incubated under the supervision of WWF at the Ma' Daerah Hatchery. Furthermore, no nests were received from tendered beaches this season, resulting in all egg collection efforts being focused solely at Pantai Chakar Hutan.



**Endangered  
Green sea turtle  
312 nests  
28, 628 eggs**

# Nesting Distribution by Section

The highest nesting density was observed in sections 9–10, 5–6, and 7–8, suggesting a preference for these areas as nesting sites. In contrast, the lowest activity was recorded in the central to southern sections of the beach (sections 15–20), which may be attributed to environmental or anthropogenic factors.



A heatmap illustrating the distribution of green turtle landings and nests across each beach section along Pantai Chakar Hutan for the 2024 nesting season.

- Darker shades indicate sections with higher activity, helping visually identify nesting hotspots (e.g., Sections 9–10, 5–6, 7–8).
- Lighter shades represent lower activity areas.

# POST-EMERGENCE INSPECTION

Post-emergence nest excavations were conducted for all nests within the hatchery to determine the hatching success and emergence success rates. These excavations followed the emergence of hatchlings and were carried out following standard sea turtle conservation protocols.

Public engagement remains a vital component of our conservation approach. Members of the public were encouraged to visit the hatchery and actively participate in conservation activities. This not only provided an educational opportunity for visitors to learn about sea turtle biology and conservation but also allowed them to gain hands-on experience. In addition to learning how to excavate the nest contents, visitors can witness the release of hatchlings, including stragglers found during nest excavation, into the ocean.

In total, **25,012** hatchlings were successfully released into the ocean from Chakar Hutan Beach during the 2024 nesting season. When compared to the previous year (2023), there was a reduction of 1.89% in hatching success and 0.61% in emergence success. The average hatching success rate for 2024 was 88.08% (Standard Deviation = 13.59), while the average emergence success rate was 84.86% (Standard Deviation = 14.45).

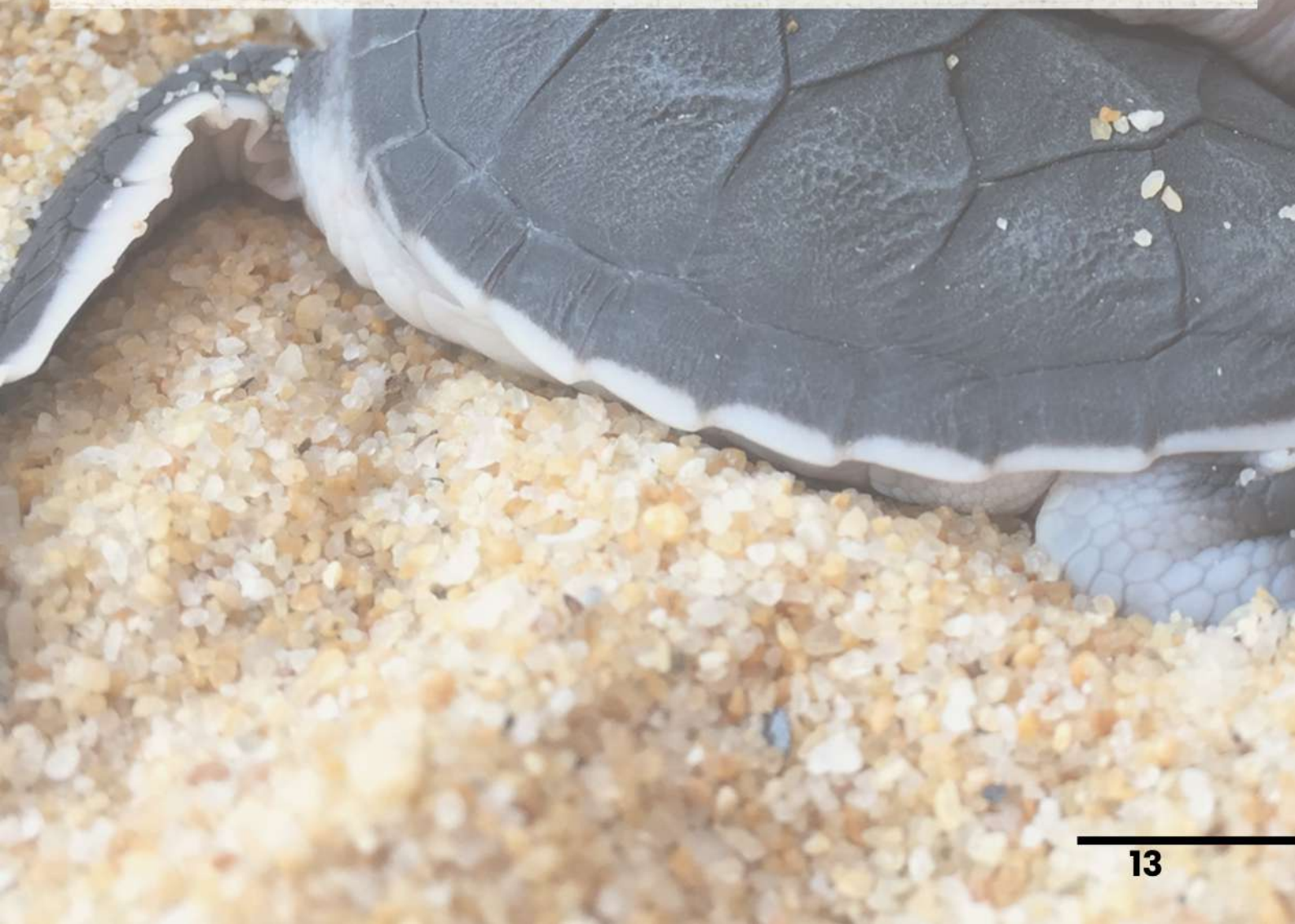
Although there was a decrease in both hatching and emergence success rates, the reduction is not considered significant. Moreover, the total number of nests recorded this season was much lower, with only 312 nests compared to over 500 nests in 2023. This decline in nest numbers may have affected the total hatchling output and contributed to the variation in success rates.



*Visitors are participating in a post-emergence inspection of a sea turtle nest in the hatchery. The local community are always welcome to join our hatchling release programs.*

The release of sea turtle hatchlings is a critical stage in the life cycle of marine turtles and plays a significant role in ensuring their natural imprinting process. In our conservation efforts, we are committed to employing the most ecologically sound practices. To this end, all green sea turtle (*Chelonia mydas* sp.) hatchlings emerging from our hatchery at Chakar Hutan Beach are released directly onto the beach, allowing them to crawl unassisted toward the ocean.

This natural crawl from the nest to the sea is essential for hatchling orientation and the imprinting of their natal beach, a process believed to guide females back to the same beach as adults for future nesting. The brief exposure to visual, magnetic, and chemical cues during this period is critical to their long-term navigation abilities.



# HATCHLING SEX RATIO

As part of our ongoing research, we studied the hatchling sex ratio of nests incubated in our hatchery. Unlike most animals, where sex is genetically determined during fertilisation, the sex of sea turtles is determined after fertilisation. Sea turtle embryos undergo temperature-dependent sex determination (TSD), in which higher incubation temperatures typically result in a greater proportion of female hatchlings, while cooler temperatures produce more males.

Nest temperature was monitored by deploying HOBO MX TidbiT 400 temperature loggers into a random nest during the egg relocation process. The data from temperature loggers were retrieved after the PEI and analysed to observe the hatchling sex ratio produced by the nest.

In total, 16 nests were monitored using temperature loggers. The findings revealed that:

- 9 out of 16 nests produced more than 50% female hatchlings.
- 4 nests produced fewer than 50% females.
- 2 nests recorded mean incubation temperatures of 28.07°C and 29.11°C, resulting in less than 1% female hatchlings, indicating that approximately 99% were male.

These results suggest that the shaded environment of our hatchery contributes to relatively cooler incubation temperatures, particularly during sunny periods. This supports existing research indicating that sand temperature strongly influences hatchling sex ratios. Through this study, we gain valuable insight into the outcomes of our conservation efforts and the potential impacts of environmental conditions on population dynamics.

<b>Nest</b>	<b>Days of incubation</b>	<b>Average temperature during temperature -sensitive period (°C)</b>	<b>Percentage of female hatchlings (%)</b>
CH1	51	29.85	100
CH16	52	29.34	99.99
CH24	56	30.37	91.85
CH40	56	28.57	91.02
CH85	54	28.5	46.71
CH128	56	28.16	80.03
CH157	62	28.41	11.74
CH180	63	29.11	0.71
CH193	62	28.07	0.85
CH217	53	27.64	99.91
CH231	53	27.9	99.91
CH239	59	28.47	28.6
CH250	59	28.48	26.73
CH260	57	29.28	86.25
CH272	56	28.34	64.22
CH273	58	30.07	30.44

*Table above shows nest temperature and sex ratio of 16 nests in our hatcheries.*

# NESTING POPULATION

Ongoing monitoring of nesting activities during the nesting season provides valuable insights into sea turtle nesting ecology and the dynamics of the nesting population.

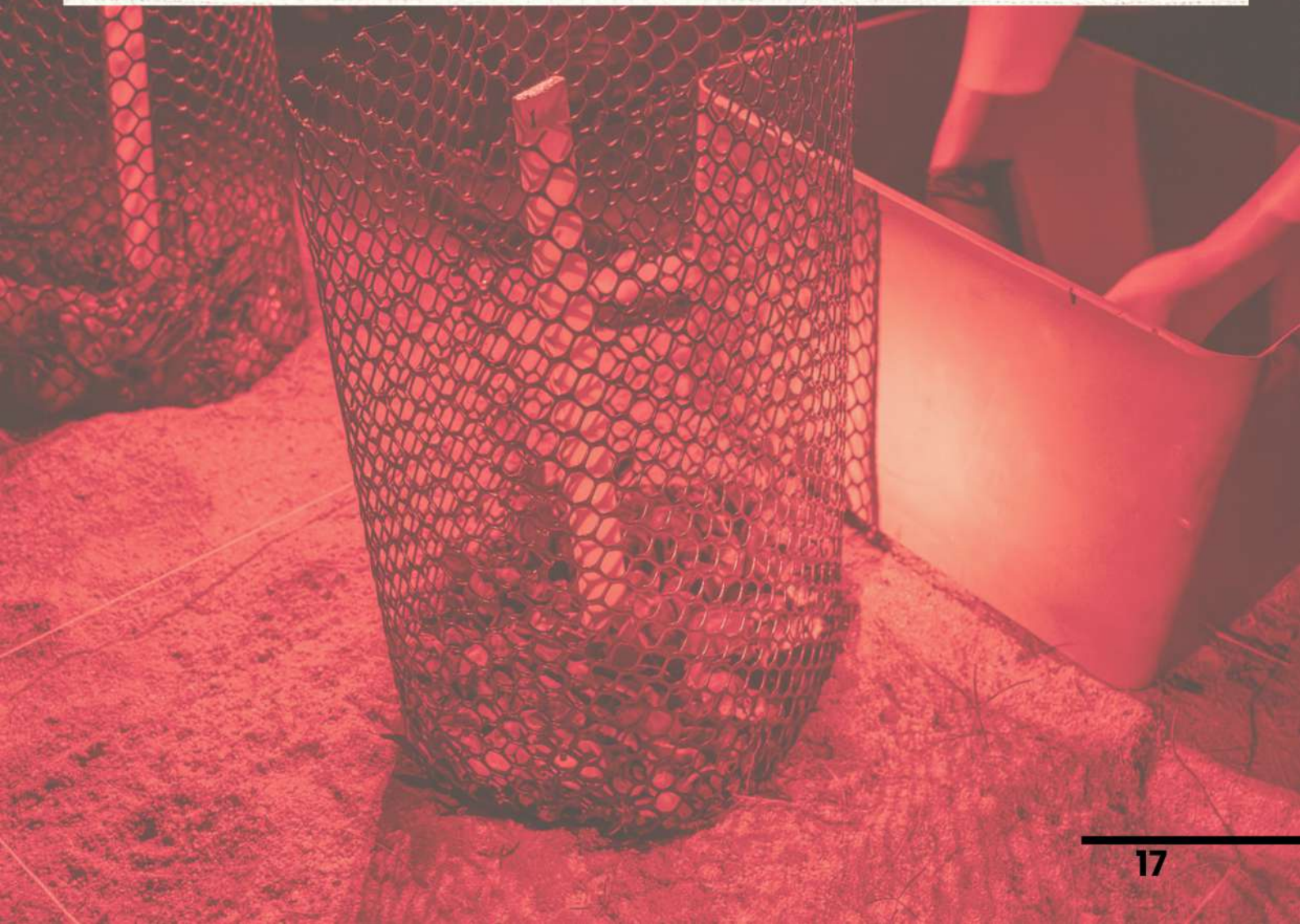
A total of 66 individual female green turtles were identified through tagging and photo-identification methods. One individual was recorded as attempting to nest during dawn hours. Of the 66 turtles identified, 14 individuals did not possess any tags, 28 individuals were tagged on both flippers, and the remaining turtles had a tag on only one flipper.

This season, 16 new individuals were tagged by the Department of Fisheries (DoF) rangers, staff, and interns. The tagging and photo-identification methods complement each other, enabling continued identification even if a turtle loses its physical tags.

Besides, five individuals were recorded nesting more than five times during the season. Our team removed the tag number MY(TRG)5941 from one turtle, as it was not securely attached to the right flipper, and replaced it with a new tag number, MY(TRG)5917. This individual, identified as CHG0198F and commonly known as Mayang, had the highest number of nests and laid the greatest number of eggs this season. She now bears tag number MY(TRG)5940 on the left flipper and MY(TRG)5917 on the right flipper.

Turtle ID	Turtle Name	No. of nests	Total eggs laid
CHG0181F	Debry	5	444
CHG0185F	Angela	5	589
CHG0194F	May	6	245
CHG0198F	Mayang	6	631
CHG0200F	Julia	5	526

*Nesting information of five individuals that nested more than five times at Chakar Hutan throughout the monitoring period in 2025.*



# STRANDING DATA

In 2024, a total of seven green sea turtles were found dead along Pantai Chakar Hutan. These cases were reported by both local residents and on-site staff. The stranded individuals consisted of five females and two males, and included turtles across various life stages—adults, sub-adults, and juveniles.

Six out of the seven cases were discovered during the early part of the nesting season (March and April). One of the cases involved a female turtle that was found deceased after nesting; she appeared to have drowned due to a collapse of sand over her body while attempting to cover her nest.

Sea turtle mortality may result from a variety of causes including, disease, injuries from boat strikes, entanglement in marine debris, ingestion of plastic, or complications during nesting. However, due to the lack of necropsy equipment and the absence of an official permit, our team was unable to conduct post-mortem examinations. According to the Fisheries Act 1985, it is illegal to disturb, harm, or engage in any activity that may adversely affect protected marine wildlife, including the handling of dead individuals without proper authorisation.

As a result, all carcasses were respectfully buried on-site at our beach. A stranding report form was completed for each case and submitted to the Department of Fisheries for official documentation.





*A stranded juvenile was found on 8th March 2024 by a local.*



*An adult female turtle was found dead, having drowned in the sand after laying her eggs (left) on 16th July 2024. Her body was later washed away by the ocean and discovered stranded on the beach by a local three days later (right). The tag numbers on both sightings were identical (middle), confirming the individual's identity.*



# OUTREACH

In 2024, our team successfully implemented Kelas Penyu (Sea Turtle Class), a public education initiative supported by a grant from The Habitat Foundation (THF). This programme aimed to raise awareness and strengthen community understanding of sea turtle biology, conservation issues, and the importance of protecting marine ecosystems.

A total of 21 Kelas Penyu sessions were conducted at the visitors' hut at Pantai Chakar Hutan. Each session focused on different aspects of sea turtle conservation, including:

- Sea turtle species identification
- Anatomy and life cycle
- Nesting behaviour and reproductive biology
- Threats to sea turtles (natural and human-induced)
- Laws and enforcement relating to sea turtles and egg protection

In total, 792 participants joined the sessions throughout the season, with an average of 37 participants per session. The sessions were designed to be interactive and engaging, allowing participants not only to learn but also to gain hands-on experience in sea turtle conservation. Educational materials—including posters, banners, and visual aids—were provided and sponsored by THF.

In addition to public education, the programme also emphasised capacity building within the local community. Selected members of the community were trained as local sea turtle facilitators, enabling them to take an active role in delivering Kelas Penyu sessions. This dual approach not only increased public awareness but also empowered local communities to become advocates for marine conservation.

By involving both visitors and locals, Kelas Penyu has proven to be a powerful platform for education, awareness, and fostering long-term stewardship of sea turtles and their habitats. The initiative reflects our commitment to inclusive conservation and marine education.



*A trained local facilitator delivering a Kelas Penyu session to participants from diverse backgrounds.*



*The Habitat Foundation (THF) also sponsored two training sessions for our local facilitators, equipping them with the necessary skills to deliver confident and effective educational talks during the Kelas Penyusu sessions*

In addition, our team organised a school outreach program in October 2024, inviting 30 students from SMK Kg. Baru Kerteh to visit our project site. The objective was to introduce the students to our sea turtle conservation efforts and provide hands-on exposure to field activities. The program included a beach cleanup, an educational turtle talk, and nest excavation in our hatchery. The students demonstrated high enthusiasm and engagement, actively participating in the activities and asking numerous questions throughout the session.



*A trained local facilitator delivering a Kelas Penyu session to participants from diverse backgrounds.*

# BEACH CLEAN UP

Marine debris, particularly plastic waste, continues to be a serious threat to sea turtle nesting habitats at Pantai Chakar Hutan. Accumulated debris along the coastline can obstruct hatchlings from reaching the sea, increasing the risk of predation, exhaustion, or disorientation. In addition to threatening hatchling survival, plastic waste also creates an unsuitable and uncomfortable nesting environment for adult female turtles.

As part of our conservation responsibilities, maintaining clean and debris-free beaches is essential to ensure a safe and supportive environment for both nesting turtles and emerging hatchlings. In 2024, our team carried out nine beach clean-up operations with the help of 75 dedicated staff members, interns, and volunteers. These efforts led to the successful removal of approximately 183 kilograms of marine debris from Pantai Chakar Hutan.

Through these clean-ups, we are not only helping to preserve the natural nesting grounds for sea turtles but also reinforcing our commitment to reducing the environmental pressures they face. The improved beach conditions contribute significantly to safer nesting and more successful hatchling journeys back to the ocean.

We would also like to extend our sincere gratitude to Miracle Spectrum for their continued support in sponsoring eco-friendly rubbish bags for our beach clean-up initiatives. The oxo-biodegradable rubbish bags provided by the sponsor have played a vital role in facilitating our efforts to remove debris from the nesting beach while minimising our environmental footprint.



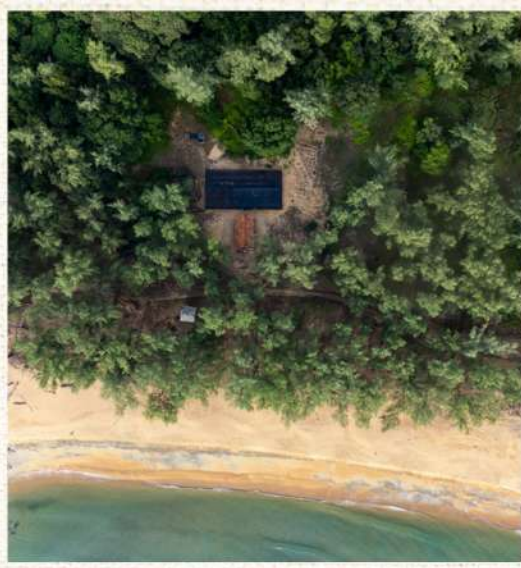
*Beach clean up with our team members and volunteers at Pantai Chakar Hutan*

# CONCLUSION

2024 marked the third year that our team launched a turtle conservation project at Pantai Chakar Hutan. We believe it continues to serve as a vital site for sea turtle conservation, where ongoing efforts in research, habitat protection, education, and community engagement have yielded a measurable impact. Beyond its ecological significance, Chakar Hutan holds great potential for Edutourism — a promising platform to integrate environmental education with responsible tourism.

With thoughtful planning and sustainable practices, we are confident that conservation and tourism can coexist and mutually benefit. Looking ahead, we remain committed to strengthening collaborations with both existing and new partners. Our future goals include expanding outreach and educational programs across Terengganu, particularly engaging kindergartens, primary, and secondary schools, to cultivate a more informed and environmentally conscious generation.

Furthermore, we hope to see increased participation from local communities in our conservation initiatives. Their involvement is essential in building long-term stewardship and ensuring the continued success of our efforts at Pantai Chakar Hutan.



# GALLERY