

RED SEA TURTLES PROJECT™

Distinctive Specialty Course

INSTRUCTOR GUIDE



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RED SEA TURTLES PROJECT™

Distinctive Specialty Course



Acknowledgements

RED SEA PROJECT™ is an international non-profit organisation dedicated to the protection and conservation of marine ecosystems and biodiversity in the Red Sea.

RED SEA PROJECT™ uses an inexpensive, simple, non-invasive method for the monitoring of marine turtles in the Red Sea. With the help of education and citizen science, anyone can help monitor and protect marine turtles.

RED SEA PROJECT™ collaborates with the PADI AWARE Foundation. This program is partially funded by the PADI AWARE Foundation's™ Mission Hub Community Grant.

Visit www.redsea-project.com to learn more.

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RED SEA PROJECT™

OUR MISSION AND COMMITMENT TO SUSTAINABLE DEVELOPMENT GOALS

As an organization deeply committed to environmental protection and nature conservation, in the RED SEA PROJECT™, we have effectively integrated the Sustainable Development Goals (SDGs) into our mission and operations. The SDGs provide a comprehensive framework for addressing social, economic, and environmental challenges, and we have identified the goals that align most closely with our mission. We have conducted a thorough assessment of our impact on these goals, further reinforcing our dedication to global sustainability and collaborative action.

Through our alignment with the SDGs, we are determined to make a significant and measurable contribution to sustainable development in the Red Sea region. By focusing our efforts on the identified goals, we aim to create a positive and lasting impact on the environmental well-being of the area. Our commitment to the SDGs serves as a testament to our unwavering dedication to fostering sustainable development and protecting the natural beauty and resources of the Red Sea.



RED SEA PROJECT™ is an international non-profit organisation dedicated to the protection and conservation of marine ecosystems and biodiversity.

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WHAT WE DO

The RED SEA PROJECT™ is an international non-profit organization dedicated to the protection and conservation of marine ecosystems and biodiversity. Our primary objective is to contribute to the realization of the United Nations Sustainable Development Goals' 2030 Agenda. As a grassroots conservation organization, we harness the power of education, research, and citizen science, collaborating closely with local communities, diving federations, and educational institutions to safeguard endangered species and the invaluable ecosystems they inhabit.

Our mission encompasses several key areas of focus:

- **Monitoring Marine and Terrestrial Ecosystems and Mega-Fauna:** We conduct extensive monitoring efforts to better understand the state of marine and terrestrial ecosystems and the well-being of key species. By gathering data and implementing targeted conservation programs, we strive to preserve the Red Sea's unique biodiversity.
- **Environmental Awareness Programs:** We prioritize raising environmental awareness among children, local workers, tourists, and visitors. Through engaging and informative programs, we aim to foster a sense of responsibility and appreciation for the marine environment.
- **Education:** Our team work closely with first-class organizations and educational institutions to establish a modern and comprehensive educational curriculum centered around the Red Sea and its biodiversity. Together with our esteemed partners, we develop cutting-edge materials and programs that provide in-depth knowledge of the unique marine ecosystem.
- **Citizen Science:** We actively involve divers, snorkelers, and the local community in citizen science programs. By encouraging their participation in data collection and research activities, we promote a sense of ownership and empower individuals to contribute to nature conservation efforts.
- **Conservation Strategies and Eco-Tourism Planning:** We work closely with stakeholders to design and implement effective conservation strategies and sustainable tourism plans. By striking a harmonious balance between conservation efforts and responsible tourism practices, we aim to ensure the long-term viability of the Red Sea's natural resources.

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I. Introduction

This section contains information on how to use this guide, an overview of course goals, and describes ways in which you can organise and integrate student diver learning. During this training, emphasis should be placed on enjoyment and safety.

Purpose

The purpose of the RED SEA TURTLES PROJECT™ Distinctive Specialty Course is to introduce participants (student divers and snorkelers) to marine turtle conservation and monitoring. During this training, emphasis should be placed on enjoyment and safety.

How to Use this Guide

This guide speaks to you, the RED SEA TURTLES PROJECT™ Specialty Instructor. It contains four sections as follows:

- Section 1: standards specific to this course
- Section 2: knowledge development presentations
- Section 3: confined water training
- Section 4: open water dives

All required standards, learning objectives, activities and performance requirements specific to the RED SEA TURTLES PROJECT™ Diver course appear in **boldface print**. The **boldface** assists you in easily identifying those requirements that you must adhere to when you conduct the course. Items not in boldface print are recommendations for your information and consideration. General course standards applicable to all PADI courses are located in the General Standards and Procedures section of your PADI Instructor Manual.

Course Overview and Goals

The goals of the RED SEA TURTLES PROJECT™ Distinctive Specialty Course training are:

1. To raise awareness about the importance of marine turtle conservation and introduce RED SEA TURTLES PROJECT™.
2. To introduce participants to the biology of marine turtles and their conservation status worldwide and in-particular in the Red Sea.
3. To introduce the concept of Citizen Science.
4. To teach participants how to correctly and reliably identify marine turtle species.
5. To teach skills such as photographic identification as a monitoring tool to record data.
6. To enable participants to plan, organise and execute a marine turtle survey in a manner that is safe for both the recorder(s) and environment, as well as in-keeping with turtle encounter practices and codes of conduct.
6. To provide awareness of marine ecosystem conservation opportunities through participation in RED SEA TURTLES PROJECT™.
7. To have participants submit data that contributes to sea turtle research and conservation.

Course Flow Options

There are two Knowledge Development sessions as part of the RED SEA TURTLES PROJECT™ Specialty Course.

The first Knowledge Development Session focuses on:

- **Introduction to Marine Turtles**
- **Taxonomy and Biology of Marine Turtles**
- **Sex Identification**
- **Senses**
- **Rare and Common Species**
- **Nest Biology, Life Cycle and Reproduction**
- **Ecological Role within Living Environments**
- **Threats and Conservation Status**

The second Knowledge Development Session focuses on training students on how to observe marine turtles and conduct a marine turtles Survey and how to upload data in the global database.

- **Code of Conduct and Best Practices for Turtles Watch**
- **Code of Conduct and Best Practices in Turtle Nesting Areas**
- **Code of Conduct and Best Practices during Hatching**
- **Health Abnormalities in Marine Turtles**
- **Code of Conduct and Best Practices for Sea Turtles in Abnormal Health**
- **RED SEA TURTLES PROJECT™**
- **How to Upload Your Turtle ID Photos**

A confined water dive is not required for the RED SEA TURTLES PROJECT™ specialty course. However, you may want to consider having a session that allows student divers to practice buoyancy to help student divers with monitoring skills such as assessing turtle behavior and writing underwater on a dive slate. You might consider pairing that confined session with PADI's Peak Performance Buoyancy Specialty Course.

There is one open water dive required for PADI Marine Turtles Monitoring Diver certification.

Student divers are also involved in recording and reporting data. It is a certification requirement that students must be involved in the complete process of citizen science research, from surveying sea turtles underwater to data entry. This hands-on approach prepares participants for independent monitoring of marine turtles, and to become valuable citizen scientists.

***Note to Instructor:** The instructor guides students, as a group, through the process of data submission. Make sure you have access to the RED SEA PROJECT™ website (www.redsea-project.com) to download educational materials.

Collected data is submitted to Internet of Turtles (<https://iot.wildbook.org>) to upload survey data results. Participants can enter their data using the Report Encounter page: (<https://iot.wildbook.org/submit.jsp>). This platform is completely free.

Course Option 1:

- Student divers complete Knowledge Development Session 1 and 2 and the Knowledge Review and Practical Survey.
- Practice Survey before participating in Open Water Dives 1 and data reporting.

Course Option 2:

- Participants complete Knowledge Development Session 1, then Knowledge Development Session 2, the Knowledge Review, Virtual Practice Survey, and finally Open Water Dive 1 and data reporting.

Knowledge Development sessions can be delivered as a face-to-face presentation or through a webinar using the Knowledge Development presentations.

RED SEA PROJECT™ will record these Knowledge Development sessions and make them available online for students. Please contact RED SEA PROJECT™ for further information.

II. Section One: Course Standards

This section includes the course standards, recommendations, and suggestions for conducting the RED SEA TURTLES PROJECT™ Diver course.

Certification Requirements

Divers must complete:

- Two knowledge development presentations including the Virtual Practice Survey and Knowledge Review
- Open Water Dives 1
- Data Entry of the marine turtle surveys and upload these to the global database of Wild ME

Depth Limits

Open Water Dive is limited to certification level for divers ages 12+.
For participants aged 10 - 11 the maximum depth is 12 metres / 40 feet.

Depth Prerequisites

Divers must be at least 10 years old and be certified at a minimum as a PADI (Junior) Open Water Diver.

Note: snorkelers and PADI Freedivers are encouraged to participate in the course but will have different administrative, certification and in-water requirements.

Equipment

As described in the General Standards and Procedures Guide, each diver will need:

- Underwater camera
- Underwater data slate with pencil

Note: The RED SEA TURTLES PROJECT™ data slate is recommended but any slate can be used for recording the information. Divers should write the survey date, time, and location on the slate during the pre-monitoring briefing whilst you explain the methodology. Divers will also need an underwater compass to help navigate in seagrass beds or wide sandy areas.

RED SEA TURTLES PROJECT™

Data Card

Survey Site Name:	Air Temperature:	°C
Team Leader:	Water Temperature:	°C
Survey Date: / /	GPS Coordinates:	
Vessel:	Latitude	°N
Wind Speed: Km/h	Longitude	°E

Nº	SPECIES	SEX (M/F/J)	LENGTH	WIDTH	DEPTH	TIME	NOTES
1							
2							
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							
13							
14							
15							
16							
17							
18							
19							
20							



Fig.1 RED SEA TURTLE PROJECT™ Data Card slate for data collection during turtle survey.

For snorkelers, participants must have:

- Mask, snorkel and fins
- Exposure suit
- Underwater camera
- Underwater data slate with pencil

Forms

Download the most current forms from the website www.padi.com/Pros. Check with your PADI Office for region-specific releases, applications or forms.

Required

- PADI Continuing Education Administrative Document (Int'l 10038 or EU 10541)

Recommended

- Youth Diving: Responsibility and Risks Acknowledgement (10615)
- Youth Diving: Responsibility and Risks Flipchart (79130) for children who are 10 - 11 years old

Instructor Ratings

Only current RED SEA TURTLES PROJECT™ Distinctive Specialty Instructors may teach the RED SEA TURTLES PROJECT™ Distinctive Specialty Course.

The PADI Specialty Instructor Application Form (10180) must be used when applying directly to PADI and written permission of the authors of the RED SEA TURTLES PROJECT™ Distinctive Specialty Course must be included in the submission to PADI.

For more information on certification as a PADI Specialty Instructor, please refer to the “PADI Professional Ratings” section of the PADI Instructor Manual. If you still have questions after reading this section, please contact your PADI Office.

Materials Instructor:

Required

- RED SEA TURTLES PROJECT™ Specialty Instructor Guide
- RED SEA TURTLES PROJECT™ Knowledge Development Presentations 1 and 2
- RED SEA TURTLES PROJECT™ Code of Conduct and Best Practices for Turtles Watch
- Marine Turtles ID Chart
- Marine Turtles Data Collection Slate
- RED SEA TURTLES PROJECT™ Knowledge Review
- RED SEA TURTLES PROJECT™ Virtual Practice Survey
- RED SEA TURTLES PROJECT™ Resource Toolkit
- Access to the RED SEA PROJECT™ website (www.redsea-project.com) to download educational materials

Access to the Internet of Turtles website (<https://iot.wildbook.org>) to upload survey data results

Recommended

- RED SEA TURTLES PROJECT™ Digital Tool Package
- PADI AWARE's 10 Tips for Divers to Protect the Ocean Planet
- PADI AWARE Manual – Our World, Our Water

Student:

Required

- RED SEA TURTLES PROJECT™ Marine Turtles of the Red Sea
- RED SEA TURTLES PROJECT™ Code of Conduct and Best Practices for Turtles Watch
- RED SEA TURTLES PROJECT™ Marine Turtles ID Chart
- Marine Turtles data collection slate
- How to submit your data to Internet of Turtles Guidelines

Recommended

- PADI AWARE's 10 Tips for Divers to Protect the Ocean Planet
- PADI AWARE Manual – Our World, Our Water
- Join My Ocean and PADI Torchbearer community Hub

Assessment Standards

Only current RED SEA TURTLES PROJECT™ Distinctive Specialty Instructors may teach the RED SEA TURTLES PROJECT™ Distinctive Specialty Course.

Students must gain knowledge by attending the RED SEA TURTLES PROJECT™ Knowledge Development presentations. You can assess presentation information by reviewing the student's Knowledge Review and the Virtual Practice Survey. The participant diver must demonstrate accurate and adequate knowledge during open water dives in a manner that demonstrates minimal or no stress.

Ratios

The participant to instructor ratio is 8:1. For any open water or confined open water dive that includes 10 - 11 year olds, the maximum ratio is 4:1 and where no more than 2 of the 4 participants may be aged 10 - 11. You cannot increase this ratio with the use of certified assistants.

Supervision

Direct Supervision:

Instructors must directly supervise all student divers on Dive 1 of this specialty course, and any Dive 2 dives that are conducted deeper than 12 metres / 60 feet.

Certification

Student divers are issued the RED SEA TURTLES PROJECT™ Distinctive Certification Card upon successful completion of the course.

Divers should also be encouraged to donate to receive the PADI AWARE version of their PADI certification card to support PADI AWARE Foundation's work.

Links to other courses

Divers who successfully complete the RED SEA TURTLES PROJECT™ Distinctive Specialty Course earn a credit towards the PADI Master Scuba Diver rating.

Divers may apply for the rating of PADI Dedicated Master Scuba Diver Rating if they are a PADI Advanced Open Water Diver and PADI Rescue Diver (or hold alternative accepted qualifying certifications from another organisation) with certification in at least four additional PADI Distinctive Specialty ratings. Divers must also show evidence of at least 50 logged dives.

Open Water Training

- For divers, the course consists of one open water dives.
- For snorkelers, the course consists of one snorkelling survey.

General Open Water Considerations:

Sequencing

- Before Open Water Dive 1, student divers must complete Knowledge Development Session 1 and 2 the RED SEA TURTLES PROJECT™ Knowledge Review and the RED SEA TURTLES PROJECT™ Virtual Practice Survey.

Students must also demonstrate that they can reliably identify the different species of marine turtles.

III. Section Two: Knowledge Development

Use the following teaching outline as a road map of the conduct, content, sequence and structure for the RED SEA TURTLES PROJECT™ course. The result should be student divers with theoretical knowledge and pragmatic experience who can adapt what they have learned to monitor marine turtles. Student divers will be able to explain the following learning objectives.

1. To raise awareness about the importance of marine turtle conservation and introduce RED SEA TURTLES PROJECT™.
2. To introduce participants to the biology of marine turtles and their conservation status worldwide and in-particular in the Red Sea.
3. To introduce the concept of Citizen Science.
4. To teach participants how to correctly and reliably identify marine turtle species.
5. To teach skills such as photographic identification as a monitoring tool to record data.
6. To enable participants to plan, organise and execute a marine turtle survey in a manner that is safe for both the recorder(s) and environment, as well as in-keeping with turtle encounter practices and codes of conduct.
6. To provide awareness of marine ecosystem conservation opportunities through participation in RED SEA TURTLES PROJECT™.
7. To have participants submit data that contributes to sea turtle research and conservation.

Class Requirements

- Cost of course (Be sure to explain all course costs)
- Equipment needs
- Materials needed for the course
- Attendance requirements

Administration

- Complete paperwork – Have students register and fill out PADI Continuing Education
- Administrative Document (10038 or EU 10541)

PADI AWARE Foundation™

Learning Objectives

By the end of this session, you will be able to:

1. Explain PADI AWARE Foundation™'s Mission and Purpose
2. Explain PADI AWARE Foundation™'s partnership with RED SEA PROJECT™

PADI Aware Foundation's Mission and Purpose

PADI AWARE Foundation™ empowers divers to protect our ocean planet – one dive at a time. PADI AWARE Foundation™'s engages with thousands of divers in more than 180 countries to combat two major ocean issues underwater – sharks in peril and marine debris. Join the growing movement of divers striving toward a clean, healthy and abundant ocean planet. (<https://www.padi.com/aware>)

PADI AWARE Foundation™ is a registered non-profit organization.



RED SEA TURTLES PROJECT™

The RED SEA PROJECT™ established the RED SEA TURTLES PROJECT™ in 2020 to monitor the population size, distribution, habitat usage, and migration patterns of these turtles throughout the year. By employing cost-effective, non-invasive monitoring techniques, individual turtles are counted, measured, and photo-identified. Photographic analysis of unique markings on the turtles' heads and carapaces enables accurate identification. Divers also record valuable data, such as behavior, sex, size, injuries, and any unusual observations. Additionally, the RED SEA PROJECT™ endeavors to safeguard the health of crucial ecosystems like seagrass meadows and coral reefs, which are essential for the survival of sea turtles. The collected data contributes to a better understanding of marine turtle populations in the Red Sea and aids in their protection.

As an integral part of the RED SEA TURTLES PROJECT™, the team organizes regular educational workshops and evening presentations to share accessible and non-invasive turtle monitoring techniques. Engaging both tourists and local community members as citizen scientists, the project encourages the sharing of information and documentation of turtle sightings. By collaborating with citizen scientists, the RED SEA PROJECT™ gains invaluable insights into the population structure and distribution of marine turtles, facilitating the implementation of effective conservation measures. The project's success is attributed to a combination of citizen science and fieldwork conducted by specialists. In 2023, over 8,000 turtle sightings were submitted to the Internet of Turtles platform, and multiple scientific publications were released. With the commitment of volunteers, interns, students, professionals, and tourists, this project is rapidly growing into one of the largest databases on marine turtles, furthering conservation efforts in the Red Sea.

PADI AWARE Foundation AWARE's Partnership with RED SEA PROJECT™

In 2022, PADI AWARE Foundation™ teamed up with the RED SEA PROJECT™ group to encourage divers and snorkelers to monitor marine turtles. This valuable relationship has seen RED SEA PROJECT™ monitoring and conservation tools promoted to thousands of divers worldwide. To learn more about the PADI AWARE Foundation• visit (www.padi.com/aware). To learn more about RED SEA PROJECT™ website (www.redsea-project.com).

WILD ME



WILDME

WILD ME's Mission

Our mission is to scale wildlife research and support conservationists by providing multi-feature techniques, speed, and accuracy in animal monitoring, replacing hours of human labor with minutes of computation to combat the ongoing sixth mass extinction. Wild Me promotes the cheaper and more scalable use of photography and AI-powered computer vision to identify individual wildlife, which avoids physically tagging animals and supports public integration using imagery taken from camera traps, aerial surveys, social media images and videos, tourists, and citizen science. We facilitate long-term data curation and collaboration, and empower researchers to leverage the potential of citizen scientists' contributions.

Problem

According to a 2020 study in the PNAS journal, a sixth mass extinction is underway, a trend signaled by widespread vertebrate losses that “may be the most serious environmental threat to the persistence of civilization, because it is irreversible”. Large-scale yet efficient responses and long-term population analysis are necessary for wildlife researchers to understand and respond to species' population decline. To effectively counter species' population decline, conservation projects require not only long-term data curation, collaboration, and engagement with the public, but also individual animal recognition capabilities. Researchers need access to advanced and adaptable computer science tools and technical experience to collect more animal imagery data, analyze it faster to identify individual animals, and use data to continuously optimize solutions in conservation. Isolated population studies provide insufficient amounts of data too sparsely, while manual data processing (by eye) adds years between studies so that results are unclear or too late for effective large-scale conservation action.

WILD ME's Solutions

We provide researchers with pioneering Codex platforms with advanced and adaptable computer science tools to collect more animal imagery data, analyze it faster in order to identify animals, and engage the public to continuously optimize solutions in conservation. These customizable platforms perform computational photo-identification for many species within minutes, enabling a global scientific community to collaborate online and identify individuals from these species from photos collected by tourists, tour operators, researchers, and the public. Our user base spans six continents of marine and terrestrial species research. Visit our platforms to discover the many species we support. visit (www.wildme.org)

III a. Knowledge Development I

Learning Objectives

By the end of knowledge development, student divers will be able to explain:

- Introduction to Marine Turtles
- Taxonomy and Biology of Marine Turtles
- Sex Identification
- Senses
- Rare and Common Species
- Nest Biology, Life Cycle and Reproduction
- Ecological Role within Living Environments
- Threats and Conservation Status

Introduction to Marine Turtles

Marine turtles (also known as sea turtles - superfamily Chelonioidea) comprise one of the most ancient lineages of surviving reptiles on the planet, having inhabited tropical and sub-tropical waters for millions of years.

Marine turtles are keystone species of seagrass meadows and coral reefs, playing a vital role in supporting healthy levels of productivity and other species' abundances. They also function as an important indicator for the relative health of the ecosystems within which they occur.

Seven living species of marine turtle are currently recognised, five of which inhabit the Red Sea. These are the green turtle (*Chelonia mydas*), hawksbill turtle (*Eretmochelys imbricata*), loggerhead turtle (*Caretta caretta*), olive-ridley turtle (*Lepidochelys olivacea*), and the leatherback turtle (*Dermochelys coriacea*). Of these, two species are frequently observed in the Red Sea: the green turtle and the hawksbill turtle.

Taxonomy and Biology of Marine Turtles

As members of the Chelonioidea, marine turtles are placed within the larger order Testudines (turtles and tortoises) of the class Reptilia (reptiles). This order Testudines is genetically most closely related to the crocodylians (Crocodylia) and birds (Aves). Of the seven marine turtle species, these have been split into two taxonomic families: the larger family Cheloniidae is represented by all species except the leatherback turtle, which is the only living member of the Dermochelyidae family.

Marine turtles are ectotherms (cold-blooded) and thus must rely primarily on external sources of heat to regulate their body temperature. This means they are unable to function as efficiently in colder environments and is one reason why we only find turtles within temperate and tropical waters. As with all reptiles, marine turtles are air-breathers and cannot respire directly from the water. Because of this, they must surface at regular intervals, whereby they hold their head above water and breathe through their nose.

Did you know?

The amount of time in which marine turtles can hold their breath depends on their size and level of activity. During active feeding they may hold their breath for between 10 to 40 minutes, but when sleeping they can hold their breath for up to 7 hours!

Carapace (shells)

The hard shell of a marine turtle consists of a back (carapace) and belly (plastron) that are connected at the sides. These are formed mainly of bone, comprised of around 50 to 60 individual bones developed from their ribs. On the outer surfaces, scales of keratin (in the Cheloniidae) called scutes cover the carapace and plastron to provide structural reinforcement. For leatherback turtles, these keratinous scales are replaced by bony plates. A marine turtle's streamlined shell and flattened flippers allow them to be brilliantly adapted for efficient swimming.

Sex Identification

For mature individuals, identifying the sex of marine turtles is straightforward and requires examination of only the tail. In males the tail is long and thick, extending beyond the back flippers and housing the reproductive organs. In females, the tail is considerably shorter and extends only slightly beyond the carapace.

Senses

Marine turtles have well-developed, light-sensitive eyes and can see in full colour. They lack visible ears or ear-openings (the ear is covered by scales) but have effective hearing and can respond to a broad range of auditory cues. Marine turtles also have olfactory and chemical signal detectors.



Fig.2 Marine Turtles of the Red Sea.

Common Species Overview:

- Green turtle (*Chelonia mydas*)
- Hawksbill turtle (*Eretmochelys imbricata*)

Rare Species Overview:

- The Loggerhead Turtle (*Caretta caretta*)
- Olive ridley turtle (*Lepidochelys olivacea*)
- Leatherback turtle (*Dermochelys coriacea*)

LOGGERHEAD TURTLE *Caretta caretta*

Sporting a reddish-brown colouration with a yellowish underside, loggerhead turtles are named for their large heads that support powerful jaw muscles that facilitate in crushing hard-shelled prey like sea urchins. They tend to venture into colder waters more than other hard-shelled turtle species.

Diet: Carnivorous
Molluscs, urchins & crustaceans

Range:
Tropical to temperate seas

Weight:
Up to 110 kg

Size:
Adult: up to 1.2 m
Juvenile: up to 0.6 m

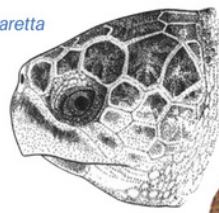
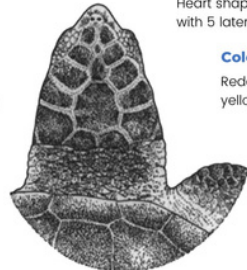


SCAN FOR
MORE INFORMATION

Head:
Large & rounded
with a strong jaw

Carapace:
Heart shaped & rough
with 5 lateral scutes

Color:
Reddish/brown with a
yellowish/light underside



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Illustrations: Research and Management Techniques for the Conservation of Sea Turtles, IGCN - SSC -
Marine Turtle Specialist Group and NOAA



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Fig. 3 Informative slide of *Caretta caretta* sea turtle species.

Loggerhead turtles are named for their comparatively large heads that support powerful jaw muscles that facilitate in crushing hard-shelled prey like clams and sea urchins. Loggerheads may reach up to 1.2 metres in length and weigh 110kg. Their carapace is reddish-brown with a light / yellowish underside and is formed of 5 lateral scutes. Each flipper has 2 discreet claws. Like all marine turtles, this species is threatened by illegal egg collection, hunting, a loss of nesting sites, and as bycatch (unintentional capture) in fishing gear.

OLIVE RIDLEY TURTLE *Lepidochelys olivacea*

The olive ridley turtle is the second smallest marine turtle species in the world and the smallest occurring in the Red Sea. They are the most globally abundant of all marine turtles, however their nesting sites are limited to very few places around the world and thus are highly vulnerable to disturbance.

Diet: Omnivorous
Molluscs, crustaceans & algae

Range:
Tropical & subtropical seas

Weight:
Up to 50 kg

Size:
Adult: up to 0.8 m
Juvenile: up to 0.6 m

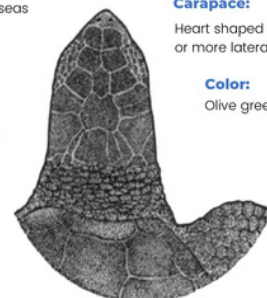


SCAN FOR
MORE INFORMATION

Head:
Small & narrow

Carapace:
Heart shaped & smooth with 6
or more lateral scutes

Color:
Olive green/brown



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Marine Turtle Specialist Group and NOAA



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Fig. 4 Informative slide of *Lepidochelys olivacea* sea turtle species.

Named after their olive-green carapace, these are the second smallest marine turtle species in the world (after the Kemp's ridley) and the smallest in the Red Sea, growing up to around 70cm long and weighing up to 50kg. The olive green / brown carapace is made of 6 or more lateral scutes, while on the flippers there are either 1 or 2 rather discreet claws. They are the most globally abundant of all marine turtles, however their nesting sites are limited to very few places around the world. Olive ridley populations are thus highly vulnerable to disturbance.

LEATHERBACK TURTLE *Dermochelys coriacea*

The leatherback turtle is the largest of all marine turtles and the only member of the 'soft-shelled' family Dermochelyidae. Their black leather-like carapace is formed of 5-7 ridges and supported by bony plates under a thin layer of skin - unlike all other marine turtles that instead have keratinous scutes.

Diet: Omnivorous
Jellyfish & sometimes algae

Range:
Tropical to temperate seas

Weight:
Up to 800 kg

Size:
Adult: up to 3 m
Juvenile: up to 1.2 m

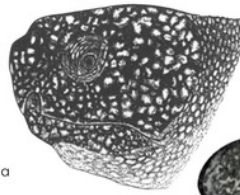
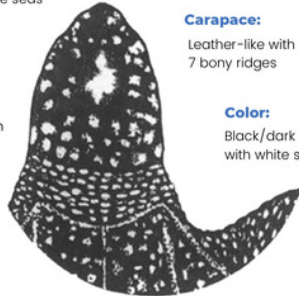


SCAN FOR
MORE INFORMATION

Head:
Large & round with a
notched beak

Carapace:
Leather-like with 5 to
7 bony ridges

Color:
Black/dark grey
with white speckles



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Illustrations, Research and Management techniques for the Conservation of Sea Turtles, IUCN - SSC -
Marine Turtle Specialist Group and NOAA.



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Fig. 5 Informative slide of *Dermochelys coriacea* sea turtle species.

Leatherback turtles are a special sight to behold in the Red Sea. They are the largest of all marine turtles and the only species not included in the family Cheloniidae. Named for their leather-like carapace, they can measure up to 3 metres in length and weigh over 700kg. The carapace; black or dark grey in colour and adorned with white speckles; is formed of 5-7 ridges supported by bony plates covered by a layer of thin leathery skin, unlike all other marine turtles that instead have keratinous scutes. They are also unique in that they lack claws. Leatherbacks have the most worldwide distribution of all marine turtle species and often venture into colder waters, however their populations have declined dramatically over the last 50 years as a result of intense egg collection and fishery activity. All leatherback turtles are protected by local and international laws.

GREEN TURTLE *Chelonia mydas*

The green turtle is the second largest and the only truly herbivorous species of marine turtle. They are named after their green fat and cartilage (not their carapace) which are thought to be caused by their diet of plants and algae. They may migrate huge distances between feeding and hatching grounds.

Diet: Herbivorous

Plants (such as seagrasses) & algae

Range:

Tropical & subtropical seas

Weight:

Up to 185 kg

Size:

Adult: up to 1.4 m
Juvenile: up to 0.8 m



SCAN FOR MORE INFORMATION

Head:

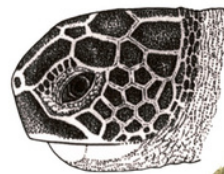
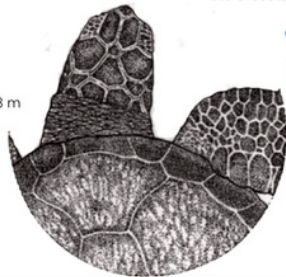
Small, blunt & roundish

Carapace:

Smooth & ovular with 4 lateral scutes

Color:

Dark/olive green/grey



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Fig. 6 Informative slide of *Chelonia Mydas* sea turtle species.

The green turtle is the largest hard-shelled and the second largest of all marine turtle species. They are named after their green fat and cartilage caused by their herbivorous diet of seagrasses and algae. Green turtles may measure up to 1.4 metres in length and weigh 185kg. Their dark olive green / grey carapace is formed of 4 lateral scutes, while each flipper has only one discreet claw. Nesting in over 80 countries, they are widely distributed across mainly tropical and subtropical oceans and can migrate huge distances between their feeding grounds and the beaches from where they hatched (this is called natal homing or philopatry).

HAWKSBILL TURTLE *Eretmochelys imbricata*

Hawksbill turtles are named after their characteristic narrow and pointed beak (which resembles a hawk's), and are associated particularly with coral reefs. They are the second smallest marine turtle found in the Red Sea, and use their specialised beaks to extract soft-bodied prey items from the reef.

Diet: Omnivorous

Soft corals, sponges & algae

Range:

Tropical & subtropical seas

Weight:

Up to 68 kg

Size:

Adult: up to 1.1 m
Juvenile: up to 0.7 m



SCAN FOR MORE INFORMATION

Head:

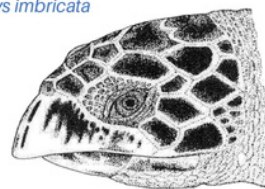
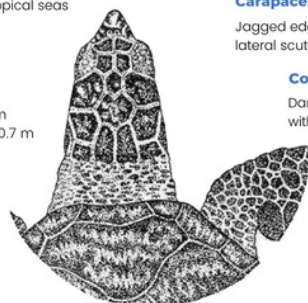
Long & pointed with a sharp beak

Carapace:

Jagged edges with 4 lateral scutes

Color:

Dark brown/black, flecked with light/red markings



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Fig. 7 Informative slide of *Eretmochelys imbricata* sea turtle species.

Hawksbill turtles are named after their characteristic narrow and pointed beak (which resembles a hawk's), and are found mostly across the world's tropical oceans, especially on coral reefs. The second smallest marine turtle found in the Red Sea, they may grow up to around a metre in length and weigh up to 68kg. The carapace is comprised of 4 lateral scutes and is either black or dark brown, flecked with light brown, yellowish or red markings. Each flipper has 2 discreet claws. Hawksbills feed mainly on soft corals and sponges using their specialised beaks, but also feed on anemones and jellyfish.

Nest Biology, Life Cycle and Reproduction

Marine turtle mating occurs out at sea, after which the female will come onto dry land to lay her eggs on sandy beaches. The female excavates a suitable hole in the sand using her flippers as shovels, before laying her eggs in the nest cavity and covering her eggs with sand to disguise the nest. For all sea turtle species, the eggs are left to incubate for around 45 - 60 days before the young then hatch out of their eggs. Depending on the species, a female may lay between 50 to 400 eggs in 1 to 8 clutches per season.

Did you know?

The sex of a marine turtle depends on the temperature at which it is incubated within the egg. A nest temperature higher than 29°C will produce female turtles, while a temperature of less than 29°C will produce male turtles. This is known as temperature-dependent sex determination. In your opinion, what could be the consequences of global warming on marine turtle populations?

Hatching occurs at night in mass synchronisation with other hatchlings within the nest (and often with other nests on the beach), in which the hatchlings make a quick dash towards the water. The definitive cause of synchronous hatching is unknown, but several factors are thought to aid the process such as vocalisations, CO₂ concentrations in the nests, detection of movement from other hatchlings, and relative stable nest temperatures. Simultaneous hatching provides safety in numbers where predators would otherwise overwhelm the young. To find the water, the hatchlings orientate themselves on the reflection of the moon and stars on the water, as well as by the downwards slope of the beach.

Once the hatchlings make it to the ocean they will swim offshore and spend their first years at the surface following oceanic currents, and in Sargassum or other seaweed floats that provide shelter from predators. Here they feed on small animals and algae that they find in the water. These years are known as the 'the lost years' as individuals are rarely seen during this time. Hatchlings will stay within these seaweed floats until they are large enough to make their way toward feeding grounds such as seagrass meadows or coral reefs, depending on the species.

The life of a marine turtle can thus be represented by a cycle:

- An adult female comes ashore to lay eggs on the beach.
- After incubation, hatchlings emerge from the nest and move quickly towards the sea.
- Upon reaching the sea, the baby turtles enter a period of their lives termed the 'the lost years': a time of development and growth about which we know very little. What we do know is that these young turtles spend a lot of time at the surface following oceanic currents and feeding on the small animals and algae they find in the water.
- Once they reach a certain size, the young turtles move on towards suitable feeding grounds where they will stay until adulthood.
- As adults, both male and female marine turtles migrate to and from various breeding and feeding grounds, however females will return every few years to their nesting beaches to lay eggs.
- Once the females lay eggs, the cycle starts once again.

Did you know?

Marine turtles may migrate huge distances between feeding and nesting grounds: some species even display natal homing (also called philopatry), whereby they will return to the same beach to lay their eggs that they themselves hatched from. To do this, marine turtles utilise the Earth's magnetic field for orientation

Ecological Role within Living Environments

Different species of sea turtle fulfill different roles in maintaining the ecosystems in which they live. For example, green turtles are crucial to the health of seagrass meadows; by grazing they stimulate seagrass growth and maintain a healthy balance of species compositions. Hawksbill turtles are important in controlling populations (for example of sponges) that are potentially harmful to the reef ecosystem and would otherwise envelop slower-growing corals and other reef-building organisms.

1. Maintain seagrass meadows: Green turtles are crucial to the health of seagrass meadows. We know that seagrass beds are an important habitat that serves as a nursery ground for many important species. Green turtles continually graze seagrass meadows, stimulating seagrass growth. This behaviour also prevents the seagrass meadow from becoming overgrown, which would obstruct currents, shade and eventually decompose the benthos.

2. Promote coral reef biodiversity: Hawksbill turtles feed selectively on corals and sponges which would normally compete for space with each other. With their feeding behaviour, hawksbills maintain a healthy balance of sponges and corals within the reef ecosystem, further promoting coral reef biodiversity.

3. Keep the marine food web balanced: Leatherback turtles feed on large amounts of jellyfish, keeping their populations under control. Green, hawksbill and loggerhead turtles are also known to feed sporadically on jellyfish. Blooms of jellyfish can be a problem for the tourism sector (people are fearful of being stung) and as predators of fish larvae they can impact negatively on fish populations.

4. Provide key habitats for other marine life: Most marine turtles carry epiphytes: these are organisms such as barnacles, algae, and other taxa that survive by attaching to other animals; including on a turtle's shell. Various species of fish and invertebrates feed on these 'hitchhikers' specifically at areas known as 'cleaning stations' around the reef. Furthermore, by carrying these species, marine turtles help to distribute them between different ecosystems.

5. Facilitate the transport of nutrients through trophic levels: The beach is an environment naturally poor in nutrients, however it hosts many species of animals and plants. Marine turtles; through unhatched eggs, egg shells, and hatchlings that die during egg development; provide nutrients for beach vegetation. This vegetation acts to stabilise beach sediment layers and thus, also stabilises turtle nesting grounds. Stranded turtles also provide a mini-ecosystem for scavengers such as birds, mammals and insects. Finally, nesting female turtles, their eggs and their hatchlings are the natural prey for a number of terrestrial and marine animals.

Threats and Conservation Status

The most serious threats that marine turtles face are anthropogenic (human). Anthropogenic factors occur at all stages within a turtle's life cycle. For example, most nesting beaches on the mainland are no longer suitable due to development and degradation, with remaining nesting habitats occurring on undeveloped ground. Light pollution on beaches confuses hatchlings that mistake artificial lights for moonlight-water reflections - and thus hatchlings often move away from the water and do not survive. Bycatch and entanglement in fishing gear from fisheries (including from ghost nets and trawling) trap and suffocate marine turtles, greatly reducing their populations. The prevalence of plastics (especially clear plastics) within marine ecosystems is another risk as these are mistaken for food and become ingested, blocking the digestive system. Increased global temperatures and a loss of coastal vegetation increases nest temperatures by reducing natural shade on beaches. Such changes are detrimental to the sex ratios of newborn turtle generations due to temperature-dependent sex determination.

All marine turtle species in the Red Sea are threatened with extinction based on assessments by the International Union for Conservation of Nature (IUCN), the most comprehensive inventory of the conservation status of biological species around the world. The IUCN has produced a 'Red List' which classifies species into one of nine main categories of extinction severity - within which three are assigned under the umbrella of 'threatened with extinction': Vulnerable (VU), Endangered (EN) and Critically Endangered (CR). The determination of a species' status within the IUCN's Red List is based on evaluations of numerous factors including rate of decline, population size, area of geographic distribution and degree of population fragmentation. Each of the nine main categories is described below:

- **Extinct (EX)** - No doubt that there remain no surviving individuals (e.g. Tasmanian tiger)
- **Extinct in the Wild (EW)** - Survives only in captivity or cultivation (e.g. barbary lion)
- **Critically Endangered (CR)** - Facing an extremely high risk of extinction in the near future (e.g. great hammerhead, hawksbill turtle, Kemp's ridley turtle)
- **Endangered (EN)** - Facing a very high risk of extinction in the near future (e.g. ring-tailed lemur, green turtle)
- **Vulnerable (VU)** - Facing a high risk of extinction in the near future (e.g. Indian rhinoceros, loggerhead turtle, olive ridley turtle, leatherback turtle)
- **Near Threatened (NT)** - Likely to become threatened in the near future (e.g. tiger shark)
- **Least Concern (LC)** - No immediate threat; unlikely to face extinction in the near future (e.g. common bottlenose dolphin)
- **Data Deficient (DD)** - Not enough information acquired to sufficiently evaluate conservation status (e.g. flatback turtle)
- **Not Evaluated (NE)** - Not yet assessed (e.g. eastern osprey)

Unfortunately, the latest assessment for any marine turtle species by the IUCN is from 2015 (for the loggerhead turtle), and even dates back to 2004 in the case of the green turtle. As a result, and as highlighted by the IUCN themselves, these evaluations are vastly outdated and most species are marked as 'update needed'. The likelihood is that a new assessment of the conservation status of marine turtles will result in turtle species being assigned a more threatened status than previously evaluated.



III b. Knowledge Development II

Learning Objectives

By the end of knowledge development, student divers will be able to explain:

- Code of Conduct and Best Practices for Turtles Watch
- Code of Conduct and Best Practices in Turtle Nesting Areas
- Code of Conduct and Best Practices during Hatchlings
- Health Abnormalities in Marine Turtles
- Code of Conduct and Best Practices for Sea Turtles in Abnormal Health
- RED SEA TURTLES PROJECT™
- How to Upload Your Turtle ID Photos



Code of Conduct and Best Practices in Turtle Nesting Areas

If you are lucky enough to be on the beach while turtles are nesting please follow these guidelines:

- ✓ Avoid off-road driving especially on the beaches of the Red Sea.
- ✓ As soon as a turtle is spotted at the beach, move away to a distance of at least 20 metres.
- ✓ If the event is occurring at night, keep all lights off and do not point light at the turtle's eyes.
- ✓ Avoid flash photography! The light of a flash could disturb or disorient the turtle and can endanger the nesting process.
- ✓ Always stay behind the turtle where it can't see you.
- ✓ Don't try to touch the turtle or move it from its original position.
- ✓ If you think that the turtle is in distress, DO NOT intervene. It is best to inform the authorities immediately.

If you are lucky enough to be on the beach during a hatching event please follow these guidelines:

- ✓ Keep your distance to the hatchlings (at least 2m) and stay behind them.
- ✓ Never touch hatchlings! Why?
 - The shell of a hatchling is very soft and fragile. Touching it can cause damage to the shell as well as to the organs.
 - To be able to return to the same beach to lay eggs as adults, the hatchlings need to crawl on the beach by themselves to imprint their beach of origin. In addition, the movements with their flippers prepare them for swimming in the water.
 - Hatchlings can carry Salmonella bacteria which could be transmitted to children and adults. Furthermore, harmful bacteria on human hands could be transmitted to the hatchlings.
- ✓ Keep lights off and ask restaurant / bar owners nearby to switch off all their lights.

Health Abnormalities in Marine Turtles

While observing turtles you may encounter a turtle that is displaying signs of abnormal health. Below we have listed signs and symptoms of common causes of health abnormalities in turtles observed in the Red Sea.

- If you see a turtle that is struggling to dive down, it may be suffering from Floating Syndrome.
- When a turtle's shell appears opened with a vertical or horizontal fissure the turtle has a broken or fissured carapace.
- When a turtle has wounds or cuts on the external body surface this has most likely been caused by large predator attacks.
- You may also see turtles with fishing hook injuries and in many cases, the hook will still be attached.
- Foreign body ingestion is another common cause of health abnormalities in turtles but there will be no obvious external signs of this.



Fig. 9; Fig.10 A Hawksbill turtle affected by a health abnormality related to its lungs. The lung infection was limiting the diving capabilities of the turtle, meaning it was unable to feed; for this reason the individual was kept under observation until cured before being released back to its natural habitat.

Code of Conduct and Best Practices for Sea Turtles in Abnormal Health

DO

- ✓ Try to identify if the turtle is alive or dead by observing if there is any movement.
- ✓ If possible, take identification photographs of the turtle.
- ✓ Immediately notify your dive guide/instructor or send your report to RED SEA PROJECT™ at www.redsea-project.com/reportsighting, and try to give the following information:
 - If the sea turtle was alive or dead.
 - Where you observed it.
 - Approximate size of the turtle.
 - Any external signs of health abnormalities.
 - Any tags or notable marks on the turtle.
 - Turtle identification photographs.

DON'T

- ✗ DO NOT touch the turtle to check its health status.
- ✗ DO NOT attempt to move the turtle.

How to Upload Your Turtle ID Photos

To provide the best opportunity at identifying a sea turtle you have seen, we would ideally like a photo of its carapace, as well as both sides of its head. Please try your best to do this without disturbing the turtle. We know that such angles are not always possible and will try to make the most out of every photo submitted.

Download your copy of “Data Submission to IOT” [LINK TO MANUAL](#)

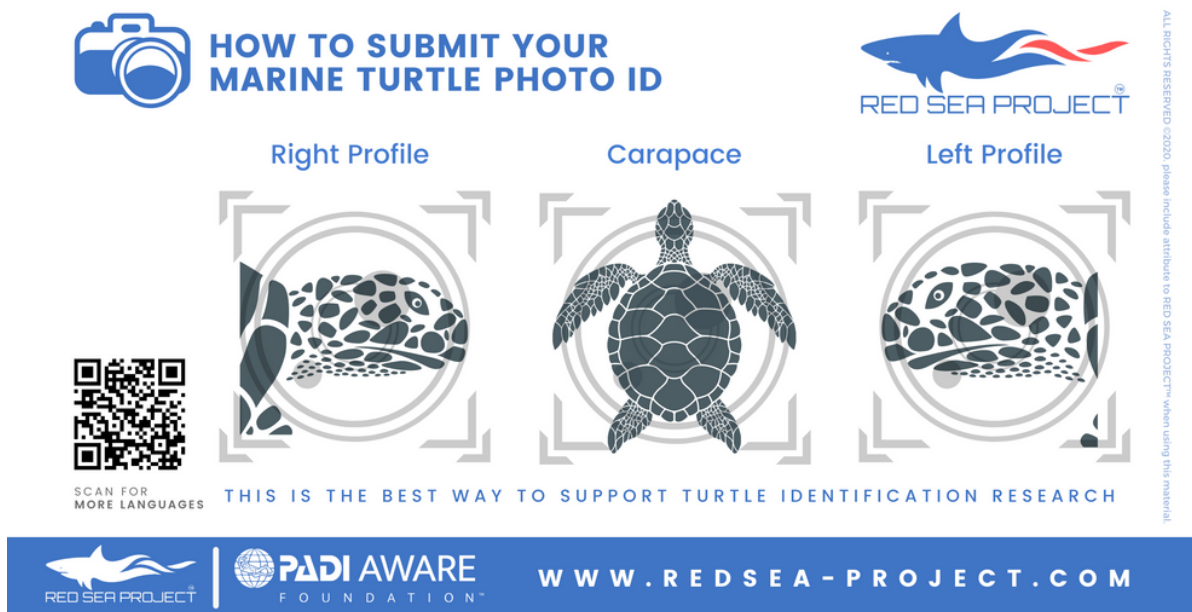


Fig.11 Informative slide showing the photos needed for sea turtle photo identification and how to correctly submit them through RED SEA TURTLES PROJECT™ page of Internet of Turtles,

Internet of Turtles

Once you have collected the photos and information on the turtle/s you have encountered, you need to upload to the database. For this you will use the RED SEA TURTLES PROJECT™ page on Internet of Turtles, a global database that uses photographic images to identify individuals and records any further encounter as well as some biological and environmental data on the turtles encountered.

RED SEA TURTLES PROJECT™ uses the platform to identify and track individual turtles regularly visiting the bays of the Red Sea, as well as new individuals appearing in the area for the first time.

For each submission to the database, data related to the turtle's size, sex, life stage and behaviour needs to be uploaded; additionally information about the encounter, such as depth, date, time and GPS coordinates can also be very useful.

For a step by step guidance use the Data Submission Guideleines.

IV. Section Three: Open Water Dives

Confined Water Training

The course does not include confined water training for divers or snorkelers unless instructors choose to conduct a snorkel or scuba skills review in confined water as a per-assessment.

Plan Your Dive

Plan your marine turtles survey to be safe and fun while carefully considering the environment and the experience levels of all divers.

Use these considerations to choose your survey site:

- Choose a site you can return to regularly.
- Your surveys will have more value if you collect data from the same site over a period of time.
- Choose a site within the dive skills and experience of all participants.
- Choose a dive site that has marine turtles present.

Remember safety is your primary consideration. Follow all normal safe diving practices and consider a safety diver – either on the boat or on the shore.

General Open Water Considerations

1. Involve student divers in dive-planning activities. Lead a discussion on choosing an ideal survey site and effective methods for monitoring marine turtles in buddy pairs.
2. Conduct a thorough briefing, as a good briefing will lead to a better learning experience. Review with students the survey method for conducting a marine turtles survey and any additional information to ensure a safe dive in your location.
3. Assign logistical duties to staff if available and consider the use of a safety diver.
4. Stress the importance of diver safety over turtles monitoring.
5. After the dive, involve all students in reporting the marine turtles survey results and as a data to the Internet of Turtles global database.

Open Water Training Dive (Certified Diver – only)

Learning Objectives

By the end of this session, you will be able to:

- i. Demonstrate a controlled entry and descent
- ii. Demonstrate neutral buoyancy by hovering
- iii. Identify marine turtles
- iv. Identify behaviour and sex (if any) and take notes/photos
- v. Maintain a safe and comfortable distance from the turtles while taking notes
- vi. Demonstrate understanding of how to use the RED SEA TURTLES PROJECT™'s data collection sheet and take notes of animal width and length
- vi. Perform a controlled safe exit

Briefing

- a. Evaluation of conditions.
- b. Dive boat orientation, if applicable.
- c. Entry techniques.
- d. Exit techniques.
- e. Bottom composition and topography.
- f. Depth range.
- g. Ending tank pressure – when to terminate the dive underwater.
- h. Interesting/helpful facts about the dive site.
- i. Sequence of training dive – review Dive One tasks:
 - Entry
 - Neutral buoyancy exercise
 - Conduct photographic identification and Identify marine turtle species
 - Identify behavior (feeding, sleeping, surfacing etc.)
 - Take note of any other behavior
 - Take measurements of width and length of the marine turtle
 - Exit
- j. Special communication underwater and topside (review boat recall system if applicable).
- k. What to do if an emergency arises.
- l. What to do if student loses class/buddy underwater.
- m. Buddy assignments.

Pre-dive Procedures

- a. Prepare personal diving equipment
- b. Determine the no decompression limits using a dive computer or using the Recreational Dive Planner
- c. Perform proper pre-dive safety check – BWRAF

Debriefing

- a. Provide positive comments regarding student performance
- b. Problems encountered during the dive and those to be avoided on future dives
- c. Discuss conducting a complete marine turtles survey
- d. Discuss the predominant
 - different species of turtles observed during the dive
 - different behaviors observed during the dive
 - turtles sex and sizes observed
- e. Log dive (instructor signs log)
- f. Data entry to Internet of Turtles:
Data entry to Internet of Turtles: <https://iot.wildbook.org/>
- g. Post Dive Briefing



Fig.12 Photo of RED SEA PROJECT™'s intern collecting data and photo identification of a green turtle in Marsa Abu Dabbab during a sea turtle survey dive.

V. Section Four: Practical Sessions Snorkeler

Open Water Training Snorkel Dive

By the end of this session, you will be able to:

- i. Demonstrate a controlled entry
- ii. Identify marine turtles
- iii. Identify behavior and sex (if any) and take notes/photos
- iv. Take identification pictures/videos
- v. Demonstrate understanding of how to use the RED SEA TURTLES PROJECT™'s data collection sheet and take notes of animal width and length
- vi. Maintain a safe and comfortable distance from the turtles while taking notes
- vii. Perform a controlled safe exit

Briefing

- a. Evaluation of conditions
- b. Snorkel Dive boat orientation, if applicable
- c. Entry techniques
- d. Exit techniques
- e. Bottom composition and topography
- f. Depth range
- g. Interesting/helpful facts about the snorkel dive site
- h. Sequence of training snorkel dive – review snorkel dive tasks:
 - Entry
 - Identify marine turtles
 - Identify behavior and sex (if any) and take notes/photos
 - Take identification pictures/video
 - Demonstrate understanding of how to use the RED SEA TURTLES PROJECT™'s data collection sheet and take notes of animal width and length
 - Conduct a complete turtle survey and enter findings on a data slate
 - Data entry to Internet of Turtles: <https://iot.wildbook.org/>
 - Exit
- i. Special communication topside (review boat recall system if applicable).
- j. What to do if an emergency arises
- k. What to do if student loses class/buddy at surface.
- l. Buddy assignments

Pre Snorkel Dive Procedures

Prepare personal snorkeling equipment

Post Snorkel Dive Procedures

- a. Provide positive comments regarding student performance
- b. Problems encountered during the snorkel dive and those to be avoided on future dives
- c. Discuss conducting a complete marine turtles survey
- d. Discuss the predominant
 - different species of turtles observed during the dive
 - different behaviors observed during the dive
 - turtles sex and sizes observed
- e. Log dive (instructor signs log)
- f. Data entry to Internet of Turtles:
Data entry to Internet of Turtles: <https://iot.wildbook.org/>
- g. Post Dive Briefing



Fig.13 Photo of RED SEA PROJECT™'s intern collecting data and photo identification of a green turtle in Abu Dabbab bay during a sea turtle snorkel survey.

VI. Knowledge Review

RED SEA TURTLES PROJECT™ Knowledge Review 1:

1. How many metres (minimum) should you keep away from marine turtles when diving?

- a) 2 metres
- b) 3 metres
- c) 4 metres
- d) 5 metres
- e) No minimum distance required, as long as the turtle is showing signs of normal behaviour.

2. Marine turtles play a vital role in supporting healthy levels of productivity in seagrass meadows and coral reefs. This is also known as being a(n) what? species.

- a) Invasive
- b) Keystone
- c) Indicator
- d) Epiphyte

3. Marine turtles hatch in synchronisation at night from their nest(s). Fill in the gaps to explain the reasons behind this phenomenon.

The definitive cause of synchronous hatching is unknown, but several factors are thought to aid the process such as vocalisations, concentrations in the nests, detection of movement from other, and relative stable

4. How many clutches will an individual female lay per season?

- a) 4-10
- b) 2-30
- c) 1-8
- d) 5-50

5. TRUE or FALSE? By grazing on seagrass, green turtles help maintain the health of seagrass beds.

.....

6. All marine turtle species in the Red Sea are threatened with extinction based on assessments by the IUCN. Respectively, how are the green turtle, hawksbill turtle, and leatherback turtle currently assessed?

- a) Endangered (EN), Endangered (EN), Vulnerable (VU)
- b) Critically Endangered (CR), Near Threatened (NT), Vulnerable (VU)
- c) Critically Endangered (CR), Not Evaluated (NE), Endangered (EN)
- d) Endangered (EN), Critically Endangered (CR), Vulnerable (VU)
- e) Vulnerable (VU), Endangered (EN), Least Concern (LC)

7. Which species of marine turtle are frequently observed in the Egyptian Red Sea? (select all that apply)

- a) Leatherback turtle (*Dermochelys coriacea*)
- b) Hawksbill turtle (*Eretmochelys imbricata*)
- c) Green turtle (*Chelonia mydas*)
- d) Olive-Ridley turtle (*Lepidochelys olivacea*)
- e) Loggerhead turtle (*Caretta caretta*)

8. Humans are responsible for causing many threats to marine turtle populations. Please write down and very briefly describe two of these threats mentioned in this course.

- 1.....
- 2.....

9. Marine turtles are ectotherms. How might this explain why many turtle species are confined to tropical and subtropical areas?

- a) They are unable to travel long distances to reach temperate areas.
- b) Marine turtles must nest on sandy beaches which are common in the tropics.
- c) They rely primarily on the temperature of their environment to regulate their body temperature.
- d) Their preferred prey is only found in warm waters.

10. All species of marine turtle play important ecological roles when it comes to maintaining the health of their environment. How?

- a) By feeding on corals and sponges selectively they help maintain a healthy balance of these organisms on a reef. This positively affects overall reef biodiversity.
- b) They provide key habitats for other marine life. Most marine turtles carry epiphytes: barnacles, algae, and other organisms on their shells.
- c) They help maintain healthy fish populations by consuming large amounts of jellyfish.
- d) All of the above.

Student Statement: I've completed this Knowledge Review to the best of my ability and any questions I answered incorrectly or incompletely I've had explained to me, and I understand what I missed.

Name Date

RED SEA TURTLES PROJECT™ Knowledge Review 2:

1. Which of these should you NOT do when you encounter a marine turtle? (select all that apply)

- a) Wear a life jacket and stay safe.
- b) Attempt to feed the turtle.
- c) Limit your observation time to a maximum of 30 minutes.
- d) Attempt to touch, ride, or chase the turtle.
- e) Use flash photography.
- f) Use underwater acoustic signalling devices.

2. TRUE or FALSE? The loggerhead turtle is the only member of the soft-shelled family Dermochelyidae.

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3. There are many ways in which you can identify a green turtle from a hawksbill turtle during a survey. For example, green turtles may measure up to 1.4 metres in length, while hawksbill turtles are smaller - up to 1 meter. Please write down one other way to distinguish between these two species that are most often encountered in the Red Sea.

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4. What are 'the lost years' of marine turtles?

- a) The years spent in the egg.
- b) When they are sleeping.
- c) The years of juvenile development and growth about which we know very little.
- d) The years that an adult female spends at sea between coming ashore to lay eggs.

5. Marine turtles are some of the most impressive and loved marine species worldwide. Fill in the gaps to explain a little bit about their biology.

The hard shell of a marine turtle consists of a back (.....) and belly (.....) that are connected at the sides. These are formed mainly of, comprised of around to individual bones developed from their ribs. On the outer surfaces, scales of keratin (in the Cheloniidae) called cover the shell to provide structural reinforcement. For leatherback turtles, these keratinous scales are replaced by bony

6. When photographing a turtle, which of the following are the most useful for individual (not species) identification?

- a) Photographs of the top of the carapace and both sides of the head (the cheeks).
- b) Photographs of the top of the carapace and the tops of all 4 flippers.
- c) Photographs of the tail, the front of the head and the top of the head.
- d) Photographs of the underside of the carapace and both sides of the head (the cheeks).
- e) Photographs of the top and sides of the carapace.

7. What feature of a marine turtle should you best look out for to identify its sex?

Its

8. TRUE or FALSE? The RED SEA PROJECT™ monitors the abundance and distribution of marine turtle populations all year round.

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9. I have been on a survey and encountered a marine turtle. In my notes, I describe it as female, of 2.3 metres in size. Its carapace is dark with white speckles, and has 6 ridges running down its length. It looks soft, unlike the shells of the turtles I usually see here in the Red Sea. Which marine turtle species have I seen? You may use the common name, latin name, or both.

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10. Where should you submit your turtle sightings for them to be identified and studied?

- a) To Facebook so they are available to the public.
- b) To the Internet of Turtles wild book or directly to RED SEA TURTLES PROJECT™.
- c) Email them to the local diving centre.

Student Statement: I've completed this Knowledge Review to the best of my ability and any questions I answered incorrectly or incompletely I've had explained to me, and I understand what I missed.

Name Date

VII. Knowledge Review (Answer key)

RED SEA TURTLES PROJECT™ Knowledge Review 1 (Answer Key):

1. A: 2 meters
2. B: K
3. CO₂, hatchlings (also accept eggs), nest temperatures
4. C: 1-8
5. TRUE
6. D: Endangered (EN), Critically Endangered (CR), Vulnerable (VU)
7. B & C: Hawksbill turtle (*Eretmochelys imbricata*), Green turtle (*Chelonia mydas*)
8. Accept any two of the following (or along the same lines):
 - Degradation of nesting beaches occurs due to development.
 - Light pollution confuses and disorients hatchlings.
 - Bycatch and entanglement in fishing gear causes suffocation and trapping.
 - Plastics are mistaken for prey and are ingested, causing problems.
 - Loss of coastal vegetation causes heat stress on nests by reducing shade.
 - Increased global temperatures may impact temperature-dependent sex determination.
9. C: They rely primarily on the temperature of their environment to regulate their body temperature.
10. D: All of the above

RED SEA TURTLES PROJECT™ Knowledge Review 2 (Answer Key):

1. B, D, E & F: Attempt to feed the turtle, Attempt to touch, ride, or chase the turtle, Use flash photography, Use underwater acoustic signalling devices.
2. FALSE: The loggerhead is part of the Cheloniidae.
3. Accept any of the following (or along the same lines):
 - The green turtle has a dark olive green / grey carapace, while the hawksbill turtle has a black or dark brown carapace, flecked with light brown, yellowish or red markings.
 - The green turtle's flippers have only one claw each, whereas the hawksbill turtle's flippers have two each.
 - The hawksbill turtle has a characteristic narrow and pointed beak, while the green turtle does not (it has a more rounded head).
 - Green turtles feed on seagrasses and algae, whereas hawksbill turtles feed primarily on soft corals and sponges.
4. C: The years of juvenile development and growth about which we know very little.
5. carapace, plastron, bone, 50, 60, scutes, plates
6. A: Photographs of the top of the carapace and both sides of the head (the cheeks).
7. Tail
8. TRUE
9. Leatherback turtle (*Dermochelys coriacea*)
10. B: To the 'Internet of Turtles wild book or directly to RED SEA TURTLES PROJECT™.

VIII. Recommended readings

- **RED SEA PROJECT™:**
<https://www.redsea-project.com>
- **Internet of turtles:**
<https://iot.wildbook.org/submit.jsp>
- **PADI AWARE foundation™:**
<https://www.padi.com/aware>
- **Turtles of the Red Sea – RED SEA PROJECT™:**
<https://www.redsea-project.com/turtles-of-the-red-sea>
- **Wild me:**
<https://www.wildme.org/>



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