UNITED ARAB EMIRATES
MINISTRY OF CLIMATE CHANGE
& ENVIRONMENT

NATIONAL PLAN OF ACTION FOR THE CONSERVATION OF MARINE TURTLES IN THE UAE 2019 - 2021

2019

www.moccae.gov.ae

NATIONAL PLAN OF ACTION FOR THE CONSERVATION OF MARINE TURTLES IN THE UAE
2019 - 2021

2019

ZAYED BIN SULTAN AL NAHYAN

THE LATE SHEIKH PRESIDENT OF THE UNITED ARAB EMIRATES

HIS HIGHNESS SHEIKH

KHALIFA BIN ZAYED AL NAHYAN

PRESIDENT OF THE UNITED ARAB EMIRATES

HIS HIGHNESS SHEIKH

MOHAMMED BIN RASHID AL MAKTOUM

VICE PRESIDENT AND PRIME MINISTER OF THE UAE

AND RULER OF DUBAI

ACKNOWLEDGMENT

We would like to express our gratitude to all the entities who contributed to the completion of this Action Plan and its deliverables. We would like to extend our thanks and appreciation to the following:

- Environment Agency Abu Dhabi
- Dubai municipality
- Environment and Protected Areas Authority in Sharjah
- Municipality & Planning Department – Ajman
- Municipality of Umm Al Quwain
- Ras Al Khaimah Environmental Protection and Development Authority
- Municipality of Fujairah
- Municipality of Dibba Al Fujairah
- Emirates Nature in association with World Wide Fund for Nature

And we would like to express our special thanks to the experts from private sector, academia and other NGOs for their input in contributing their knowledge and expertise to enrich the national plan of action for the conservation of marine turtle.

TABLE OF CONTENTS

LIST OF TABLES

National Plan of Action for the Conservation of Marine Turtles in the UAE 2019 - 2021

ABBREVIATIONS

CBD	Convention on Biological Diversity
CITES	Convention on the International Trade of Endangered Species
EAD	Environment Agency - Abu Dhabi
EIA	Environmental Impact Assessment
EMEG	Emirates Marine Environmental Group
EPAA	Environment and Protected Areas Authority
EN-WWF	Emirates Nature in association with the world wide fund for nature
IOSEA	Memorandum of Understanding on the Conservation and Management of Marine Turtles and their Habitats of the Indian Ocean and South-East Asia
ITAs	Important Turtle Areas
IUCN	International Union the Conservation of Nature
MOCCAE	Ministry of Climate Change and Environment, UAE
MRF	Marine Research Foundation
NGO	Non-Governmental Organisation
STRP	Sea Turtle Restoration Project
UAE	United Arab Emirates

National Plan of Action for the Conservation of Marine Turtles in the UAE 2019 - 2021

1. STATUS OF MARINE TURTLE CONSERVATION IN THE UAE AND THE REGION

1.1. GENERAL OVERVIEW

The Arabian Gulf is known for being a unique environment, which undergoes extreme water and air temperature fluctuations with profound impact on marine species distribution. Surface waters typically exceed 30°C (John et al. 1990) for sustained periods. Despite the harsh environment conditions, the Gulf sustains a range of costal and marine ecosystems that are key marine biodiversity hotspots, including islands, coral reefs, sea grasses, intertidal areas, salt marshes, and mangroves (Naser, 2011), providing suitable habitat also for large marine mammal and marine turtle populations (Salm et al., 1993). However, these ecosystems are under increasing pressure from human activities associated with the rapid economic, social and industrial developments in the Arabian Gulf countries (Burt, 2014).

The Arabian region supports relatively substantial marine turtle populations, with greens (Chelonia mydas) and hawksbills (Eretmochelys imbricata) found to be most abundant within the Gulf and loggerheads (Caretta caretta) and greens dominating the Sea of Oman and Arabian Sea. Marine turtles play valuable ecological roles in marine ecosystems as consumers and prey among other roles, and they are indirectly linked to seabed and fisheries stability. They function as key individuals in a number of habitats, and can be indicator species of the relative health of habitats that have a tangible value to society. These habitats support commercial fish and invertebrates (found in seagrass beds, open oceans and coral reefs, among others) that are valued by mankind. Marine turtles have also hold a cultural value in the region that traditionally related to serving as sources of meat and eggs.

Coastal development is one of a major factor that threatens life stages of turtles in the Gulf, where nesting beaches and foraging reefs are being lost to construction and sea grass meadows dredged. In addition, coastal development, noise, light and physical pollution are also important threats to the migratory and nesting natural behaviours of marine turtles. However, the full extent of impact on marine turtle populations is not yet well understood for the region.

Given the relevance that marine turtles hold for the environment and its link to human societies, the region has developed an increasing interest for the study and protection of marine turtles in the last decades. Conservation efforts of nesting sites have successfully been established in key sites such as Sir Bur Nair island and Marawah marine protected reserve in the UAE. In addition, environment protection and biodiversity laws have been enacted and enforced in several locations, conferring protection to marine turtles.

Education and awareness programmes are spreading across the UAE, and today a few previously declining turtle populations are existing. Despite these achievements, our understanding of sea turtles' ecology is still limited and indispensable in order to scale up protection to their level of ecological needs. Therefore, focusing on the study of ecological aspects such as distribution of critical turtle habitats and the associated impacts such as incidental capture of turtles is essential for the design of effective and efficient conservation programmes to successfully preserve these highly mobile marine species. Filling the gaps in our knowledge about marine turtle populations is needed to inform management and conservation practices.

1.2. SPECIES DISTRIBUTION AND ABUNDANCE

Marine turtles can be found throughout the world's oceans, other than the Arctic, and all of the seven extant species fall within varying levels of the IUCN's threatened categories. Below is an outline of existing information on the species that are present in the United Arab Emirates (UAE). The following table provides a summary of the distribution and Global IUCN Red Listing status for the five turtle species which occur in the region.

Table 1: Conservation status for marine turtle species in the Arabian gulf and the sea of Oman

Species	IUCN Global Red List Status	Present in the UAE
Green Turtle *(Chelonia mydas)*	Endangered	Abu Dhabi, Ras Al Khaimah, Dubai, Sharjah, Fujairah
Hawksbill Turtle *(Eretmochelys imbricata)*	Critically Endangered	Abu Dhabi, Sharjah, Dubai
Loggerhead Turtle *(Caretta caretta)*	**Global status:** Vulnerable **NWIO Population status:** Critically Endangered	Abu Dhabi, Dubai, Sharjah (Rehabilitation centre)
Olive Ridley *(Lepidochelys olivacea)*	Vulnerable	Duba, Sharjah, Ras Al Khaimah (Rehabilitation centre)
Leatherback Turtle *(Dermochelys coriacea)*	Vulnerable	Sharjah, Fujairah

Note: The IUCN Marine Turtle Specialist Group is focusing on assessments of regional population units with the first one conducted in the region focusing on loggerhead turtles. Hence the regional IUCN Red List status is different than the global.

National Plan of Action for the Conservation of Marine Turtles in the UAE 2019 - 2021

GREEN TURTLE
(CHELONIA MYDAS)

Being the most abundant turtle in the Gulf region, little is known about green turtle populations in the UAE. Research has shown that the UAE is home to foraging populations of green turtles, which are associated to extensive seagrass habitats present across the country. However, green turtles are not known to nest in the UAE, but there are some sporadic records of incidental nesting on Sir Bu Nair (Al Suweidi et al., 2012; EMEG records indicated 1 nest in 2014).

Extensive aerial surveys within established protected areas in Abu Dhabi have shown that green turtles forage in the vast seagrass meadows in Abu Dhabi waters with numbers peaked in 2009 with more than 7000 individuals among hawksbill and green turtles and an estimate of 69% corresponding to green turtles (per. comm., EAD 2016; EWS-WWF, 2014).

A number of smaller scale studies have indicated presence of foraging green turtles in the waters of Ras Al Khaimah where seagrass habitats are also found, and revealed the occurrence of a resident population comprised of various post-pelagic ages/sizes (Marine Turtle Newsletter, 1998). The residence of green turtles in this area has been supported by satellite tracking data from green turtles in this area which also remained for the entire period of study feeding within Ras Al Khaimah waters (Baldwin and Gardner, 2005).

Population assessments of green turtles at feeding grounds for other areas is still limited, but a recent pilot effort have been initiated by the Environment and Protected Areas Authority (EPAA) of Sharjah to monitor the mangrove channels of Khor Kalba Protected Area where juvenile green turtles seems to congregate. Through aerial surveys the monitoring aims to estimate the numbers of green turtles in this area (pers. comm., EPAA 2016). Adding to this effort, recent preliminary tracking information from one individual in this area suggested the use of the channels by juvenile turtles; and is expected that future tagging efforts can help to elucidate the extend of use and relevance of this area for the regional green turtle population (per. comm., EPAA 2018; EWS-WWF, 2018).

Overall, little is known on green turtle behaviour and movements of turtles at sea as well as their migrations in the Gulf region. Some information exists from rehabilitated turtles that have been tracked after their release by the Jumeirah Dubai Turtle Rehabilitation Project, indicating that turtles visited areas were along the west coast of the UAE, and some made movements across international boundaries (Robinson et al., 2017). However, information gaps remain around the extent of feeding areas used by green turtles in the UAE and their links to nesting areas across the region. Wider scale tracking efforts on adult green turtles across feeding grounds and population genetic assessment in the UAE are currently on their way led by Emirates Nature in association with WWF (EWS-WWF) (per. comm., EWS-WWF 2018).

HAWKSBILL TURTLE
(ERETMOCHELYS IMBRICATA)

In the UAE, hawksbill turtle is the only known nesting species, with most of the nesting habitat distributed in Abu Dhabi Waters, where nesting is recorded in a number of Abu Dhabi's islands (at least 17 offshore islands) with an inter-annual variation between 152 to 242. Key nesting areas in Abu Dhabi based on nesting activity for the 2001-2015 period are: Bu Tinah, Zarkawh, Qrnen, Arzanah, and Diyenat (EAD and AGEDI, 2009; EAD, 2011; Das et.al., 2010; IOSEA National Reporting UAE, 2014). In the Emirate of Sharjah, important nesting areas are found in Sir Bu Nair, (EWS-WWF, 2015; IOSEA National Reporting UAE, 2014; Pilcher et al., 2014a). Records presented by EPAA demonstrated more than 300 nests within a 3-year period 2010-2013. Recent records have also confirmed a small number of nesting occurrences on Saadiyat Island and Khor Kalba (reported by EPAA in 2015).

In general, and based on the information collected through the EAD monitoring programme hawksbill population trend in this Emirate seems to be stable for the last 15 years, with only seasonal fluctuations on nesting activity based on information from 19 nesting sites. However, understanding of population trends for this critically endangered species across other nesting areas in the UAE is limited. Finally, population estimates in Abu Dhabi waters through aerial surveys have recorded between 5000 to 7000 individuals of foraging hawksbill and green turtles with hawksbill turtles accounting approximately for 31% of the observations (per. comm., EAD 2016).
Information on behavior of hawksbill turtles at sea comes from long-term tracking data collected in 2010-2013 and which allowed the identification of critical foraging areas in the UAE and the Gulf region. Among the Important Turtle Areas (ITAs) identified was the south-western Gulf shared by Saudi Arabia and UAE (around the Ghuweifat Peninsula, Western Region) (Emirates Wildlife Society, 2015; Pilcher et al., 2014a). The study also showed that individuals from different nesting areas across the Gulf region use this critical feeding habitat, highlighting its relevance for the wider hawksbill population. Previous studies have shown that hawksbill turtles are genetically distinct from populations outside of the Gulf (Mortimer & Broderick, 1999). In the UAE, recent available information has also confirmed this degree of separation and has also indicated that there is a marginal level of distinctness within populations in the Gulf region, with those in the UAE showing a low genetic variability. These findings raise concerns about the sustainability of this species in the Gulf region and call for coordinated regional efforts for the development of management measures for the long-term conservation of this Critically Endangered species.

Based on tracking data migration hotspots in the central Gulf also have been identified, and particularly have been found to be used by hawksbill turtles only during July, August and September, while their foraging grounds are inhabited year-round. These seasonal migrations have been described as a behavioral response, unique to hawksbill turtles living in the Gulf and linked to annual rise in summer sea surface temperatures, having turtles migrate to cooler waters during the summer months, demonstrating the potential effect changing global climatic conditions could have on turtles in this and other parts of the world (Emirates Wildlife Society, 2015; Pilcher et al., 2014b). Rehabilitated hawksbill turtles (juvenile and sub-adults) have been also tracked by the Jumeirah Turtle Rehabilitation Centre also showing hawksbills travelling within UAE waters and remaining in the Arabian Gulf.

National Plan of Action for the Conservation of Marine Turtles in the UAE 2019 - 2021

LOGGERHEAD TURTLE
(CARETTA CARETTA)

Very little research has been done on the loggerheads within the Arabian Gulf, as they are not as prevalent in the area. There is no known foraging or nesting habitats of this species in the UAE. However, During winter of 2016 EAD collected three live loggerhead yearlings from Abu Dhabi corniche beach Management. Also the Jumeirah Turtle Rehabilitation Centre have treated sub-adult and adult loggerhead turtles releasing them back to the wild. Turtles have been tagged with satellite transmitters and collected information has revealed turtles to remain in the Arabian Gulf; swimming from the UAE north towards the Iraq/ Iran coastal water (Jumeirah Rehabilitation Center, Seaturtle.org, 2009).

OLIVE RIDLEY
(LEPIDOCHELYS OLIVACEA)

There is no known foraging or nesting habitats of this species in the UAE, only few observations exist in Dubai rehabilitation center were olive ridly was rescued (Miller et al., 2004; Baldwin and Gardner 2005). Additionally, EPAA has salvaged olive ridley from a stranding in Khor Kalba (2017).

LEATHERBACK TURTLE
(DERMOCHELYS CORIACEA)

There are no known nesting habitats of this species in the UAE. However, there is photographic evidence of leatherback turtle carcass found in 2014 in Dalma Island (EAD, unpublished data). Also recorded in Fujairah water.

1.3. THREATS & CHALLENGES

Marine turtles are currently facing threats to their survival due to indirect and direct human activities. Globally, some of the most pressing threats besides direct take of individuals and eggs consumption are related to habitat loss and degradation through coastal development, incidental mortality in mechanized and artisanal fisheries, marine pollution and the effects of climate change. Turtle populations in the Arabian region face similar threats and require urgent conservation action to mitigate the ongoing impacts of rapid economic growth and development in the region.

Worldwide, incidental mortality of turtle in fisheries operations or fisheries bycatch has been recognized as one of the main marine turtle populations' decline drivers worldwide (Wallace et al., 2010), however, its level of impact on marine turtle in the region remains limited. Recent assessments in Saudi Arabia, indicate that turtles are incidentally captured in relatively large numbers (4726 captures/year) in nine types of artisanal fisheries, among which trawl fishery was responsible for 86.3% of captures (Adbulqader et al., 2017). It is important to note that bycatch can impact turtles of all life stages but mostly adults, and while marine turtles are evolutionarily prepared to suffer high mortality rates in the early life stages (as lots of eggs and young hatchlings become food for other species), adults have a substantially high reproductive and population maintenance value. The loss of adult individuals can have substantial negative effects on population numbers, because fewer animals are then available to reproduce and maintain turtle population stocks.

Marine pollution and debris are increasingly being recognized to have an important impact on marine turtles threating their survival. In particular marine debris can impact turtles through entanglement (i.e. on ghost nets) or consumption (i.e. plastics) but the understanding of the level of impact on marine turtle is limited for the region. A recent study has documented the ingestion of marine debris by green turtles that where found stranded, indicating a potential high level of interaction between these turtles and marine debris along the Gulf of Oman coast of the UAE (Yaghmour et al., 2018). Finally, the impacts of climate change on marine turtle populations in the region are not well understood but concerns about the effect of raising temperatures exist and are particularly relevant to species with temperature dependent sex determination like turtles.

Recent research in Australia has raised the possibility of entire populations to be feminized after the prolonged effect of increasing temperatures over time (Jensen et al., 2018). In the other hand, increasing temperature and changes on ocean circulation regimes can also threat the suitability of nesting habitats and the availability and distribution of foraging grounds and prey (Fuentes et al., 2013; Hamann et al., 2007; Hawkes et al., 2007; Pike, 2013; Pilcher et al., 2014a; Witt et al., 2010). Lastly, in the region natural mortality also occurs due to stochastic events such as extreme weather conditions (i.e cyclones and low water temperatures during winter season), affecting nesting habitats and causing mortality of juvenile turtles (Pilcher at al., 2014). Whether or not these stochastic events are increasing in frequency or intensity due to the human-induced climate change remains to be studied.

The following Table 2 and Table 3 summarize the threats to turtles and challenges identified to conservation of these species in the UAE.

National Plan of Action for the Conservation of Marine Turtles in the UAE 2019 - 2021

Table 2: Description of threats to marine turtles in the UAE.

Habitat Impacted	Category	Threat	Description	Currently being addressed
Nesting environment	Increased human presence	• Use of vehicles of nesting beaches • Artificial lighting and noise pollution along the coast	The impact of population growth and its associated development is particularly prevalent in the UAE where residents live almost entirely along the coast. Activities on beaches deter turtles from the natural nesting areas. Physical pollution on beaches obstructing nesting behaviour and hatchling success.	EIAs must be implemented by developers to understand how they can mitigate their impacts on the marine environment. There are schemes such as Blue Flag, which improve the quality of beach and marina operations, and protect key habitats in their vicinity.
	Coastal development	Dredging, construction of man-made islands and associated infrastructure	Over the past few decades, rampant coastal development in the UAE for residential, tourism, industrial and commercial purposes have put significant pressure on the coastal and marine environment. Associated challenges include: Nesting and foraging habitat loss and degradation; and infrastructure creating barriers for ecological corridors and migration routes.	EIAs must be implemented by developers to understand how they can mitigate their impacts on the marine environment.
	Climate Change	• Inundation of nests due to rising sea surface levels. • Rising sand surface temperatures on nests.	The Gulf is characterised by extreme environmental conditions including high sea surface temperatures (~°15C to °36C) and high evaporation rates leading to high salinity levels (41-37psu). Therefore, any changes in climatic conditions could have a severe impact on marine populations already exposed to extreme conditions. Increased sand temperatures would impact gender ratios in turtle populations.	Work is being carried out by the United Arab Emirates University to better understand the impacts of climate change on the marine environment and its species and habitat through sophisticated modelling.
	Unsustainable fishing practices	Incidental Take	The UAE has a strong heritage of artisanal fisheries, with a fleet of dhows and tarads using a range of fishing gear, of which gargoor, tidal nets and long lines are the most prevalent. All gear and fishing practices have an associated risk of incidental capture through unsustainable fishing practices.	MOCCAE and EAD are developing an improved fisheries resource management plan for the country. This will look to better regulate the sector and shed more light on levels of incidental capture. In addition, socio-economic surveys are taking place in Abu Dhabi to collect relevant information.

(cont...)

Marine environment	Pollution	-Debris (entanglement and ingestion) -Oil exploration and industrial development	• Incidental consumption of marine debris and entanglement of turtles by discarded or lost gear, also known as "Ghost fishing". Additionally, marine debris such as plastics, ropes, wooden planks, glass bottles and jars that physically obstructs the nesting beaches. • Oil exploration and development pose direct and indirect threats to marine turtles: Rise in transport traffic increases collision and the amount of oil in the water from bilge pumping and oil spills. Acoustic pollution from maritime vessels affects migration and foraging behaviour at sea. Indirect consequences include destruction of foraging habitat by drilling, anchoring, and pollution (wastewater discharge and effluent from industrial facilities including brine from desalination).	(Yaghmour et al., 2018)
		Boat Collisions	Marine turtles can be injured or killed when struck by a boat, especially if struck by engaged propeller. This risk is associated with recreational as well as industrial activities. Industrial vessels striking migrating turtles and vessel noise affecting migration and foraging behaviour.	(Yaghmour et al., 2018)
	Coastal modification and habitat loss	Marina, private and commercial docks development	The development of marinas and private or commercial docks in inshore waters can negatively impact turtles through destruction or degradation of foraging habitat. This type of development also leads to increased boat traffic resulting in collision-related injury and mortality of turtles. Fueling facilities at marinas can result in discharge of oil and gas into sensitive estuarine habitats.	EIAs must be implemented by developers to understand how they can mitigate their impacts on the marine environment.
	Coastal modification & habitat loss Climate Change	Anchoring in coral reef and sea grass areas.	Most marine turtle species depend upon sea grass and/or coral reef habitats for food and refuge. The destruction or degradation of these habitats is a widespread and serious threat to the recovery of depleted marine turtle stocks. Direct striking of turtles by recreational vessels: Anchoring affects seagrass and coral reefs by disturbing these habitats.	There are examples in the sector of hotels and operators acting to reduce their impact on nesting beaches and educate their clients.z
		• Sea temperature rise. • Changes in oceanic currents.	Some of the direct impacts linked to climate change include: -coral bleaching associated with sea temperature rise and ocean acidification affecting food availability. -sea temperature rise affecting seagrass growth rates, another food source. - sea temperature changes can affect behaviour and migration patterns. -changes in oceanic currents affecting distribution and migration patterns.	Work is being carried out by the United Arab Emirates University to better understand the impacts of climate change on the marine environment and its species and habitat through sophisticated modelling.

National Plan of Action for the Conservation of Marine Turtles in the UAE 2019 - 2021

Table 3: Description of challenges to conservation of marine turtles in the UAE.

Challenge	Description
Lack of understanding of biodiversity and ecosystems value	There is a lack of understanding of the pivotal link between socio-economic well-being and health marine ecosystems and the interdependencies of maritime sectors on a healthy environment for its operations.
Lack of understanding of biodiversity conservation status	In the UAE where research capacity is limited and there is a deficiency in credible environmental data, conservation actions based on scientifically sound evidence is hindered.
Lack of scientific research and institutions	UAE capacity and resources in the fields of scientific marine research is limited. With few education institutions offering masters, PhDs and post-doctorates in marine and species science.
Limited and fragmented protection	Limited political support on marine conservation issues, often lead to prioritization of short-term economic growth over a long-term sustainable use and management of marine resources. A policy or regulatory framework for marine turtle conservation requires strong political buy-in and wider understanding of the links between marine turtles, healthy marine ecosystems with human wellbeing.
Low environmental awareness	A myriad of people relies on/impact the marine environment including decision-makers, tourists, consumers of marine products and maritime industries. Increased awareness of all these users to engage in marine conservation and the importance of species such as turtle can enable the adoption of responsible practices and development measures in the marine environment.
Lack of financial support	A lack of financial support backing marine science and conservation in the UAE limits the progress towards understanding the biology, behavior, associated habitats and the most effective conservation measures needed for marine turtles.

1.4. LEGISLATIVE OVERVIEW

Marine turtles species present in the UAE are currently protected under a legislative framework comprising distinct levels of administration: The Federal level and the Emirates level (Table 4 and 5). Protection is conferred through a general set of laws relevant to the environment and the UAE's preservation of natural resources. Regional and international agreements for which the UAE is a signatory state also support this framework, as every signatory state assume specific commitments with the international community for the protection of marine turtle species occurring in the country. The description and extent of action of national and international legislation frameworks relevant to the UAE is summarised in Tables 4 and 5.

1.4.1. National Legal and regulatory Framework

Table 4: Summary of legislative framework for the protection of environment and biodiversity in the UAE and that relates to the protection of marine turtles.

Date/Law	Action	Coverage
Federal Law No. 24 for year 1999	**Regarding the protection and development of the environment.** The law No.24 outlines the objectives and general principles concerned with the protection and development of the environment focusing on protection of biodiversity and habitat; and the protection, pollution prevention and preservation of natural resources.	This Law operates at the UAE Federal level
Federal Law No. 23 for year 1999	**Concerns to the exploitation, protection & development of living aquatic resources in waters of the UAE.** Law No. 23 covers fishing, protection of restricted areas, processing and marketing of fish, the extension of grants and loans to fishermen and the export, re-export and transit of fish products. Law No. 23 also sets forth procedures for registration of vessels (expressly limiting their number) and of fishermen and for licensing of their activities. The MOCCAE has authority to set catch limits.	This Law operates at the UAE Federal level
Federal Law No. 11 for year 2002	**Concerns regulating and controlling the international trade in endangered species of wild fauna and flora.** Law No.11 was issued for the purpose of implementing CITES in the UAE with advising the local management authorities on matters related to trade in endangered species, protection of species and on the disposal of confiscated specimens.	This Law operates at the UAE Federal level

1.4.2. International Cooperation

Table 5: Summary of international agreements relevant to Marine Turtles in which the UAE is a party to.

Treaty		Description
1.1. Marine Biodiversity	(a) Kuwait Regional Convention for Cooperation on the Protection of the Marine Environment from Pollution (ROPME)	The Convention is the basic legal instrument binding the eight States of the Region to coordinate their activities towards protection of their common marine environment. The Convention was adopted with the objective to ensure that development projects and other human activities do not in any way cause damage to the marine environment, jeopardize. its living resources or create hazards to human health. Another objective of the Convention was the development of an integrated management approach to the use of the marine environment and the coastal areas in a sustainable way which will allow the achievement of environmental and developmental goals.
1.2. Biodiversity	(a) Convention on Biological Diversity (CBD)	The CBD's objective is to develop national strategies for the conservation and sustainable use of biological diversity. The National Biodiversity Strategy and Action Plans (NBSAP) where developed by MOCCAE in 2014 in accordance with Aichi Targets identified under the CBD.
1.3. Endangered Species	a) Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES)	CITES aims to ensure that international trade in specimens of wild animals and plants does not threaten their survival. It covers approximately 5,000 species of animals and 28,000 species of plants
	(b) Convention on the Conservation of Migratory Species of Wild Animals (CMS)	The CMS aims to conserve terrestrial, marine and avian migratory species throughout their range.
	c) The Memorandum of Understanding on the Conservation and Management of Marine Turtles and their Habitats of the Indian Ocean and South-East Asia (IOSEA)	This is an intergovernmental regional agreement under CMS that aims to protect, conserve, replenish and recover marine turtles and their habitats in the Indian Ocean and South-East Asian region, working in partnership with other relevant actors and organizations. The Conservation and Management Plan currently includes 24 programs and 105 specific activities and focuses on reducing threats, conserving critical habitat. The Bu Tinah Shoal in Abu Dhabi and Sir Bu Nair in Sharjah where designated as IOSEA network sites in 2014.
1.4. Habitats	(a) Convention on Wetlands of International Importance especially as Waterfowl Habitat (known as the Ramsar Convention on Wetlands)	The Ramsar Convention provides a framework for national action and international cooperation for the sustainable use of wetlands and their resources. It is the only global environmental treaty that deals with a particular ecosystem. The aim is to, inter alia, stem the progressive encroachment on and loss of wetlands now and in the future, recognizing the fundamental ecological functions of wetlands and their economic, cultural, scientific, and recreational value.
1.5. Others	(b) World Heritage Convention (WHC)	The United Nations Educational, Scientific and Cultural Organization (UNESCO) seek to encourage the identification, protection and preservation of cultural and natural heritage around the world considered to be of outstanding value to humanity. It has been adopted by 191 countries, all of whom agree to identify and nominate properties on their national territory to be considered for inscription on the World Heritage List.

1.5. CONSERVATION AND MANAGEMENT

Management practices for the conservation of marine turtles in the UAE have importantly focused on the protection of nesting areas of hawksbill turtles, the only nesting species in the country. In 2000, the oldest monitoring program in the country to date was established by the Environmental Agency of Abu Dhabi to monitor nesting activity of this species across several island of the Emirate. Surveys are conducted annually and in recent years have also extended to monitor the status of important associated habitat for marine turtles such as seagrass meadows and coral aggregations in Abu Dhabi waters, particularly within the boundaries of the Marawah Biosphere Reserve. Monitoring efforts in the key site of Sir Bu Nair Protected Area - Sharjah started in recent years, the two areas (Island of Abu Dhabi and Sir Bu Nair island) comprise most of the nesting habitat for hawksbill turtles in the UAE, and as such they belong to the IOSEA Network of Sites of Importance for Marine Turtles of the Indian Ocean South-East Asia Region. The network aim is to particularly promote the long-term monitoring and conservation of sites of regional value for benefit of marine turtles and their habitats throughout the IOSEA region. Detailed information on other current and future monitoring/conservation efforts in the UAE can be found in Table 6 and 7.

Gathering long-term information at specific population level has been recognized as a global priority (Wallace et al., 2010) particularly in areas identified as data deficient such as the Gulf region, therefore, the harmonization of data collection and practices in these sites is a key aspect to the monitoring implementation as this will enable hawksbill turtle population assessment trends at national and regional levels.

Lastly, raising awareness about the role that marine turtles play in the marine ecosystem as well as threats they face is essential to their conservation. In the country, specific efforts have been made by government agencies, the private sector and the civil society in the last decade. Important to mention are the awareness and education programmes developed along conservation actions taking place in the UAE, for example, those implemented in Dubai by the Dubai Rehabilitation Centre and the Emirates Marine Environment Group (EMEG) and Park Hyatt in Abu Dhabi, where schools, tourist and visitors in general are being informed and actively engaged about the importance of turtles to the marine environment, their link with human societies as well as the way they can helped. However, efforts that can reach wider communities across the UAE are still desirable (i.e the development and inclusion of educational material in schools' curriculum).

National Plan of Action for the Conservation of Marine Turtles in the UAE 2019 - 2021

1.5.1. Current management practices and future initiatives

Table 6: Current projects and activities taking place within the UAE.

Location	Leading organization	Project	Objectives	Methodology	Major Results
Abu Dhabi	EAD -2000present	Monitoring of Marine Endangered Species of Abu Dhabi	To monitor nesting habitat of hawksbills	Field Surveys (nesting site monitoring)	Annual nesting variability is stable between 2016 -2001
			Hatching success	Field Surveys (nesting site monitoring)	Differential hatching success by nesting zone
			Abundance estimation	Aerial survey	Population estimation for green and hawksbill turtles
Dubai	Dubai Turtle Rehabilitation Centre	Rescue and rehabilitate marine turtle, this project is run in collaboration with Dubai's Wildlife Protection Office, with veterinary support provided by the Dubai Falcon Clinic and the Central Veterinary Research Laboratory	Rescue, rehabilitate and release back into the wild any marine turtles that are found sick or injured throughout the region Educate general public about marine turtle biology and the local and global plight of the marine turtle To understand the success of rehabilitation and to research turtle movements throughout the region and beyond via a satellite tracking initiative	Implementation of rehabilitation protocols.	The project has release of over 560 rescued marine turtles back into Dubai's waters. In 2011 alone over 350 sick or injured marine turtles were treated the project is currently the only one of its kind in the Middle East and Red Sea region.
Sharjah	EPAA Once every year	Turtle Nesting Activity	Nesting Activity Monitoring in Khor Kalba and Sir Bu Nair	Record nests/ tracks/ biological data/ nest inventory	Report and analysis
		Turtle Population Survey (Pilot)	Estimate Population	Aerial Surveys of canals in low and high tides	Population Estimation Report
		Marine reptile and mammal stranding response program (2016 - present)	Rescue, monitoring and research of marine reptile and marine mammal stranding	Beach surveys and reports followed by necropsy and laboratory analysis when appropriate	Marine debris ingestion report (complete), diet component analysis report (pending), frequency and impact of boat strikes report (pending) and heavy metal concentration in tissues report (pending).
UAE Wide and regional Scope	EN-WWF 2014-2010	Marine Turtle Conservation Project-Migration and foraging behavior of the critically endangered hawksbill turtles.	Understand the extent of distribution, habitat use and hawksbill turtle populations needs.	75 post nesting female hawksbill turtles monitored via satellite telemetry from various sites in the Arabian region.	Important Turtle Areas (ITAs) were Identified. Behavioral response to the annual rise in summer sea surface temperatures discovered; where turtles migrate to cooler waters during the summer months.

Table 7: Future planned projects for conservation of marine turtles in the UAE

Location	Leading organization	Project	Objectives	Methodology	Major Results
UAE Wide and regional Scope	Gulf Green Turtles Project	2016-2019	The project will help form a robust regional baseline upon which strategies can be designed to address species population priorities, rather than solely focusing on fragmented national actions that do not benefit highly migratory species. EWS-WWF leading the study in partnership with the MOCCAE and key institutions in the UAE and the region.	EN-WWF	Identify links between nesting populations and foraging assemblages, identify crucial habitat for green turtle habitats, and assess population distribution against current formal protection.
UAE Wide	Study on fisheries interactions with turtles based on fishermen interviews.	2019-2021	Work in a collaborative way with fishermen to better understand the level of exposure of marine turtles to fisheries in the UAE and share information.	EN-WWF	This information can be overplayed with species distribution. The information will also be used at regional platforms to share lessons learnt.
UAE Wide	Develop technical guidelines to include biological and ecological needs for marine turtles in the EIA permitting and spatial planning process.	2019-2020	Provide guidelines that highlighting the biological and ecological principles; and explain how development can proceed in a sustainable way across the marine seascape to be use by decision-makers, planners, and the private sector. Guidelines can be integrated into the current maritime planning and development processes (e.g. Environmental Impact Assessments, permitting procedures, risk assessments).	EN-WWF	By 2017, minimize threats from development by designing guidelines that integrate marine turtle conservation needs into the planning and management process (Flagship species and habitats).
Abu Dhabi	Expanding monitoring efforts of Marine Endangered Species of Abu Dhabi	On going	The objective is to study the ecology of foraging habitats of marine turtles and monitor hatching success in relation to nest temperature.	EAD	Initiate monitoring programme around sand temperatures and climate change impacts.

National Plan of Action for the Conservation of Marine Turtles in the UAE 2019 - 2021

1.5.2 Habitat protection

Several marine sites within the UAE have afforded protection to safeguard the emirates biodiversity and natural resources. These are outlined in the following sections:

Table 8: Protected areas contributing to the conservation of marine turtles in the UAE

Site	Designation	Managed by	Area Characteristics	Stakeholder Use
Sir Bu Nair (Sharjah)	Nature Reserve in 2000 UN Ramsar Convention in 2007	EPAA Monitoring of turtles by EMEG	40 coral species and 76 reef-fish species have been recorded, including seven coral species that are classified in the International Union for Conservation of Nature Red List as being vulnerable. Colonies of birds, such as the Sooty gull and the Bridled tern, nest and live on the island alongside gazelles and hedgehogs.	The island is part natural sanctuary, part military and part police. There are dhow races allowed each year, but they remain under strict supervision. A single wooden cottage, belonging to the Bin Hada family in al Khan area of Sharjah, remains on the island. Crescent Petroleum is the concession holder of the Sir Bu Nair area.
Jebel Ali Marine Sanctuary (Dubai)	Protected area in 1998	Dubai	The sanctuary is a safe breeding ground for the Green turtles and an important habitat for marine mammals such as Dugong, Indo-Pacific Humpback dolphins, Bottlenose dolphins, Spinner dolphins and Finless porpoises. The area is of high ecological importance due to the extensive sea grass beds, which represent critical habitat for many species of fish and shellfish.	Oyster Enhancement Project which began in 2012.
Marawah Biosphere Reserve (Abu Dhabi)	Marine Protected area in 2001 Biosphere Reserve UNESCO in 2007	EAD	The area includes the islands of Marawah, Bu Tinah, Liffiyah, Bazm al-Gharbi, Junana and Umm Amim, much of the Khor al-Bazm, and a stretch of coastline, running westwards from the port of Mirfa. Offshore, it holds important marine habitats of sea grass beds, coral reef, macroalgae outcrops and mangroves. Marawah Biosphere reserve is also of global importance as a shelter and feeding ground for the vulnerable Dugongs (Dugong dugon), Bottlenose, Humpback dolphins, and 4 species of marine turtles.	Made up of three zonation areas: Core Zone, Buffer Zone, and Transition Zone. Core Zone allows low impact uses and non-destructive research, buffer zone can be used for recreation and research and transition zone is used for carefully managing areas resources.
Al Yasat (Abu Dhabi)	Marine Sanctuary in 2005	EAD	The group of islands consist of Al Yasat Al Ali and Al Yasat Al saafli., Esam and Karsha, covering a total area of 482sq km. The islands are surrounded by coral reefs. Fauna in the area include the endangered Green turtle, hawksbill turtle and the Dugong.	No Take zone where catching or removal of organisms are prohibited. As part of preparations for the designation of the Al Yasat Islands as a Marine Protected Area, EAD has undertaken extensive scientific research, including surveys and assessments of the coral reef habitat of the area, studying and satellite-tracking marine turtles after their egg-laying and installation of permanent monitoring stations to monitor the regeneration of coral reefs.

(cont...)

Saadiyat (Abu Dhabi)	Saadiyat Marine National Park	EAD	Saadiyat is a barrier island located in the east of Abu Dhabi Island. It contains a wealth of marine life appealing to eco-tourism, including coral reefs, seagrass beds, critically endangered hawksbill turtles, endangered green turtles, dolphins, commercially valuable fish, and colorful reef fish.	Current stakeholders include fishermen and recreational boat users. Area is open to visitors.
Bul Sayeef	National Park	EAD	In addition to being an important wetland for birds, the Bul Syayeef MPA is a site with several critical marine habitats including coral reefs and seagrass meadows. These habitats have attracted a wide diversity of fish species, foraging marine turtles and are a potential site for dugongs.	As of 2007, after the declaration of Bul Syayeef as a protected area, no commercial fishing has taken place inside the protected area. EAD satellite tracking study is carried out in this area. Construction activities as part of the Musaffah Channel project.
Mangrove National Park	National Park	EAD	The total area of the mangrove forest in the Eastern Corniche is about 19.5 sq. km. This is an important habitat which: • Supports 60-40 bird species in and around (feeding, nesting, nursery, resting), as Western reef heron, Night Heron, Clamorous Reed Warbler, Graceful Prinia, Palm Dove, Greater Flamingos, Crab Plovers, Grey Heron, Green Shank, Red Shank, Godwits, Ruff, sandpipers and occasionally Spotted Eagles • Supports other biodiversity components as fish, shells, sponges, shrimps, echinoderms, and crabs. • Carbon sequestration (carbon sink and fixation as organic materials). • Coastal protection against sea surges and waves	Open to visitors and ecotourism activities.
Khor Khalba Mangroves and Alhafeya Protected Area (Sharjah)	Protected area in 2012 Ramsar wetland site in 2013	EPAA	The Avicennia marina mangrove trees found in Kalba are the tallest and comprise the most extensive mature woodland in the biogeographic region; they provide breeding, nursery and feeding grounds for several fish and invertebrate species, besides protecting the coastline from storm damage and erosion while trapping sediments washed off the land. Hawksbill, loggerheads and green turtles have been observed at the site.	The management and monitoring of this site is carried out with the involvement of the local residents, and an educational visitor center is currently in the pipeline.

(cont...)

National Plan of Action for the Conservation of Marine Turtles in the UAE 2019 - 2021

Ras Al Khor Wildlife Sanctuary (Dubai)	Wildlife Sanctuary in 1998. Ramsar	Dubai Municipality	6.2 km2. The sanctuary holds approximately 450 species of fauna and 47 species of flora and is one of the best managed arid zone wetlands in the region.	Dubai Municipality has introduced environmental education facilities in RAKWS that highlights the natural processes by which RAKWS will be sustained
Al Zoura Reserve (Ajman)	Marine protected area in 1995	Ajman Municipality	1.4 km2. A large variety of rare or migratory bird species can be found in the various parts of Al Zorah lagoon and mangroves. Close to 58 different species of birds inhabit this ecosystem.	Al Zorah is designed with the resident's and visitor's experience in mind. The arrival sequence is carefully orchestrated through the infrastructure network layout and the transition between the districts. Tourism (strictly viewing purposes)
Al Aqqa	Marine protected area in 1995	Fujairah Municipality	0.71 km2. Rich marine life	Activities are generally prohibited except from diving for scientific studies and research.
Al Faqueet (Bird island)	Marine protected area in 1995	Fujairah Municipality	2.2 Km2 Rich marine life	Activities are generally prohibited except from diving for scientific studies and research.
Dhadna	Marine protected area in 1995	Fujairah Municipality	0.08 km2 Rich marine life	Activities are generally prohibited except from diving for scientific studies and research.
Bidiya	Marine protected area in 1995	Fujairah Municipality	0.57 Km2 Rich marine life	Activities are generally prohibited except from diving for scientific studies and research.

1.5.3 Education, awareness and capacity building

The following table highlights the education and awareness programs; and the capacity building initiatives which are taking place within the UAE.

Table 9: Ongoing and planned education, awareness, and capacity building programmes in the UAE.

Emirate	Responsible Authority	Description of activities
Abu Dhabi	EAD	Publication and distribution of public awareness material. Marine school trips, teacher training programme, workshops in schools, meeting with fishermen, sustainable school programme and EAD's school initiative that addresses schools with the aim of reducing ecological footprint and increase its 'ecological handprint.
		On the job training of internal staff (as part of nesting and foraging habitat study and investigation of mortality)
Sharjah	EPAA	Sir Bu Na'air studies annually / Khor Kalba plan for 2017
		Awareness of turtle by-catch handling - Number of dead turtles after by-catch release
		Awareness of Plastic Pollution impact on turtles - Number of Dead Turtles washed up or reported due to plastic digestion (Yaghmour, 2018).
UAE Wide	EN-WWF	Throughout the implementation of the hawksbill project, EWS-WWF implemented an awareness campaign around marine turtles with the following activities: • Hosted a virtual race (Great Gulf Turtle Race) on the EWS-WWF website where the public could follow the turtles, had a series of press releases resulting in extensive media coverage. • Implemented a social media campaign. • Offered a number of talks and presentation to the public (schools, private sector).
UAE wide and regional scope	EN-WWF	As part of the hawksbill project EWS-WWF implemented training in the field with partners on satellite transmitter deployment techniques. In addition, EWS-WWF hosted a workshop in April 2014 with a number of stakeholders from the region and offered an informal training on satellite tracking data acquisition, data filtering and final analysis using GIS.

National Plan of Action for the Conservation of Marine Turtles in the UAE 2019 - 2021

1.6 GAPS

The need to make informed decisions based on the best available information is acknowledged as a principle to guide management conservation practices for marine turtles in the UAE In the light of this principle there are recognized important gaps to the conservation of marine turtles despite the increasing conservation efforts towards marine turtles and the advances in our knowledge about marine turtle populations present in UAE waters.

Major challenges common to the conservation of widely distributed and long-lived species such as marine turtles are particularly related to the difficulty that their complex life cycle imposes to the assessment of conservation status at biologically appropriate scale; and the fact that turtles spend most of their lives migrating among different marine habitats and only come close to shore for reproduction purposes. However, efforts on gathering information at specific population level is a recognized global priority (Wallace et al., 2010), particularly in areas identified as data deficient, contributing to feed current global extinction risk assessments and frameworks for marine turtles - IUCN Red List of Threatened Species (www.iucnredlist.org). Capturing and assessing variation in status and trends of individual populations is therefore crucial result particularly important on establishing conservation priorities based on those assessments

In addition, gaps to the management conservation process exist and are related to the current capacity to undertake research studies of marine populations and implement priority actions and management strategies. In this sense regulatory frameworks, institutional capacity and adequate mechanisms for implementation may also impose a challenge for marine turtle conservation. The Table 10 summarizes the gaps for marine turtle conservation identified in the present status review.

Table 10: Summary of gaps for marine turtle conservation in the UAE. Even though relevant information on the topics listed below might be available for one species or in a particular area, a good understanding at national and cross species level is required.

Topics	Identified Gaps
1. Biology and Ecology of marine turtle populations	• Identification of critical habitat to the survival of marine turtles. • Population trends based on standardized nesting monitoring surveys. • Understanding of migration patterns and connectivity among population assemblages. • In-water monitoring on trends of foraging populations • Characterization of genetic diversity and definition of population boundaries. • Description of foraging biology and diet. • Understanding of threats and their impact on specific population segments (e.g. juveniles, sub-adults, adults). • Assessment of incidental capture of turtles in fisheries. • Disease and natural mortality rates. • Impact of climate change on nesting and foraging patterns and processes of marine turtles.
2. Management practices	• Understanding on current practices implemented in each Emirate. • Harmonisation of management activities and procedures for long-term data collection. • Establishment of a national marine turtle program to collect base-line information for monitoring of local populations. • Monitoring and management of critical habitats, including nesting and foraging areas. • Involvement of stakeholders in data collection (Peoples participation in science and conservation.
3. Capacity for implementation	• Turtle-specific legislative and regulatory framework. • Designation of Areas of High Conservation value or ITAs. • Institutional capacity for regulation and enforcement. • Stakeholder engagement and coordination of activities to tackle threats to marine turtles.
4. Education & Awareness	• Targeted awareness initiatives focusing on key stakeholders affecting marine turtle populations (e.g. Fishermen, tourism operators, developers, marine enforcement agency).

National Plan of Action for the Conservation of Marine Turtles in the UAE 2019 - 2021

2. CONSERVATION PLAN 2018-2021

2.1. VISION AND GOALS

Vision:
Marine Turtles populations and their critical habitats in the UAE are effectively conserved and managed to enable their sustainability.

Goals:

I. Reduce direct and indirect causes of marine turtle's mortality
II. Protect, conserve and rehabilitate marine turtle's habitats
III. Improve understanding of marine turtle's ecology and populations through research, monitoring information exchange
IV. Raise public awareness and encourage public participation in marine turtle's conservation activities
V. Enhance the implementation of national legislations and policies for the protection, cooperation and integrated management of marine turtles at the national, regional and international levels
VI. Enable effective conservation through capacity building and awareness

The plan of action is intended to have an initial three years' duration commencing in 2019 until 2021, followed by a review which will enable to take an adaptive management approach and ensure the attainment of its strategic goals and overall vision. Identified goals and programmes are specific to the situation in the UAE, and address the gaps and challenges identified in the section of this document on current conservation status of marine turtles in the UAE.

The implementation will be coordinated by the Ministry of Climate Change and Environment - MOCCAE in close collaboration with a number of key stakeholders working for the conservation of marine turtles in the UAE, and its progress will be assessed and reported annually at the Emirates Climate Change and Environment Council.

2.2. CRITERIA FOR THE CONSERVATION PLAN

The structure proposed for the definition of goals and programmes followed recommendations of the Memorandum of Understanding on the Conservation and Management of Marine Turtles and their Habitats of the Indian Ocean and South-East Asia (IOSEA) for the development of actions plans. Identification and prioritization of programmes was achieved throughout consultation with different stakeholders working on conservation of marine turtles in the UAE and following the criteria described below to determine level of priority and time for completion of programmes.

High priority action:
Actions those are essential for avoiding the extinction or decline of the species. These actions are considered "critical measures" and should be compulsory throughout the duration of the NPOA. The success of the plan could be assessed by the implementation of these activities. The non-implementation of these actions should result in the revision of the Plan.

Medium priority action:
Actions necessary for avoiding a significant decline of the population, its distribution area or the quality of its habitat.

Low priority action:
Other actions that are recommended for the adequate recovery of the species. These are non-critical measures for the execution timeline of the Plan.
In addition, the table indicated indicative timeframe for completion. Below The definition of the timeframe

Timeframe for completion:
Actions that could be completed between 2-1 years were considered to be short term actions. Those requiring 3 to 5 years were considering medium term and finally actions that would require a completion time over 5 years were considered long term actions.

National Plan of Action for the Conservation of Marine Turtles in the UAE 2019 - 2021

3. ACTIONS PROPOSED AS PART OF THE CONSERVATION PLAN

CONSERVATION PLAN

Goal 1: Reduce direct and indirect causes of marine turtles mortality

Programmes	Activities	Priority for Programs	Indicators	Outputs	Time Frame
1.1 Identify and assess the threats to marine turtle populations and their habitats	a) Collect and organize existing data on threats to marine turtle populations b) Collect baseline information and assess the levels of marine turtle bycatch. c) Establish national baseline data collection and monitoring programs to collect information on the nature of threats d) Determine direct and indirect sources of mortality affecting populations e) Investigate poaching of marine turtle eggs, if any.	H	Number of threats identified and assessed of marine turtle populations and their habitats	Database of threats of marine turtle populations and their habitats	Short term
1.2 Reduce the incidental capture and mortality of marine turtles	a) Develop techniques and adopt the use of gear and devices to minimize incidental capture of marine turtles in fisheries b) Enact and enforce legislation requiring the use of marine turtle-friendly fishing gears and management and disposal of fishing nets c) Develop procedures and training programs to promote implementation of these measures d) Coordinate with fisheries industries and fishermen cooperation's to develop and implement incidental capture mitigation mechanisms in national waters (e.g. Disentanglement techniques) Promote cooperation with the fisheries sector to develop and implement mitigation mechanisms to reduce incidental capture in the UAE.	H	Number of technical manuals are developed Number of legislation and policies updated or/and develope	National baseline on bycatch data Training programmes for	Long term
1.3 Develop nesting sites management programs	a) Develop and/or implement conservation techniques that emphasize natural processes to reduce the mortality of eggs and hatchlings to maximize hatchling recruitment and survival b) Minimize the mortality of eggs, hatchlings and nesting female turtles caused by feral and domestic animals c) Develop and implement management measures to reduce the impact of artificial light at key nesting sites are developed and implemented d) Management measures are developed and implemented to remove debris that impedes turtle nesting and hatchling production	M	Population trends of nesting sites	Nesting site management plans and monitoring program including stranding data	Medium term

Goal 2: Protect, conserve and rehabilitate nesting and foraging marine turtle habitats

Programmes	Activities	Priority	Indicators	Outputs	Time Frame
2.1. Establish measures to protect and conserve marine turtle habitats	a) Designate and manage protected/ conservation areas and IOSEA Network Sites b) Establish measures to conserve marine turtle habitats by identifying critical habitats and developing initiatives for adequate protection. c) Undertake assessments of the environmental impact of marine and coastal development and other human activities that may affect marine turtle populations and their habitats	H	Percentage of key marine turtle habitats protected and conserved	Management plans for key nesting and foraging sites	Long term
2.2. Identify important turtle areas (ITAs)	a) Identify/Confirm critical areas (Important Turtle Areas) b) encompassing different life stages of marine turtles and delineate areas for their conservation action / protection.	H	Number of ITAs in the UAE	Map of critical areas for marine turtles in the UAE.	Medium term
2.3 Develop rehabilitation and rescue programs for marine turtles	**Rehabilitation of Habitats** a) Determine factors and degree of impact of natural and anthropogenic activities on key habitat. b) Remove debris that impedes turtle nesting and hatchling production c) Develop marine turtles' habitat's rehabilitation programs and initiatives **Rehabilitation of individuals** a) Establish marine turtles rescue and rehabilitation facilities b) Develop specialist training programs for marine turtle rescue and rehabilitation Protocols c) Develop protocols for the rescue, rehabilitation and rescue of marine turtles at all life stages.	H	Number of rehabilitation initiatives Number of training programs for marine turtle rescue	Rehabilitation and rescue protocol	Long term

Goal 3: Improve understanding of marine turtles' ecology and populations through research, monitoring information exchange

Programmes	Activities	Priority	Indicators	Outputs	Time Frame
3.1 Conduct research studies and monitoring activities on marine turtles and their habitats	a) Develop monitoring programs and promote the reduction of water quality from land-based and maritime pollution that may adversely affect marine turtles and their habitats b) Initiate and/or strengthen long-term monitoring of marine turtle populations in order to assess conservation status and population trends (in-water and nesting areas). c) Develop study to understand potential impact of climate change on the status of marine turtles, their habitats, and their behavior patterns such as migration. d) Develop programs to study life history of marine turtles (including disease and mortality rate) to assess marine turtle's health e) Establish a data collection baseline f) Conduct assessments for the identification of critical nesting and foraging habitats. g) Identify migratory routes through the use of tagging, genetic studies, and/or satellite tracking. Incorporate genetic sampling of populations under existing monitoring activities Implement research programs for ecological studies of marine turtle habitats.	H	Number of key sites have long term monitoring programmes running Number of research studies and monitoring activities on marine turtle and their habitats in UAE	Distribution map for key nesting and foraging areas for marine turtles in UAE Research programs for ecological studies of marine turtle habitats	Long term
3.2 Exchange information on a national level	a) Determine appropriate standardized methods for data collection/ recording and develop protocols b) Exchange on a regular basis scientific and technical information and expertise among governmental institutes, scientific institutions, and non-governmental organizations in order to develop and implement best practice approaches to conservation of marine turtles and their habitats on a national level Regular progress updates on marine NPOA during National Happiness and positive committee meetings.	H	Number of meeting related marine turtle's issues	Adopt best practices and platform/ mechanism to centralized data sharing Data collection protocols Platform to exchange information Working Group of technical experts to exchange information	Long term

Goal 4: Raise public awareness of the threats to marine turtles and their habitats, and encourage public participation in conservation activity

Programmes	Activities	Priority	Indicators	Outputs	Time Frame
4.1 Establish and/ or enhance the implementation of public education and awareness programs	a) Develop and disseminate education materials on marine turtles, their ecological and cultural value and their habitats. b) Develop and conduct media related information and awareness programs on marine turtles and their habitats for different sectors of the community c) Encourage the incorporation of marine turtle biology and conservation issues into school curricula d) identify specific activities to be implemented a national level to raise awareness on marine turtles.	H	Number of awareness programs Number of educational material developed and disseminated Number of media awareness initiatives implemented	Education and awareness programs	Long term
4.2 Promote public participation in marine turtles conservation activities	a) Involve stakeholders in planning and implementation of conservation and management measures b) Encourage the participation of Government institutions, non-governmental organizations, the private sector and the general community in research and conservation efforts c) Develop multimedia educational materials to be distributed at national level d) Promote marine turtle conservation in the UAE in association with international significant Biodiversity & turtle days.	M	Number of stakeholders involved in research and conservation efforts	Campaigns in marine turtle's conservation	Long term

Goal 5: Enhance implementation of national legislations and strengthen cooperation on national, regional and international levels

Programmes	Activities	Priority	Indicators	Outputs	Time Frame
5.1. Enhance mechanisms for regional & international cooperation and promote information exchange	a) Identify and strengthen existing mechanisms for cooperation at the sub-regional level b) Develop a web-based information resource for marine turtle conservation c) Encourage the development of networks for cooperative management of shared populations, within or across sub-regions	M	Number of collaborative initiatives implemented (national/regional)	Mechanism of regional and international cooperation established / strengthened UAE national reports at IOSEA MoU	Long term
5.2. Strengthen legislation framework and enforcement of conservation legislation	a) Review national policies and legislation to address gaps on marine turtle conservation and develop legislations or policies to address these gaps, as appropriate. b) Identify efficient mechanisms to enhance enforcement of policies, and collaborate with enforcement agencies to protect nesting and foraging habitats.	M	Relevant Number of legislation and policies are enacted.	The national plan of action is adopted and implemented	Long term

Goal 6: Enable effective conservation through capacity building and awareness

Programmes	Activities	Priority	Indicators	Outputs	Time Frame
6.1 Training and capacity building on marine turtle and their habitats conservation	a) Identify needs for capacity building b) develop training and capacity building programs c) Strengthen capacity at national and regional levels, related to technical interventions for management, and research d) Promote partnerships with universities, research institutions and other organizations that can provide support on capacity building.	M	Number of materials produced oriented to build capacity for marine turtle management and conservation Number of capacity Building and training workshops	Programs of capacity building Training programs	Long term

4. IMPLEMENTATION OF THE NPOA

This NPOA covers a period of 3 years commencing in 2019 until 2021. The implementation of the NPOA will be coordinated by MOCCAE in close collaboration with a number of key stakeholders working for the conservation of marine turtles in the UAE. Progress will be assessed and reported annually at the Emirates Climate Change and Environment Council.

NPOA Implementation Enabling Activities

A number of priority activities will be initiated during the initial phase of implementation. These priority activities are seen as 'enablers' that will allow effective implementation of the plan, periodic evaluation of progress and effective participation of key stakeholders. These enabling activities are listed below with a suggested timeline within a timeframe of 3 years.

Table X: List of Enabling Activities with a suggested timeline

'Enabling' Activities for NPOA Implementation	2019	2020	2021
Priorities activities and identify roles and responsibilities of key stakeholders	X		
Identify indicators to measure success of NPOA implementation	X		
Develop standardization protocols for data collection and training	X		
Assessment of distribution of nesting and foraging habitats of importance for marine turtles in the UAE	X	X	
Recognition of ITAs - nesting and foraging habitats of importance for marine turtles		X	X
Data collection and initial assessment of threats including bycatch and interaction of fisheries with marine turtles		X	X
Identify funding opportunities for the implementation of the NPOA	X		

National Plan of Action for the Conservation of Marine Turtles in the UAE 2019 - 2021

Stakeholders for the implementation of the NPOA

Stakeholders play an important role in supporting various components of this NPOA. In addition, since this NPOA is aiming to conserve migratory species, dissemination of information and collaboration at a regional level is required. An indicative list of important stakeholders is provided below.

GOVERNMENT

- Ministry of Climate Change and Environment
- Ministry of Culture, Youth and Community Development
- Environment Agency - Abu Dhabi
- Dubai Municipality
- Sharjah Environment and Protected Areas Authority
- Umm Al Quwain Municipality
- Fujairah Municipality
- Ras Al Khaimah Environment Protection and Development Authority
- Oil and Gas Government Companies
- Chambers of Commerce
- Critical Infrastructure and Coastal Protection Authority
- Dibba Fujairah Municipality
- Ajman Municipality & Planning Department

NON-GOVERNMENTAL GROUPS AND ORGANIZATIONS

- Dubai Falcon Clinic and Central Veterinary Research Laboratory
- Dubai Rehabilitation Centre
- Emirates Diving Association and Dive clubs (across all emirates)
- Emirates Marine Environmental Group (EMEG)
- Emirates Natural History Groups (all chapters)
- Emirates Nature in association with the World Wide Fund for Nature (EN-WWF)
- Fishermen Cooperatives
- Private hotel operators adjacent to important turtle habitats (eg.Park Hyatt and Noukhada)
- Universities in the UAE

REGIONAL / INTERNATIONAL

- Convention of Migratory Species (CMS) Secretariat – Abu Dhabi
- Gulf Cooperation Council
- IUCN Turtle Specialist Group
- Memorandum of Understanding on the Conservation and Management of Marine Turtles and their Habitats of the Indian Ocean and South-East Asia (IOSEA)
- PERSGA, Regional Organization for the Conservation of the Environment of the Red Sea and Gulf of Aden
- Regional Organization for the Protection of the Marine Environment (ROPME)
- FAO Regional Commission on Fisheries (RECOFI)
- CITES Secretariat

REFERENCES

1. *Abdulqader, E. 2008. IOSEA Turtle Memorandum of Understanding Country Report: Bahrain. Indian Ocean South-East Asian Sea Marine Turtle MoU, Bangkok, Thailand.*
2. *Abdulqader, E. A. A. and Miller, J. 2012. Marine turtle mortalities in Bahrain territorial waters. Chelonian Conservation and Biology. 138–133:(1)11.*
3. *Al Mohanna, S. and Meakins, R. 2000. First Record of the Leatherback Turtle (Dermochelys coriacea) from Kuwait. Zoology in the Middle East. 29 –27:(1)21.*
4. *Al- Mohanna, Salim Y., Amani SY Al- Zaidan, and Preeta George. 2014. Green turtles (Chelonia mydas) of the north- western Arabian Gulf, Kuwait: the need for conservation. Aquatic Conservation: Marine and Freshwater Ecosystems 178-166 :24.2.*
5. *Al Suweidi, A., Wilson, K., Healy, T. and Vanneyre, L. 2012. First Contemporary Record of Green Turtle (Chelonia mydas) Nesting in the United Arab Emirates. Marine Turtle Newsletter. 22 –20:(133)22.*
6. *Al-Ghais, S., Balazs, G., and Hasbun, C. 1998. Preliminary Observations on Green Turtles, Chelonia mydas. In: Foraging Pastures of the United Arab Emirates. Marine Turtle Newsletter 9-8 :79.*
7. *Anon. 1999. Federal Law No. 1999 .1999/23. Apropos Exploitation, Protection and Development of Marine Bio-resources in the U.A.E (Unofficial (English) translation). Gulf Office Services Bureau. Abu Dhabi. United Arab Emirates. Accessed from https://www.uaeinteract.com/uaeint_misc/pdf/perspectives/14.pdf*
8. *Aspinall, S. 2001. Environmental Development and Protection in the UAE. In: United Arab Emirates: A New Perspective. Trident Press. United Arab Emirates.*
9. *Aspinall, S.J. and Hellyer, P. 1997. A proposal for a Western Abu Dhabi coast and islands World Heritage Site. Tribulus 8–5 :(1) 7.*
10. *Asrar, F. F. 1999. Decline of marine turtle nesting populations in Pakistan. Marine Turtle Newsletter. 14–83:13.*
11. *Baldwin, R., and Gardner, D. 2005. Marine Reptiles. In: The Emirates A Natural History. Abu Dhabi, United Arab Emirates: Trident Press Ltd.*
12. *Bishop, J. M., Deshti, T., and Al-Ayoub, S. 2007. The Arabian Gulf's first record of the olive ridley, Lepidochelys olivacea, from Kuwait. Zoology in the Middle East. 103–42:102.*
13. *Burt, John A. 2014. The environmental costs of coastal urbanization in the Arabian Gulf. City 770-760 :18.6.*
14. *Casale, P. 2015. Caretta caretta (North West Indian Ocean subpopulation). The IUCN Red List of Threatened Species 2015: e.T84127873A84127992. http://dx.doi.org/10.2305/IUCN.UK.4-2015.RLTS. T84127873A84127992.en. Downloaded on 01 May 2016.*
15. *Cornelius, S.E., Arauz, R., Fretey, J., Godfrey, M.H., Márquez-M., R. and Shanker, K. 2007. Effect of land-based harvest of Lepidochelys. In: P.T. Plotkin (ed.), Biology and Conservation of Ridley Sea Turtles, Johns Hopkins University Press, Baltimore, MD.*
16. *Das ,S., H., Kabbara, L., R., Al-Abdessalam, T., Z., 2010. Nesting Ecology of Hawksbill Turtle in Abu Dhabim UAE. In: Blumenthal, J., Panagopoulou, A., and Rees, A.F., compilers 2013. Proceedings of the Thirtieth Annual Symposium on Sea Turtle Biology and Conservation, NOAA. Accessed in http://www.nmfs.noaa.gov/pr/pdfs/species/turtlesymposium2010.pdf.*
17. *Das, S., H., Grandcourt, E., Al Hameli, M., Al Abdessalaam, T., Z., 2014. UAE Turtle Conservation Overview. Presentation in Marine Turtle Conservation – Stakeholders workshop held in Dubai by EWS-WWF in 2014. Proceedings accessed in http://d2ouvy59p0dg6k.cloudfront.net/downloads/ews_wwf_mtcp_workshop_proceedings_final_version.pdf.*
18. *D'Aloia, Marie-Ann, and Saif M. Al-Ghais. 2000. Preliminary genetic analysis of the green turtle, Chelonia mydas, in the Arabian Gulf using mitochondrial DNA. Zoology in the Middle East 54-47 :21.1.*
19. *EAD and AGEDI. 2009. Marine and Coastal Environment of the emirate of Abu Dhabi, United Arab Emirates. Environment Agency Abu Dhabi and Abu Dhabi Global Environment Data Initiative, Abu Dhabi, UAE.*
20. *EAD and AGEDI. 2011. Environmental Atlas of Abu Dhabi Emirate. Environment Agency Abu Dhabi and Abu Dhabi Global Environment Data Initiative, Abu Dhabi, UAE.*

21. *EAD. 2011. Environmental Atlas of Abu Dhabi Emirate. Abu Dhabi. United Arab Emirates.*
22. *Ebrahim A.A. Abdulqader, Jeff Miller, Ahmed Al-Mansi, Khaled Al-Abdulkader, Nabil Fita, Hussein Al-Nadhiri, Lotfi Rabaoui. 2017. Turtles and other marine megafauna bycatch in artisanal fisheries in the Saudi waters of the Arabian Gulf, Fisheries Research,Volume 196, Pages 84-75, ISSN 7836-0165. https://doi.org/10.1016/j.fishres.2017.08.008.*
23. *EWS-WWF. 2015. Marine Turtle Conservation Project Final Scientific Report. Emirates Wildlife Society in association with World Wide Fund for Nature, Dubai, United Arab Emirates.*
24. *EWS-WWF. 2014. Marine Turtle Conservation Project Stakeholder Workshop. Emirates Wildlife Society in association with World Wide Fund for Nature, Dubai, United Arab Emirates.*
25. *Fuentes, M.M., Pike, D.A., Dimatteo, A. and Wallace, B.P., 2013. Resilience of marine turtle regional management units to climate change. Global Change Biology, 5)19), pp.1406-1399.*
26. *Gasperetti, J., Stimson, A.F., Miller, J.D., Ross, J.P. and Gasperetti, P.R. 1993. Turtles of Arabia. In: W., Butticker, F., Krupp (eds.), Fauna of Saudi Arabia 13, National Commission for Wildlife Conservation and Development, Riyadh and Pro Entomologia, Basel, Switzerland.*
27. *Hamann, M., Limpus, C.J. and Read, M.A., 2007. Vulnerability of marine reptiles in the Great Barrier Reef to climate change.*
28. *Hawkes, L.A., Broderick, A.C., Godfrey, M.H. and Godley, B.J., 2007. Investigating the potential impacts of climate change on a marine turtle population. Global Change Biology, 5)13), pp.932-923.*
29. *IOSEA National Reporting - UAE. 2014. Accessed in http://iosea-reporting.org/test/reporting/NatRepts/UAE_2014_09_19.pdf.*
30. *John V, Coles S, Abozed A. 1990. Seasonal cycles of temperature, salinity and water masses of the western arabian gulf. Oceanologica Acta, -273 ,(3)13 281. Open Access version http://archimer.ifremer.fr/doc/24246/00131/*
31. *Kami, H.G. 1997. First Record of the Olive Ridley Turtle in Iranian Coastal waters. Zoology in the Middle East, 70–15:67.*
32. *Marine Turtle Newsletter, 1998. Preliminary observations on green turtles, chelonia mydas, in foraging pastures of the United Arab Emirates. Marine Turtle Newsletter 9-79:8.*
33. *Meakins RH, Al Mohanna SY (2004) Sea turtles of Kuwait. Centre for Research and Studies on Kuwait, Kuwait City.*
34. *Michael P. Jensen, Camryn D. Allen, Tomoharu Eguchi, Ian P. Bell, Erin L. LaCasella, William A. Hilton, Christine A.M. Hof, Peter H. Dutton, Environmental Warming and Feminization of One of the Largest Sea Turtle Populations in the World, Current Biology, Volume 28, Issue 2018 ,1, Pages 159-154.e4, ISSN 9822-0960, https://doi.org/10.1016/j.cub.2017.11.057.*
35. *Miller G. 2012. Marine and Coastal Reptiles In Marine Atlas, Western Arabian Gulf (2nd Edition). Ronald A. Loughland and Khaled A. Al-Abdulkader (Eds). A Saudi Aramco Environmental Protection Publication, Environmental Protection Department, Saudi Aramco.*
36. *Mobaraki, A. 2004a. Nesting of the Hawksbill Turtle at Shidvar Island, Hormmozgan Province, Iran. Marine Turtle Newsletter. 103:13.*
37. *Mobaraki. A. 2004b. Marine Turtles in Iran, Results from 2002. Marine Turtle Newsletter. 104:13.*
38. *Moqbil, A. 2007. Marine turtle activities in the Republic of Yemen. IOSEA. Accessed in www.ioseaturtles.org.*
39. *Moritz, C. 1999. Conservation units and translocations: strategies for conserving evolutionary processes. Hereditas 228-217 :130.3.*
40. *Mortimer, J. A., and D. Broderick. 1999. Population genetic structure and developmental migrations of sea turtles in the Chagos Archipelago and adjacent regions inferred from mtDNA sequence variation.*
41. *Nasher, A. K. and Al Jumaily, M. 2013. Initial steps to building long term sea turtle conservation program on Soqotra. Tayf, the Soqotra Newsletter, 10: page 14.*
42. *Naser, H., Hoad, G. 2011. An investigation of salinity tolerance and salt secretion in protected mangroves, Bahrain. Gulf II: an international conference. The state*

(cont...)

of the Gulf ecosystem: Functioning and services. Kuwait City, Kuwait. 9-7 February 2011.

43. *Pike, D.A., 2013. Climate influences the global distribution of sea turtle nesting. Global Ecology and Biogeography, 5)22), pp.566-555.*
44. *Pilcher, N.J, Antonopoulou, M., Perry, L., Abdel-Moati, M.A., Al Abdessalaam, T.Z., Albeldawi, M., Al Ansi, M., Al-Mohannadi, S.F., Al Zahlawi, Z., Baldwin, R., Chikhi, A., Das, H.S., Hamza, S., Kerr, O.J., Al Kiyumi, A., Mobaraki, A., Al Suwaidi, H.S., Al Suweidi, A.S., Sawaf, M., Tourenq, C., Williams, J. and Willson, A. 2014a. Identification of Important Sea Turtle Areas (ITAs) for hawksbill turtles in the Arabian Region. Journal of Experimental Marine Biology and Ecology. 99–460:89.*
45. *Pilcher, N.J. and Saad, M. 2006. Status of Leatherback Turtles in Yemen, Indian Ocean – South East Asian Leatherback Turtle Assessment. IOSEA Marine Turtle MoU, Bangkok, Thailand.*
46. *Pilcher NJ, Al Ansi M, Aljabri A. 2008. Marine turtle conservation in Qatar. In: Dean K, Lopez-Castro M (comps) Proc 28th Annu Symp Mar Turtle Conserv Biol. NOAA Tech Mem NMFS-SEFSC602-. NOAA, Miami, FL, Witt MJ, Hawkes LA, Godfrey MH, Godley BJ, Broderick p 181–180.*
47. *Pilcher, N.J., Perry, L., Antonopoulou, M., Abdel-Moati, M.A., Al Abdessalaam, T.Z., Albeldawi, M., Al Ansi, M., Al Mohannadi, S.F., Baldwin, R., Chikhi, A., Das, H.S., Hamza, S., Kerr, O.J., Al Kiyumi, A., Mobaraki, A., Al Suwaidi, H.S., Al Suweidi, A.S., Sawaf, M., Tourenq, C., Williams, J., Willson, A., 2014b. Short-term behavioural responses to thermal stress by hawksbill turtles in the Arabian region. Journal of Experimental Marine Biology and Ecology 198-457:190.*
48. *Pilcher NJ, Al-Maslamani I, Williams J, Gasang R, Chikhi A. 2015. Population structure of marine turtles in coastal waters of Qatar. Endangered Species Research 174-28:163*
49. *Rees, A. F., Al-Kiyumi, A. Broderick, A. C. Papathanasopoulou, N. and Godley, B. J. 2012. Conservation related insights into the behavior of the olive ridley sea turtle Lepidochelys olivacea nesting in Oman. Marine Ecology Progress Series. 205–450:195.*
50. *Rees, A. and Baker, S.L. 2006. Hawksbill and Olive Ridley Nesting on Masirah Island, Sultanate of Oman: an Update. Marine Turtle Newsletter. 5–113:2.*
51. *Robinson, D. P., Jabado, R. W., Rohner, C. A., Pierce, S. J., Hyland, K. P., & Baverstock, W. R. 2017. Satellite tagging of rehabilitated green sea turtles Chelonia mydas from the United Arab Emirates, including the longest tracked journey for the species. PLoS ONE, 9)12), e0184286. http://doi.org/10.1371/journal.pone.0184286*
52. *Rodríguez-Zárate, C.J., Rocha-Olivares, A. and Beheregaray, L.B., 2013. Genetic signature of a recent metapopulation bottleneck in the olive ridley turtle (Lepidochelys olivacea) after intensive commercial exploitation in Mexico. Biological conservation, 168, pp.18-10.*
53. *Ross, J.P. and Barwani, M.A. 1982. Review of sea turtles in the Arabian area. In: K. A. Bjorndal (ed.), Biology and Conservation of Sea Turtles, Smithsonian Inst. Press, Washington D. C., USA.*
54. *Salm, R.V., Jensen, R.A.C. and Papastavrou, V.A. 1993. Marine fauna of Oman: Cetaceans, Turtles, Seabirds and Shallow Water Corals. A Marine Conservation and Development Report. Gland: IUCN.*
55. *Seaturtle.org, 2009. Dubai Turtle Rehabilitation Project, 2015. Accessed in http://www.seaturtle.org/tracking/index.shtml?project_id=687&dyn=1457340590.*
56. *Seminoff, J.A. (Southwest Fisheries Science Center, U.S.). 2004. Chelonia mydas. The IUCN Red List of Threatened Species 2004: e.T4615A11037468. http://dx.doi.org/10.2305/IUCN.UK.2004.RLTS.T4615A11037468. en. Downloaded on 21 May 2016.*
57. *SharjahTourism.ae. 2013. East Coast. Government of Sharjah, Sharjah, United Arab Emirates.*
58. *Shamblin BM, Bolten AB, Abreu-Grobois FA, Bjorndal KA, Cardona L, Carreras C, et al. (2014) Geographic Patterns of Genetic Variation in a Broadly Distributed Marine Vertebrate: New Insights into Loggerhead Turtle Stock Structure from Expanded Mitochondrial DNA Sequences. PLoS ONE 1)9): e85956. doi:10.1371/journal.pone.0085956*
59. *Spotila, J. R. (2004). Sea turtles: A complete guide to their biology, behavior, and conservation. JHU Press.*
60. *Tollab, M.A, Mohammad Hashem Dakhteh, Ghasem Ghorbanzadeh Zaferani, Majid Askari Hesni, Farideh Ahmadi, Mahtab Shojaei Langari, Zahra Alavian, and Mohsen Rezaie-Atagholipour. 2015. The Olive Ridley Turtle, Lepidochelys olivacea, in the Persian Gulf: A Review of the Observations, Including the First Nesting of the Species in the Area. Chelonian Conservation and Biology 196-192:(2)14. doi: http://dx.doi.org/10.2744/CCB1148.1-*
61. *Tucker, A.D., Baldwin, R., Willson, A., Al-Kiyumi, A., Schroeder, B., Possardt, E. and Witherington, B. 2013. Preliminary estimates for loggerhead clutch frequency from Masirah, Oman derived from satellite tracking. In: T. Tucker, L. Belskis, A. Panagopoulou, A. Rees, M. Frick, K. Williams, R. Leroux & K. Stewart (ed.), Proceedings of the 33rd Annual Symposium on Sea Turtle Biology and Conservation. NOAA Tech. Mem NMFS-SEFSC243 :645-.*
62. *The National. 2015. Hawksbill hatch on Saadiyat Island. (Retrieved from http:// www.thenational.ae / uae/hawksbill-turtles-hatch-on-saadiyat-island - The National 2015).*
63. *Wallace BP, DiMatteo AD, Hurley BJ, Finkbeiner EM, Bolten AB, et al. 2010. Regional Management Units for marine turtles: A novel framework for prioritizing conservation and research across multiple scales. PLoS ONE 12)5): e15465. doi:10.1371/journal.pone.0015465.*
64. *Wallace, B.P., Tiwari, M. & Girondot, M. 2013. Dermochelys coriacea. The IUCN Red List of Threatened Species 2013: e.T6494A43526147. http://dx.doi.org/10.2305/IUCN.UK.2-2013.RLTS.T6494A43526147. en. Downloaded on 20 September 2016.*
65. *Willson, A., Tiwari, M., Baldwin, B., Al Kiyumi, A., Al Harthi, S., Bulushi, Witherington, B., A., Possardt, E. (2015) Spatial analysis of satellite tracking of female loggerheads Masirah Island Oman; application and utility in evaluating fisheries co-occurrence for the assessment of bycatch. 35th ISTS Symposium on Sea Turtle Biology and Conservation, Dalaman, Turkey.*
66. *Witherington, B., Willson, A., Baldwin, R., Al Kiyumi, A., Al Harthi, S., Al Blooshi, A. & Possardt, E. 2015. Comparison of Recent and Historical Surveys of Nesting by Loggerhead Turtles on Beaches of Masirah Island, Sultanate of Oman. Presentation at International Sea Turtle Symposium 2015, Dalaman, Turkey.*
67. *Witt, M.J., Hawkes, L.A., Godfrey, M.H., Godley, B.J. and Broderick, A.C., 2010. Predicting the impacts of climate change on a globally distributed species: the case of the loggerhead turtle. The Journal of Experimental Biology, 6)213), pp.911-901.*
68. *Vine, P. 1999. Sir Bani Yas. Trident Press. London. United Kingdom.*
69. *Yaghmour, F., Pereira, J., Whittington-Jones, B., Al Bousi, M., García-Nuñez, S., and Budd, J., 2018. Marine debris ingestion of green sea turtles, Chelonia mydas, (Linnaeus, 1758) from the eastern coast of the United Arab Emirates. Marine Pollution Bulletin. 1)135), pp.61-55*

National Plan of Action for the Conservation of Marine Turtles in the UAE 2019 - 2021

UAE MINISTRY OF CLIMATE CHANGE & ENVIRONMENT
Biodiversity Department
PO Box 1509, Dubai, United Arab Emirates
Email: biodiversity@moccae.gov.ae

www.moccae.gov.ae

@MOCCAEUAE
www.moccae.gov.ae