



The Maldives National Red List of Threatened Species

Scope: National

Language: English

Eretmochelys
imbricata
Hawksbill sea turtle

Köhnk, S.

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Maldives National Red List Assessment: Hawksbill Sea Turtle

A. Background Information

1. Assessment Information:

Assessor Name Stephanie Köhnk

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2. Taxonomic Information:

Scientific Name *Eretmochelys imbricata*

Common Name (English) Hawksbill sea turtle

Common Name (Dhivehi) Kahanbu, ޯޯސަރުޖު

Order Testudines

Taxonomy Sub-order Cryptodira

Family Cheloniidae

Taxonomic Notes **Synonym(s):** *Testudo imbricata* Linnaeus, 1766

3. Geographic Range

3.1 Summary of Global Distribution

Hawksbill turtles are distributed circumglobally in tropical and subtropical waters. They are found in the waters of 108 countries, while nesting occurs in 70 countries (IUCN Global Assessment, Mortimer and Donnelly 2008).

3.2 Countries of Occurrence

Extant (resident): American Samoa; Antigua and Barbuda; Australia; Bahamas; Bahrain; Barbados; Belize; Bonaire, Sint Eustatius and Saba (Bonaire, Sint Eustatius, Saba); Brazil; British Indian Ocean Territory; Cambodia; China; Colombia; Comoros; Costa Rica; Cuba; Curaçao; Dominican Republic; Ecuador; Egypt; El Salvador; Equatorial Guinea (Bioko); Eritrea; Fiji; French Southern Territories (Mozambique Channel Is.); Grenada; Guadeloupe; Guam; Honduras; India (Nicobar Is., Andaman Is.); Indonesia; Iran, Islamic Republic of; Jamaica; Japan; Kenya; Kuwait; Madagascar; Malaysia; Maldives; Martinique; Mauritius; Mayotte; Mexico (Campeche, Yucatán); Micronesia, Federated States of ;

Mozambique; Myanmar; Nicaragua; Oman; Palau; Panama; Papua New Guinea; Philippines; Puerto Rico; Qatar; Saint Kitts and Nevis; Saint Martin (French part); Samoa; Sao Tome and Principe; Saudi Arabia; Seychelles; Sint Maarten (Dutch part); Solomon Islands; Somalia; Sri Lanka; Sudan; Taiwan, Province of China; Tanzania, United Republic of; Thailand; Trinidad and Tobago; United Arab Emirates; United States (Hawaiian Is.); Vanuatu; Venezuela, Bolivarian Republic of; Viet Nam; Virgin Islands, British; Yemen

Presence Uncertain: Cayman Islands; Sierra Leone

3.3 National Distribution

Hawksbill turtles can be found in all atolls throughout the Maldives according to anecdotal reports and systematic surveys (Frazier et al. 1984). Recent sea turtle monitoring based on the photo identification method conducted in approximately 46% of the country identified significant numbers of Hawksbill Turtles (>500) in Ari, Baa, and North Male (Kaafu) atoll (Olive Ridley Project 2020).

Hawksbill turtle nesting has been suspected to occur throughout the entire country (Frazier et al. 1984) and has been recorded recently in five atolls: Baa, Haa Dhaalu, Kaafu, Laamu and Lhaviyani (Ahmed et al. 2020).

4. Population:

4.1 Summary

Hawksbill turtle populations in the Maldives have experienced a severe historic decline. The current known Hawksbill Turtles in the country are predominantly juveniles or individuals of unclear sex, which could be reflective of the historic declines. Predictions based on capture-mark-recapture methods project an unclear population trend for the species in the country, with numbers increasing on some reefs but decreasing on others (Hudgins, personal communication).

4.2 Population size

Historical records focus on nesting beaches. Different studies have recorded the number of observed nests on a select number of beaches.

Zahir 2000 reports nesting hawksbills between 1988 and 1995, with a detailed regional report on observed nesting female hawksbills in different atolls from North to South resulting in a total number of nesting females of 529.

A subsequent estimate of 460-767 nesting females per year is based on an estimate of 2300 nests per year (Zahir and Hafiz 1997, Mortimer and Donnelly 2008) in the 1980s to 1990s.

More recent nesting reports are sporadic and rarely exceed a single nest per location, recording less than 20 nests in total from nine islands from five atolls (Ahmed et al. 2020). This is likely an underestimation of actual nest numbers, as strategic monitoring efforts are missing. As the less than 20 nests were recorded in one quarter of the country, extrapolations can lead to an estimate of less than 80 nests per year for the entire country.

As of November 23rd, 2021, 3982 individual Hawksbill Turtles have been identified during surveys and opportunistic data collection conducted in ca 46 % of the country, based on the photo identification method (Olive Ridley Project photo-ID database, internal communication). Of these 312 individuals could be identified as adult females and 83 as males. The majority, 3565 individuals, are considered juveniles (1666) or could not be assigned (1921).

4.3 Population trend

Based on the historical and recent estimates of nests and nesting females, there was a near complete collapse of the hawksbill nesting population with a significant decrease in population size from the 1980s to 2020 of over 95 % (see for example Zahir 2000, Mortimer and Donnelly 2008, Ahmed et al. 2020).

Current abundance estimates and models based on photo-ID data from 2016-2019 and capture-mark-recapture predict a mix of stable (i.e., remaining resident) and unstable populations on six index reefs in the country. Additionally, population trends at these significant reefs in Ari, Baa, Kaafu, and Laamu atoll are not uniform, with

slowly increasing populations at three reefs and decreasing populations on the other three reefs (Hudgins, personal communication). No clear trend for the general Maldivian population can be inferred from the currently available data

4.4 Continuing decline in mature individuals?

Unknown - No specific record for mature individuals

4.5 Extreme fluctuations?

No

4.6 Severely fragmented?

No – this is a migratory species which is known to easily cover distances greater than the distance between islands and atolls (see for example Whiting and Koch 2006, Hamilton et al. 2015, Fossette et al. 2021).

5. Habitat and Ecology:

5.1 Summary

Hawksbill turtles spend most of their lives in the ocean, mainly in neritic areas for feeding and resting. They show a strong association with coral reefs. Occasional journeys through pelagic areas occur during nesting migrations. Terrestrial areas, specifically beach areas are used for nesting activity.

5.2 Systems (Terrestrial/Freshwater/Marine)

9. Marine Neritic -> 9.1 Pelagic, 9.8 Coral Reef, 9.9 Seagrass (Submerged); 12. Marine intertidal -> 12.2 Sand Shoreline and/or Beaches, Sand Bars, Spits, etc.; 13. Marine Coastal/Supratidal -> 13.3. Sand Dunes (<http://www.iucnredlist.org/technical-documents/classification-schemes>)

Habitat	Season	Suitability	Major Importance?
9. Marine Neritic -> 9.1. Pelagic	Neonates and Juveniles	Suitable	-
9. Marine Neritic -> 9.8. Coral Reef	Resident	Suitable	-
9. Marine Neritic -> 9.9. Seagrass (Submerged)	Resident	Suitable	Yes
12. Marine Intertidal -> 12.2. Marine Intertidal - Sandy Shoreline and /or Beaches, Sand Bars, Spits, Etc	Resident	Suitable	-
13. Marine Coastal/Supratidal -> 13.3. Marine Coastal/Supratidal - Sand Dunes	Breeding Season	Suitable	Yes

5.3 Continuing Decline in Area, Extent, and/or Quality of Habitat?

Hawksbills are threatened by a decline in the feeding habitat by the repeated decrease in coral reef quality through coral bleaching over multiple bleaching events in the past with uncertain potential of recovery (Ibrahim et al. 2016, Noo Raajje 2020), as well as a decline in nesting habitat due to continuing coastal development and beach erosion.

5.4 A Migratory Species?

Yes (see for example Whiting and Koch 2006, Hamilton et al. 2015, Fossette et al. 2021)

6. Use and Trade:

Hawksbill turtles have been used in the international tortoiseshell trade, and for the tourist trade until the 1980s (Colton 1977, Frazier 1980). Additionally, they are occasionally used as a food source (occasionally meat, but specifically eggs; Frazier et al. 1984) and used in the pet trade.

Hawksbill turtles are occasionally taken for personal consumption as food (Frazier et al. 1984). Additionally, the practice of taking hatchlings from nests and keeping them as pets is still not uncommon in the country (Ahmed et al. 2019 and 2020).

There are five official records of international trade (export) of this species for personal or scientific purposes in the CITES trade database (CITES 2021), but overall export numbers were markedly higher. The most important impact though on the hawksbill population of the Maldives has been the commercial use of their shell in the international tortoiseshell trade and the use of full or partial specimens as souvenirs. The practice was more common in the past, but is still not entirely eradicated (Colton 1977, Frazier 1980, Abdulla and Techera 2021). The Maldives has exported significant amount of tortoiseshell in the past, ranging up to 6.4 metric tons annually (Frazier et al. 1984, Hewayisenth 1990, Mortimer and Donnelly 2008).

7. Threats:

A variety of threats has been identified to have an impact on hawksbill turtles on land and in the ocean in the Maldives.

Marine pollution and habitat loss due to coastal development and reef degradation are threatening hawksbill populations in the sea. On land, threats include habitat loss due to development, beach degradation, light pollution and beach erosion, as well as poaching activity (nests and adults) and the use in pet trade (Frazier et al. 1984, Ibrahim et al. 2016, Ahmed et al. 2019, Ahmed et al. 2020, Olive Ridley Project 2020).

Under the IUCN – CMP Unified Classification of direct threats 2012 (Version 3.2), the following threats are applicable to this species.

(<http://www.iucnredlist.org/technical-documents/classification-schemes>)

Threat	Timing	Scope	Severity	Impact Score	Stress
1. Residential & commercial development -> 1.1. Housing & urban areas	ongoing	Minority (<50%)	Unknown	Unknown	Species Disturbance
1. Residential & commercial development -> 1.2. Commercial & Industrial areas	ongoing	Majority (50-90%)	Unknown	Unknown	Species Disturbance
1. Residential & commercial development -> 1.3. Tourism & recreation areas	ongoing	Majority (50-90%)	Unknown	Unknown	Species Disturbance
5. Biological resource use -> 5.4. Fishing & harvesting aquatic resources -> 5.4.1. Intentional use: (subsistence/small scale)	ongoing	Minority (<50%)	Unknown	Unknown	Species Mortality or Reduced Reproductive Success

5. Biological resource use -> 5.4. Fishing & harvesting aquatic resources -> 5.4.2. Intentional use: (large scale)	ongoing?	Whole (>90%)	Rapid declines	Unknown	Species Mortality
5. Biological resource use -> 5.4. Fishing & harvesting aquatic resources -> 5.4.4. Unintentional effects (large scale)	ongoing	Minority (<50%)	Unknown	Unknown	Species Mortality
6. Human intrusions & disturbance -> 6.1 Recreational activities	ongoing	Minority (<50%)	Causing/could cause fluctuations	Unknown	Species Mortality or Disturbance
11. Climate change & severe weather -> 11.5. Other impacts	ongoing	Whole (>90%)	Causing/could cause fluctuations	Unknown	Species Disturbance

8. Conservation and Research:

Limited information is available about the biology of hawksbills in the Maldives in general, but initiatives focusing on biogeography, population ecology, reproductive biology and conservation are in place and continuously being extended (internal communication Environmental Protection Agency Maldives, documents available directly upon request; also see for example Olive Ridley Project 2021). The species has been protected under national legislation since 2016. It is listed under the CITES Convention Appendix I. The Maldives is also a signatory to the CITES convention since 2012, as well as to the Memorandum of Understanding on the Conservation and Management of Marine Turtles and their Habitats of the Indian Ocean and South-East Asia (IOSEA Marine Turtle MOU).

8.1 Conservation actions in place

The conservation efforts for Hawksbill Turtles can be categorized into three categories namely; (1) global efforts, (2) Regional and (3) National efforts

(1) Global Efforts: Maldives is a party to three conventions with conservation efforts and recommendations to conserve the hawksbill turtle. These includes CITES, CMS and CBD.

All the turtle under the family Cheloniidae including Hawksbill turtle is listed in the Appendix I of the CITES, which is considered as species that need highest level of protection. Hence, CITES prohibits international trade in specimens of these species except when the purpose of the import is not commercial, for instance for scientific research. In these exceptional cases, trade may take place provided it is authorized by the granting of both an import permit and an export permit (or re-export certificate).

The instrument for conservation of all sea turtles under the CMS is covered in the Memorandum of Understanding on the Conservation and Management of Marine Turtles and their Habitats of the Indian Ocean and South-East Asia (IOSEA Marine Turtle MOU) Moreover, CMS has listed Hawksbill turtles under the Appendix I, where parties that are a Range State to a migratory species listed in Appendix I shall endeavour to strictly protect them by: prohibiting the taking of such species, with very restricted scope for exceptions; conserving and where appropriate restoring their habitats; preventing, removing or mitigating obstacles to their migration and controlling other factors that might endanger them

(2) Regional efforts: IOTC Resolution 12/04 (Resolution 12/04 On the conservation of marine turtles | IOTC)

(3) National efforts, all species of marine turtles are protected under the Environment Protection and Preservation (4/93). According to the Turtle Protection Decree dated 4 April 2016, the following activities are prohibited:

- Capturing, harming, disturbing turtles
- Extraction of turtle eggs and harming/disturbing nests or any other habitats of turtles
- Keeping turtles as pets
- Trade of live animals and by products of turtles
- Research and rehabilitation without permit from EPA

There are additional legal instruments in place that directly and indirectly support sea turtle conservation, such as the designation of key habitats of hawksbill turtles such as nesting beaches and coral reefs as Protected Areas under the Protected Areas Regulation (R-78/2018). In this regard, the Environmental Impact Assessment Regulation (R-27/2012) and Waste Management Regulation (R-58/2013) are also expected to play a role in mitigating and shielding from the impact of coastal zone development, as well as marine pollution.

At present there are at least 5 registered operational sea turtle rescue and rehabilitation centers, with 3 facilities providing veterinary services specializing in sea turtles. The different NGOs are actively engaged in sea turtle conservation awareness, especially in promoting best practices in sea turtle-human interactions.

8.2 Research in place

Various research efforts are in place including population monitoring and biogeography, nest monitoring and population health, genetics studies and social surveys for the perception and attitude towards sea turtle consumption and conservation in Maldives.

8.3 Conservation needs

The following conservation needs have been identified for the Maldives: Identification of significant hawksbill nesting sites, increased protection of those nesting beaches, enforcement of existing legislation (e.g., harvest ban) and upcoming management plans (currently under development), improved conservation literacy for the public, and especially in the tourism sector and incorporation of any new research findings, e.g., regarding species distribution, nesting areas and genetics.

8.4 Research needs

Overall limited information is available, but specific research needs have been identified in the area of population genetics and migratory patterns (Ahmed et al. 2020), in depth analyses of the characteristics of coral reefs favoured by the species, and the impact of coastal development on hawksbill foraging grounds and nesting sites, as well as understanding the socio-economic and cultural implications of conservation.

B. Assessment

9. CRITERION A

Criterion A

Generation Length	45 (Mortimer and Donnelly 2008)
3 Generations	135
Reduction in population size?	Yes
Start Date of Reduction	1980s
End Date of Reduction	2020
Rate of Reduction (%)	>95% (estimate based on the number of nests)

	A1	-
Meets Criteria Thresholds?	A2	Critically Endangered
	A3	-
	A4	-
	a	-
	b	yes
Reduction Based on Which Sub-criteria?	c	yes
	d	yes
	e	-

Assessment Under Criterion A

CR A2bcd

Narrative Justification for the Criterion A

Criterion A is based on observed, estimated, inferred or suspected reduction of the population size (i.e., number of mature individuals) (IUCN 2019). In the case of marine turtles, the annual reproductive effort (i.e., counts of nesting activities, nesting females and/or nests) is normally used to monitor population status and trends (NRC 2010). This method accounts only for a small percentage of the population, excluding males and non-nesting females, as well as juveniles even though these are not directly relevant for the current assessment.

To include all sea turtles in the population, photo identification (photo-ID) data can be used to achieve an estimate closer to the actual population size. Additionally, photo-ID data can provide an insight into population trends, reidentifying individual turtles over a great time span (Carpentier et al. 2016).

Criterion A requires estimating changes in population size over three generations (or a minimum of 10 years, according to whichever is longer). In the case of hawksbill turtles, generation length was estimated to be around 45 years (see global assessment), therefore data from roughly 135 years would be required to apply criterion A. Since hawksbill turtles are a very long-lived species, abundance data is not available for the entire required time frame. Therefore, it was assumed that the population abundance three generations ago was similar to the first observed abundance. This approach has been used for other assessments of other long-lived species such as the African Elephant *Loxodonta africana* (Blanc 2008), the Leatherback Turtle *Dermochelys coriacea* (Wallace et al. 2013), and the Loggerhead Turtle *Caretta caretta* (Casale and Tucker 2015), as well as for the Green Turtle *Chelonia mydas* regional assessment in the North Indian Ocean (Mancini et al. 2019).

Based on estimated numbers of nesting females and nest numbers a reduction of over 95% has been found (Frazier et al. 1984; Zahir and Hafiz 1997; Zahir 2000 as summarized in Mortimer and Donnelly 2008; Ahmed et al. 2019, 2020) leading to the classification of Critically Endangered under the criterion A2.

10. CRITERION B

Criterion B

AOO		Estimated 40 km ²
EOO		90.000 km ² (area of the EEZ Maldives)
Meets Criteria Thresholds?	B1	no
	B2	Yes – Endangered
Severely Fragmented?		No – migratory species
No. Locations		1
Threat used to calculate locations		Habitat loss
Continuing (i) EOO		-

Decline?	(ii) AOO	Yes
	(iii) Habitat	Yes
	(iv) Locations / Subpopulations	-
	(v) Mature Individuals	-
	(i) EOO	-
Extreme Fluctuations?	(ii) AOO	-
	(iii) Locations / Subpopulations	-
	(iv) Mature Individuals	-

Assessment Under Criterion B **EN B2ab(ii,iii)**

Narrative Justification for the Criterion B

The subpopulation occupies the marine area of the Maldives from Ihavandhippolhu Atoll in the north to Addu Atoll in the south, spanning an area of roughly 90,000 km² equal to the countries Exclusive Economic Zone (EEZ). This distinctly exceed the threshold of >20,000 km² for criterion B1.

When looking at the area of occupancy required for criterion B2, the smallest habitat for a critical stage in the life of the species is the available nesting habitat. Here it is estimated that this area of known nesting activity is around 40 km² as hawksbill turtles have been reported to nest on only a limited number of the country's islands, which meets the threshold of Endangered under criterion B2.

Since the hawksbill turtle population of the Maldives has undergone a severe decline in the past and a multitude of factors such as climate change, beach erosion and coastal development are negatively impacting the species' most important habitats throughout the entire country (nesting and foraging), we consider the species to be considered Endangered under criterion B2 specifically with a projected decline in area of occupancy and quality of habitat.

11. CRITERION C

Criterion C

No. Mature Individuals	Observed 400-2300 individuals, estimated 800-4600	
Continuing Decline in Population Size?	Unknown – past decline in nesting females documented, future direction unclear	
Is Rate of Decline Known?	Past decline documented	
Generation Length	45 years	
C1	Meets Thresholds for Rate of Decline?	Yes
	Rate of Decline (%)	47 years
	Time Period of Decline	47 years
C2	(a) (i) No. Mature Individuals in Each Subpopulation	-
	(a) (ii) % Mature Individuals in one Sub-population	-
	(b) Extreme Fluctuations in No. Mature Individuals?	-

Assessment Under Criterion C

EN C1

Narrative Justification for the Criterion C

For criterion C, the total number of adult females and males in the population is needed. We currently know of <500 mature individuals identified in the country with a sex ratio of 3.8:1 female to male. Additionally, over 1920 individuals have been identified, but their life stage is currently unknown. Since these numbers were collected from surveys covering roughly 46% of the country, we estimate the total number of adult hawksbill turtles in the Maldives could be 800-4600.

The currently known number of adult hawksbill turtles including individuals of unknown life stage is below the threshold of <2,500 mature individuals for the Endangered category. Since the estimated decline detailed in Criterion A markedly exceeds 25 % within one generation, we believe that the condition for C1 is fulfilled. The Maldivian hawksbill turtle population can be considered as Endangered under criterion C1.

CRITERION D

Criterion D

No. Mature Individuals	Observed 400-2300 individuals, estimated 800-4600
Meets Criteria Thresholds?	Unclear
AOO	Estimated 40 km ²
No. Locations	1
VUD2	
Plausible Future Threat That Would Quickly Drive Taxon to CR or EX	
Plausible Future Threat That Would Quickly Drive Taxon to VU or EN	-

Assessment Under Criterion D

NT D1

Narrative Justification for the Criterion D

The number of mature individuals is currently observed to be <2500 individuals and estimated to be between 800-4600, thus most likely not meeting the criteria threshold under criterion D. We do not consider this population to qualify for a threatened category under criterion D directly but consider it Near Threatened based on the lower number of estimates of mature individuals.

CRITERION E

Criterion E

Has a Quantitative Analysis Been Conducted?	No
Type of Quantitative Analysis	NA
Generation Length	NA

Probability of Extinction within 100 Years	NA
Probability of Extinction within 20 Years / 5 Generations (whichever is longer)	NA
Probability of Extinction within 10 Years / 3 Generations (whichever is longer)	NA

Assessment Under Criterion E DD

Narrative Justification for the Criterion E

No quantitative analysis was available at the time of the assessment.

1. PRELIMINARY ASSESSMENT

	Preliminary Assessment	CR A2bcd
	Up-list, Down-list, or No Change?	No Change
Regional Adjustment	Justification for Regional Adjustment	Not enough data is available to evaluate the potential rescue effects and interactions with other populations in the ocean basin, therefore no regional adjustment is made.

Final Assessment CRA A2bcd

Narrative Justification for Assessment

The current data on hawksbill turtles in the Maldives is still limited in various aspects, but specifically observations and estimates of nesting females and nest numbers indicate a very clear decline in population size since at least the 1980s of over 95 %. Additionally, since a multitude of threats including habitat loss, poaching and pollution are not projected to decline significantly or cease completely, hawksbill turtles were classified as Critically Endangered under Criterion A2bcd for the country.

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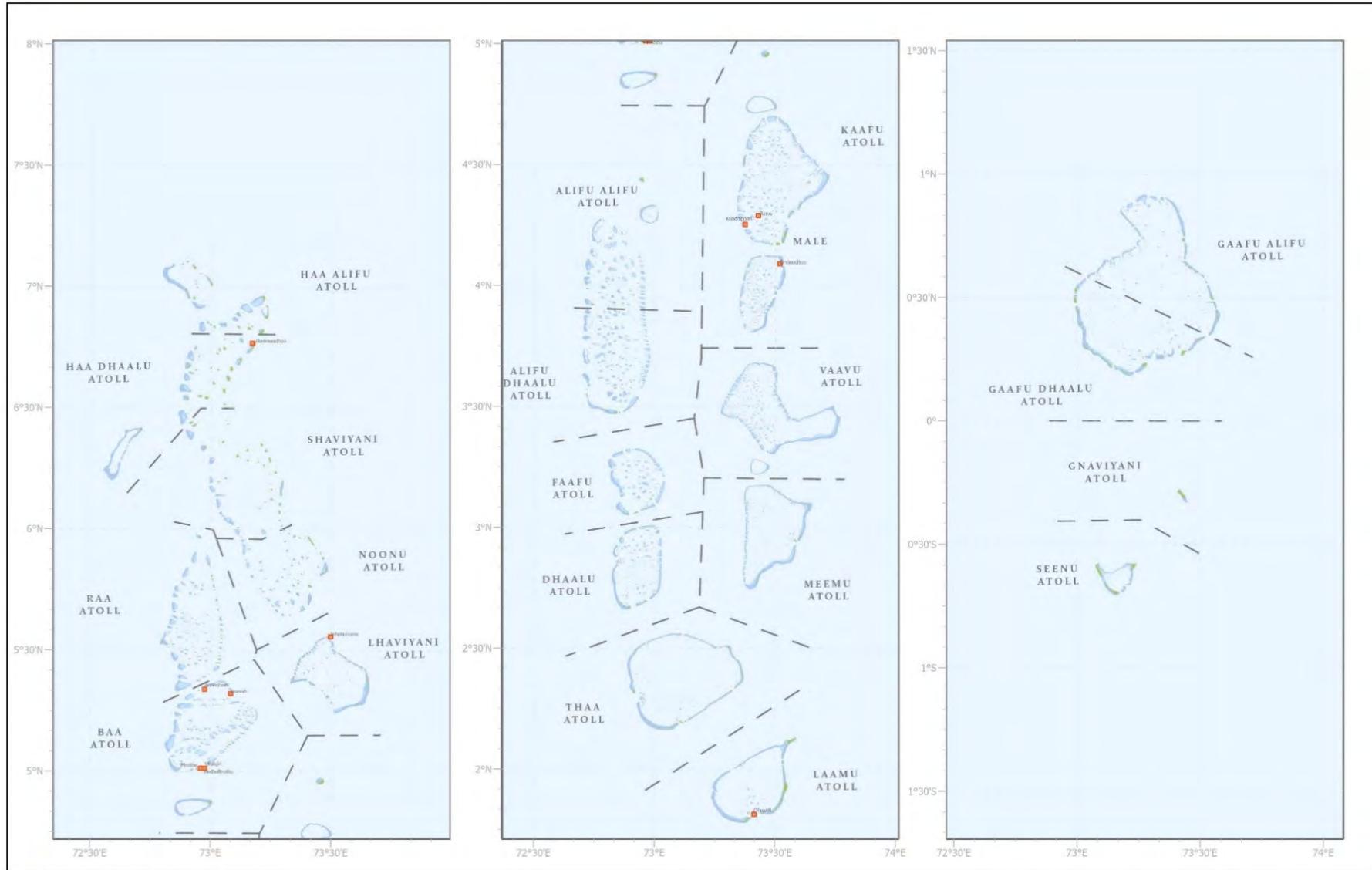
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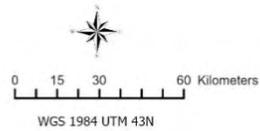
Appendix

HAWKSBILL SEA TURTLES AOO MAPS



Maldives Turtle Nesting Beaches

- Islands
 - Lagoons
 - Reefs
 - Atoll Boundaries
 - Hawksbill Turtle AOO
- Total AOO : 40 km²

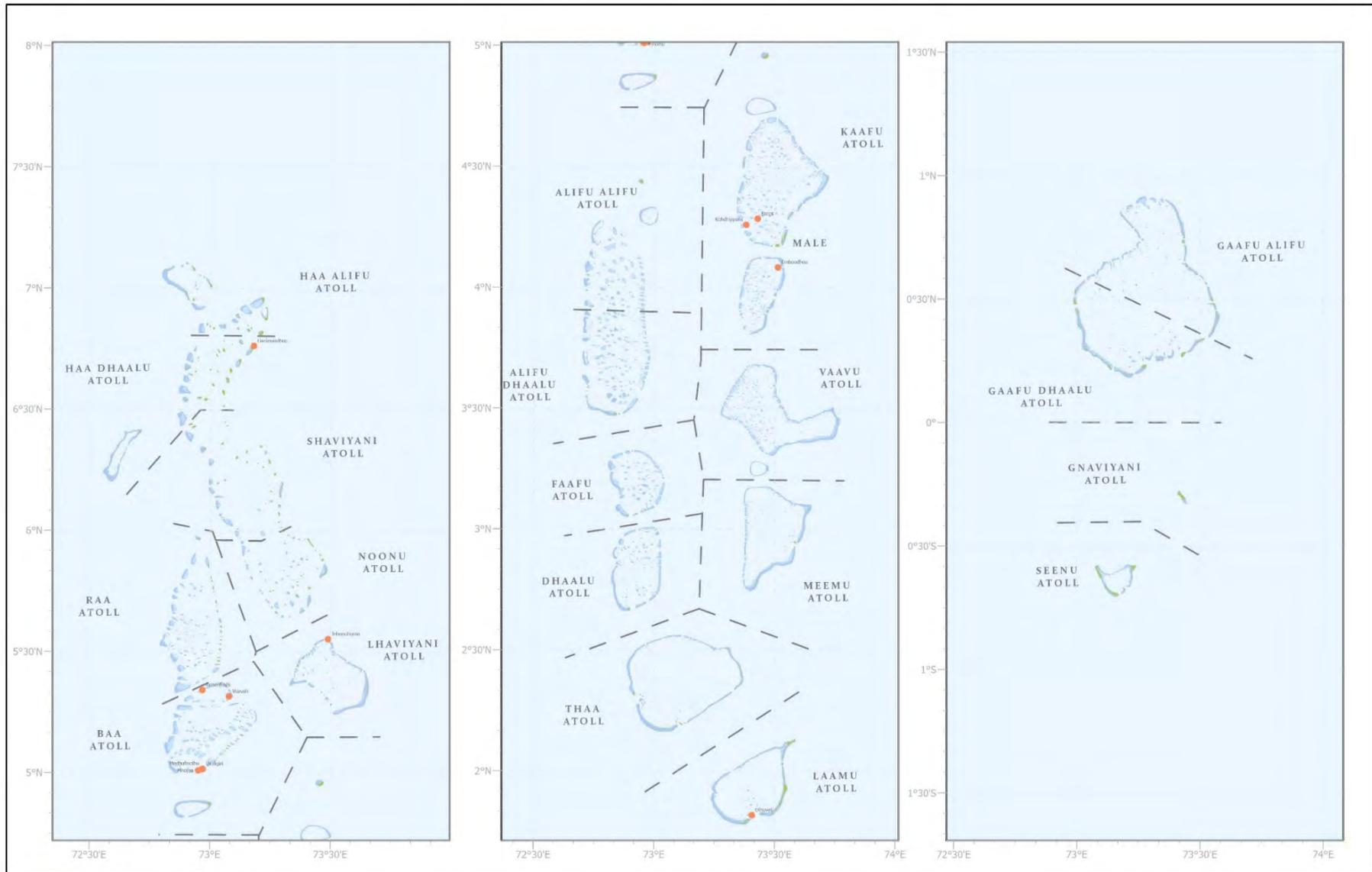


All Turtle data points are based on Ministry of Environment Climate Change and Technology, Government of Maldives datasets.
All base layers are based on UNOCHA HDX datasets.

Prepared in January 2022

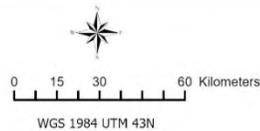
* Maps are indicative and should not be used for navigational purposes.

HAWKSBILL SEA TURTLES NESTING POINTS



Maldives Turtle Nesting Beaches

- Islands
- Reefs
- Hawksbill Turtle
- Lagoons
- Atoll Boundaries



All Turtle data points are based on Ministry of Environment Climate Change and Technology, Government of Maldives datasets.
All base layers are based on UNOCHA HDX datasets.

Prepared in January 2022

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