Migratory Species and Climate Change Expert Workshop

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MARINE TURTLE FEEDING BEHAVIOURS

(Based on a document prepared by the UK Government)

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Marine turtle feeding behaviours

Ecosystem – coral reefs

Coral reefs are among the most diverse and productive ecosystems on Earth, typically located in warm, shallow waters of tropical oceans. They are built by colonies of coral polyps in symbiosis with zooxanthellae algae, providing habitats for a wide variety of marine life, from fish and molluscs to sea turtles and sharks. They are threatened by multiple drivers, including overfishing, pollution, non-native species, eutrophication, and physical damage. These pressures are further exacerbated by the effects of climate change, such as rising sea temperatures, heatwaves, intensifying storms and ocean acidification (Hughes *et al*. 2017; James *et al*. 2023; Riegl *et al*. 2009). By protecting coral reefs, crucial biodiversity is preserved, coastal communities are safeguarded, and natural barriers against storm surges and erosion are maintained (James, *et al*. 2013).

Species –Marine turtles

All seven marine turtle species are listed on Appendix II of the CMS Appendices, with 6 being additionally listed on Appendix I (CMS 2024). Marine turtles are regulators which shape ecosystem structures through top-down modifications, undertaking essential ecological roles across marine habitats (Patel *et al*. 2022). All species are susceptible to population declines due to their vulnerability to anthropogenic impacts throughout all life-stages, including but not limited to, degradation of nesting and foraging habitats (e.g. coral reefs, seagrass beds), entanglement in and ingestion of fishing gear, and egg harvest (Mortimer and Donnelly 2008; Seminoff 2023). Climate change is also predicted to pose a threat to species like marine turtles, with climate change driven loss of beaches due to erosion and rising sea levels being one of the top concerns.

Climate change nature-based solution(s)

Healthy coral reefs provide important coastal protection due to their robust structure, reducing wave energy by up to 97% and protecting coastlines from erosion and flooding (Ferrario *et al*., 2014). The foundation of these reefs is built by stony corals (Scleractinia spp.), which face competition from algae and sea sponges (Porifera) for space and resources. Whilst a balance of the three allow for a healthy reef, herbivores and spongivores are vital in ensuring corals are not outcompeted. The selective feeding on competitively superior sea sponges by hawksbill turtles can influence this competition, affecting succession and reef diversity, allowing for improved coral health and species richness (León and Bjorndal 2002; Patel *et al*. 2022). The grazing on algae by green and hawksbill turtles is vital for the health and resilience of coral reefs, as when released from top-down control algal assemblages can shift from highly productive turfs to less productive, late successional stage macroalgae such as sargassum (Goatley *et al*. 2012). Whilst these roles can be filled by other coral reef species, such as parrot fish, which have been performing these services in the face of marine turtle declines, they are not as effective as marine turtles (Goatley *et al*. 2012; León and Bjorndal 2002). These beneficial feeding behaviours extend beyond coral reefs to surrounding seagrass beds, highlighting the importance of protecting these migratory species that interact with many ecosystems that act

as natural buffers against coastal erosion, storm surges, and the rising sea levels driven by climate change, offering critical protection to vulnerable coastlines (Elliff and Silva 2017; Gracia *et al* 2018; Spalding *et al* 2014).

Conservation actions

Key conservation measures for marine turtles include identifying and protecting critical habitats for all life stages, implementing measures to reduce bycatch, managing threats to females, nests and hatchlings on beaches and to continue monitoring climate change impacts. Actions should be taken on a national and international scale to ensure they target the full range of these species. The IOSEA marine turtle MoU and the Atlantic Turtle MoU, both under CMS, have created Conservation and Management Plan's (CMP's) to aid in a collaborative effort to conserve marine turtles found within the Indian Ocean, South-East Asia, and the Atlantic coast of Africa. There are also single species action plans for Loggerhead turtles in the Pacific Ocean, and Hawksbill turtles in South-east Asia and the Western Pacific.

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