

for simulating population abundance and potential biological removal in the Mediterranean. *Endangered Species Research* 29: 239-254.

FitzSimmons, N. N. & C.J. Limpus. 2014. Marine turtle genetic stocks of the Indo-Pacific: Identifying boundaries and knowledge gaps. *Indian Ocean Turtle Newsletter* 20: 2-18.

Lucchetti, A., J. Pulcinella, V. Angelini, S. Pari, T. Russo, & S. Cataudella. 2016. An interaction index to predict turtle bycatch in a Mediterranean bottom trawl fishery. *Ecological Indicators* 60: 557-564.

Riskas, K. A., M.M. Fuentes, & M. Hamann. 2016. Justifying the need for collaborative management of fisheries bycatch: A lesson from marine turtles in Australia. *Biological Conservation* 196: 40-47.

SUMMARY OF THE LOGGERHEAD TURTLE RED LIST ASSESSMENTS IN THE INDIAN OCEAN

KIMBERLY A RISKAS^{1#} AND ANDREA D. PHILLOTT²

¹James Cook University, Townsville, Australia

²Asian University for Women, Chittagong, Bangladesh

#kimberly.riskas@my.jcu.edu.au

A summary based on:

Casale, P. 2015a. *Caretta caretta* (North East Indian Ocean subpopulation). The IUCN Red List of Threatened Species 2015: e.T84126444A84126520. <http://dx.doi.org/10.2305/IUCN.UK.2015-4.RLTS.T84126444A84126520.en>.

Casale, P. 2015b. *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.2015-4.RLTS.T84127873A84127992.en>.

Casale, P., K. Riskas, A.D. Tucker & M. Hamann. 2015. *Caretta caretta* (South East Indian Ocean subpopulation). The IUCN Red List of Threatened Species 2015: e.T84189617A84189662. <http://dx.doi.org/10.2305/IUCN.UK.2015-4.RLTS.T84189617A84189662.en>.

Casale, P. & A.D. Tucker. 2015. *Caretta caretta*. The IUCN Red List of Threatened Species. e.T3897A83157651. <http://dx.doi.org/10.2305/IUCN.UK.2015-4.RLTS.T3897A83157651.en>.

Nel, R. & P. Casale. 2015. *Caretta caretta* (South West Indian Ocean subpopulation). The IUCN Red List of Threatened Species 2015: e.T84199475A84199755. <http://dx.doi.org/10.2305/IUCN.UK.2015-4.RLTS.T84199475A84199755.en>.

Following decades of scientific debate over the appropriateness of using a global listing for sea turtles (Groombridge & Luxmoore, 1989; Mrosovsky, 2003; Godfrey and Godley, 2008), the IUCN Red List of Threatened Species now includes assessments for species at both the global and subpopulation levels. This enables systematic regional evaluation of each management unit, as threats, conservation efforts and recovery levels can vary significantly between regions.

A recent assessment of the loggerhead sea turtle (*Caretta caretta*) now lists the global population as 'Vulnerable', with the following listings assigned to each of its ten subpopulations (Casale & Tucker, 2015):

Critically Endangered: North East Indian, North West Indian, South Pacific

Endangered: North East Atlantic

Near Threatened: South East Indian, South West Indian

Least Concern: Mediterranean, North West Atlantic, South West Atlantic, North Pacific

The greatest threat to loggerheads worldwide is mortality associated with fisheries bycatch, followed by coastal development and direct harvest of eggs, meat and other products (Wallace *et al.*, 2011). Many of these threats also place loggerhead turtle populations in the Indian Ocean at risk (Casale & Tucker, 2015).

Loggerhead subpopulations in the northern Indian Ocean are among those facing the highest risk of extinction, and are listed as 'Critically Endangered'. Track counts at Oman's Masirah Island—the nexus of nesting for the North West Indian Ocean subpopulation—have declined by 70% over a thirty-year period (Casale, 2015b). Unfortunately, estimates of total abundance for this subpopulation are not available, with Oman's nesting data coming solely from a single index site. For the small and largely understudied North East Indian Ocean subpopulation, nesting is believed to be limited to the beaches of Sri Lanka, with a mere 25 nests estimated annually (Casale, 2015a). Unfortunately, there is a lack of robust population abundance data for Sri Lanka's loggerheads. Habitat management for loggerhead turtles in the northern Indian Ocean is also a concern, as protection in Oman is limited to Masirah Island, and does not currently exist for nesting or foraging areas in Sri Lanka (Hamann *et al.*, 2013).

Both the North West and North East Indian Ocean subpopulations are threatened by fisheries bycatch, direct harvest and habitat degradation, but there is a need for additional research to evaluate the relative impacts of each of these threats (Hamann *et al.*, 2013; Casale 2015a,b).

In contrast, subpopulations in the southern Indian Ocean are listed as 'Near Threatened', and have benefited from the implementation of conservation measures at key nesting and foraging areas. The South West Indian Ocean loggerhead subpopulation nests primarily in South Africa and Mozambique, with only small nesting grounds in Madagascar (Nel & Casale, 2015). Long-term population monitoring data indicate that nest counts have increased over the past generation, probably due to the establishment and ongoing maintenance of protected areas and nesting beach monitoring programs. All known loggerhead nesting for the South East Indian Ocean subpopulation, believed to be one of the largest in the world, occurs in Western Australia (Baldwin *et al.*, 2003). While these nesting beaches are often located within marine parks and are, therefore, relatively protected, the lack of consistent monitoring has resulted in limited knowledge on population trends, sex ratios, or migration patterns of this genetic stock.

Threats to loggerhead turtles in the South West Indian Ocean include fisheries bycatch and direct harvest (Bourjea *et al.*, 2008; Petersen *et al.* 2009; Humber *et al.*, 2011; Brazier *et al.*, 2012; De Wet 2013), while feral predators, vehicular beach traffic, industrial development and associated light pollution are the major threats affecting loggerhead turtles in the South East Indian Ocean (Casale *et al.*, 2015).

The key knowledge gaps for loggerhead turtles in the

Indian Ocean include:

1. Recent nesting data for rookeries in Madagascar which form part of the South West Indian Ocean subpopulation (Nel & Casale, 2015).
2. Unquantified nesting of the South East Indian Ocean subpopulation on some areas of the Western Australia coastline (Casale *et al.*, 2015).
3. Long term monitoring to establish census data (e.g. annual number of nesting females and nests) and understand key demographic parameters (e.g. adult sex ratio, remigration interval, number of clutches per female) of the North East (Casale, 2015a) and South East Indian Ocean (Casale *et al.*, 2015) subpopulations.
4. Unquantified nesting outside of the single index site (Masirah Island) in the North West Indian Ocean subpopulations.
5. Unquantified effects of threats to all subpopulations.

Literature cited:

Baldwin, R., G. Hughes & R. Prince, R., 2003. Loggerhead turtles in the Indian Ocean. *Loggerhead Sea Turtles*. Smithsonian Books, Washington, DC, 218-232.

Casale, P. 2015a. *Caretta caretta* (North East Indian Ocean subpopulation). The IUCN Red List of Threatened Species 2015: e.T84126444A84126520. <http://dx.doi.org/10.2305/IUCN.UK.2015-4.RLTS.T84126444A84126520.en>. Downloaded on 06 April 2016.

Casale, P. 2015b. *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.2015-4.RLTS.T84127873A84127992.en>. Downloaded on 06 April 2016.

Casale, P., K. Riskas, A.D. Tucker & M. Hamann. 2015. *Caretta caretta* (South East Indian Ocean subpopulation). The IUCN Red List of Threatened Species 2015: e.T84189617A84189662. <http://dx.doi.org/10.2305/IUCN.UK.2015-4.RLTS.T84189617A84189662.en>. Downloaded on 06 April 2016.

Casale, P. & A.D. Tucker. 2015. *Caretta caretta*. The IUCN Red List of Threatened Species. e.T3897A83157651. <http://dx.doi.org/10.2305/IUCN.UK.2015-4.RLTS.T3897A83157651.en>. Downloaded on 06 April 2016.

Godfrey, M.H. & B.J. Godley. 2008. Seeing past the red: Flawed IUCN listings for sea turtles. *Endangered Species Research* 6: 155-159.

Groombridge, B. & R.A. Luxmoore. 1989. The green turtle and hawksbill (Reptilia: Cheloniidae): World status, exploitation and trade. Lausanne, Switzerland: Secretariat of the Convention on International Trade in Endangered Species of Wild Fauna and Flora.

Hamann, M., R. Kamrowski & T. Bodine. 2013. Assessment of the conservation status of the loggerhead turtle in the Indian Ocean and South-East Asia. IOSEA Marine Turtle MoU Secretariat, Bangkok.

Mrosovsky, N. 2003. Predicting extinction: fundamental flaws in IUCN's Red List system, exemplified by the case of sea turtles. <http://www.seaturtle.org/members/>

mrosovsky/extinct.pdf. Accessed on 15th December 2013.

Nel, R. & P. Casale. 2015. *Caretta caretta* (South West Indian Ocean subpopulation). The IUCN Red List of Threatened Species 2015: e.T84199475A84199755. <http://dx.doi.org/10.2305/IUCN.UK.2015-4.RLTS.T84199475A84199755.en>. Downloaded on 06 April 2016.

Wallace, B.P., A.D. DiMatteo, A.B. Bolten, M.Y. Chaloupka, B.J. Hutchinson, F.A. Abreu-Grobois, J.A. Mortimer et al. 2011. Global conservation priorities for marine turtles. *PLoS One* 6: e24510.

ANNOUNCEMENT



BARNACLE SAMPLES FROM THE INDIAN OCEAN REQUESTED TO UNDERSTAND THE ROUTE OF THEIR ATLANTIC INVASION

MARK A. ROBERTS¹ AND NADÈGE ZAGHDOUDI-ALLAN²

¹Department of Biological Sciences, University of South Carolina, USA

²Center of Marine Sciences (CCMAR), University of Algarve, Portugal

robertm2@email.sc.edu

Dear IOTN readers,

We have been conducting research on the sea turtle specific barnacle, *Stephanolepas muricata*. Sea turtles are known to host diverse communities of epibiota by providing the substratum needed for their attachment. *S. muricata* is an embedding barnacle specific to cheloniid sea turtles and was previously believed to be restricted to the Indo-Pacific. However, the species was discovered relatively recently in the Atlantic Ocean (Frick et al., 2011). Individuals are relatively difficult to detect in the field and little is known about the dispersal behaviour of *S. muricata*, making it difficult to establish whether its newfound presence in the Atlantic is the result of a recent invasion or perhaps simply a lack of historical documentation.

To address these questions, we have begun a global genetic study that aims to determine possible routes of invasion into the Atlantic, as well as if the barnacle exhibits host species specificity. We also hope to better understand the

transmission and potential gene flow in these barnacles between populations and across host taxa. By comparing the population genetic structure of this species and its host, it may be possible to infer non-reproductive connectivity between turtle populations (e.g. on feeding grounds) and, potentially, pathways of infection between turtle species with non-overlapping niches.

Unfortunately, we are lacking any samples from the Indian Ocean- which is a key component of addressing these questions. If anyone encounters these in the field, we would be very grateful if you could let us know via email. We have put together a fact sheet about the barnacle, and how to store any specimens you might collect. You can access the fact sheet at this web address: <http://tinyurl.com/hfsoecv>. Please email Mark A. Roberts (robertm2@email.sc.edu) or Nadège Zaghdoudi-Allan (nadegeallan@gmail.com) for further information.