

High Number of Olive Ridley Turtles (*Lepidochelys olivacea*) Entangled in Ghost Nets in the Central Indian Ocean

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INTRODUCTION

Lost, abandoned or discarded fishing nets, otherwise known as ghost nets, pose a serious threat to marine fauna worldwide. Currently, there is a lack of information on the incidence of ghost nets in the Indian Ocean, but an alarmingly high number of Olive Ridley Turtles (*Lepidochelys olivacea*) have been found entangled in nets in the Maldives (Fig 1).



Figure 1. Three entangled Olive Ridley turtles (ORT) and the carcasses of two more found floating near Kuredhu Island Resort in Lhaviyani Atoll.



Figure 2. Typical ghost net found in the Maldives consisting of many different nets to form one large conglomerate.

The ORT is the most abundant of all marine turtles, but is still classed as 'Vulnerable' on the IUCN Red List (2008 listing) with a globally decreasing population trend¹. Adult ORTs are highly migratory and spend much of their life in the open ocean. The greatest concentration of nesting ORTs in the Indian Ocean can be found in the arribadas (mass nesting events) of Odisha, India (Fig 3).



Figure 3. ORT arribadas in Odisha, India.

The Olive Ridley Project (ORP), founded in 2013, reports on the relatively large numbers of ORTs being found in the Maldives in ghost nets that have originated from other countries. We specifically ask:

1. What types of net are found and where do they come from?
2. When do we find the most entangled ORTs?
3. Are males or females more at risk of entanglement?
4. Which nets pose the biggest threat to ORTs?

METHOD

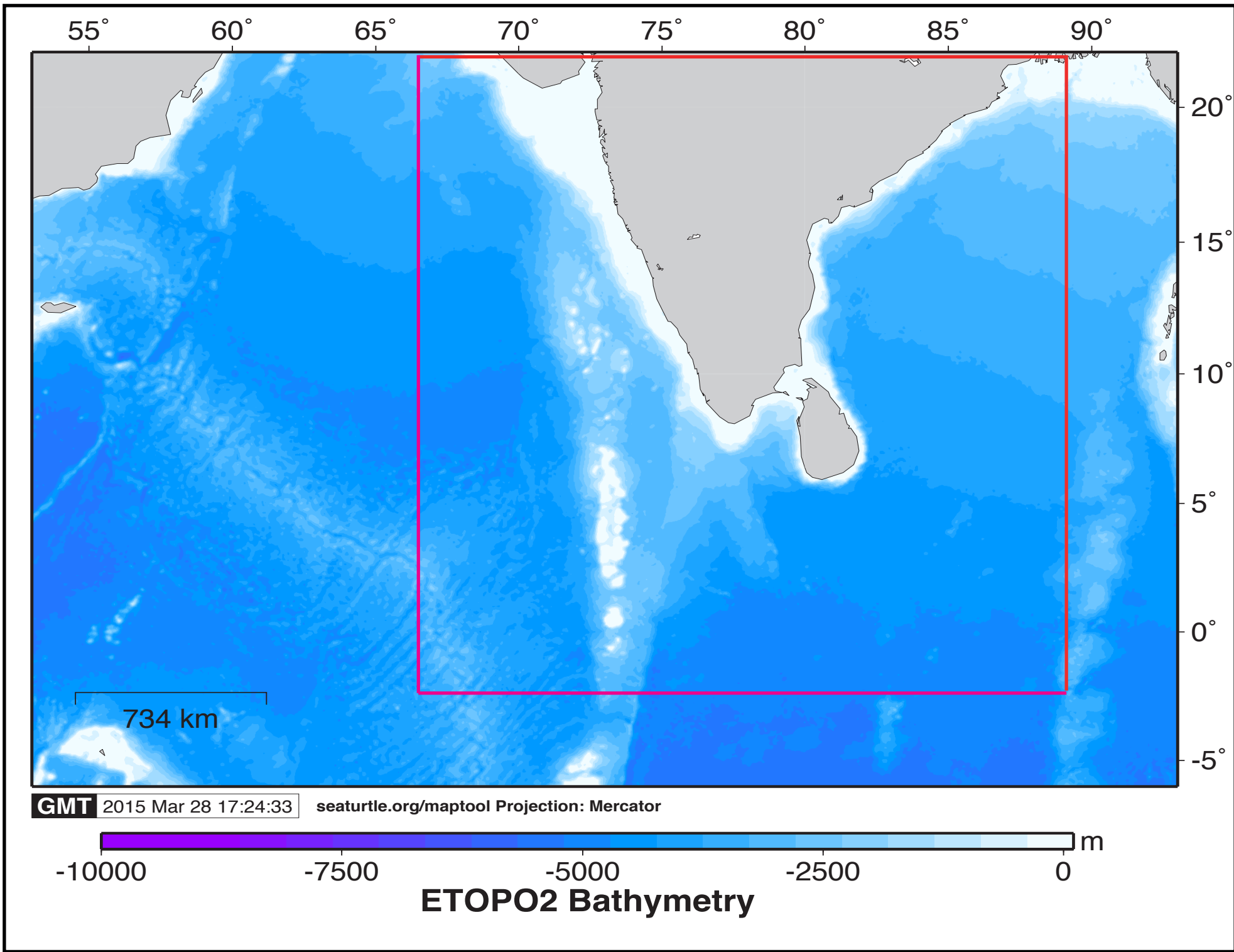


Figure 4. All data was recorded between July 2013 and July 2014 by a team of trained volunteers centered in the Republic of Maldives, and to a lesser extent India and Sri Lanka.

Of the 74 ghost net reports, 57 encounters happened in the Maldives, which consisted of 178 separate nets. 14 of the incidents were reported from India, with 25 nets found, while 3 were reported in Sri Lanka with 3 nets found. Unfortunately, many reported ghost nets could not be included in this report as the observer was either unable to take measurements or submitted incomplete information.

In collaboration with the International Union for the Conservation of Nature (IUCN), ORP designed a standardised protocol that detailed the measurements needed from all ghost nets and related marine organisms recovered. Measurements such as stretched mesh size, twine diameter and twine construction were recorded and sent to ORP and inputted into a centralised database for analysis.



Figure 5. LEFT: Trained volunteer, Fathmath Shuhaina, removing a conglomerate of ghost nets typically found in the Maldives. RIGHT: The conglomerate is separated into its separate net samples for measurement and recorded in ORPs database.



Figure 6. Entangled ORTs suffer severe injuries such as amputation, deep lacerations and dehydration that can often lead to death.

A total of 61 ORTs were recorded entangled in ghost nets in the Maldives. Curved carapace length (CCL) of entangled turtles was either estimated to the nearest 5 cm, when removal from the water was not possible, or accurately recorded when removal of the turtle from the water was feasible.

All turtle data was recorded in an ad hoc fashion (as opposed to being collected during systematic surveys). The species of turtle was confirmed either from photographs, detailed descriptions, or from a visual inspection at sea.

RESULTS

Ocean current strength and direction help identify the paths along which ghost nets may drift in the Indian Ocean. In the tropical Indian Ocean, the NE Monsoon and the SW Monsoon have significantly different current patterns.

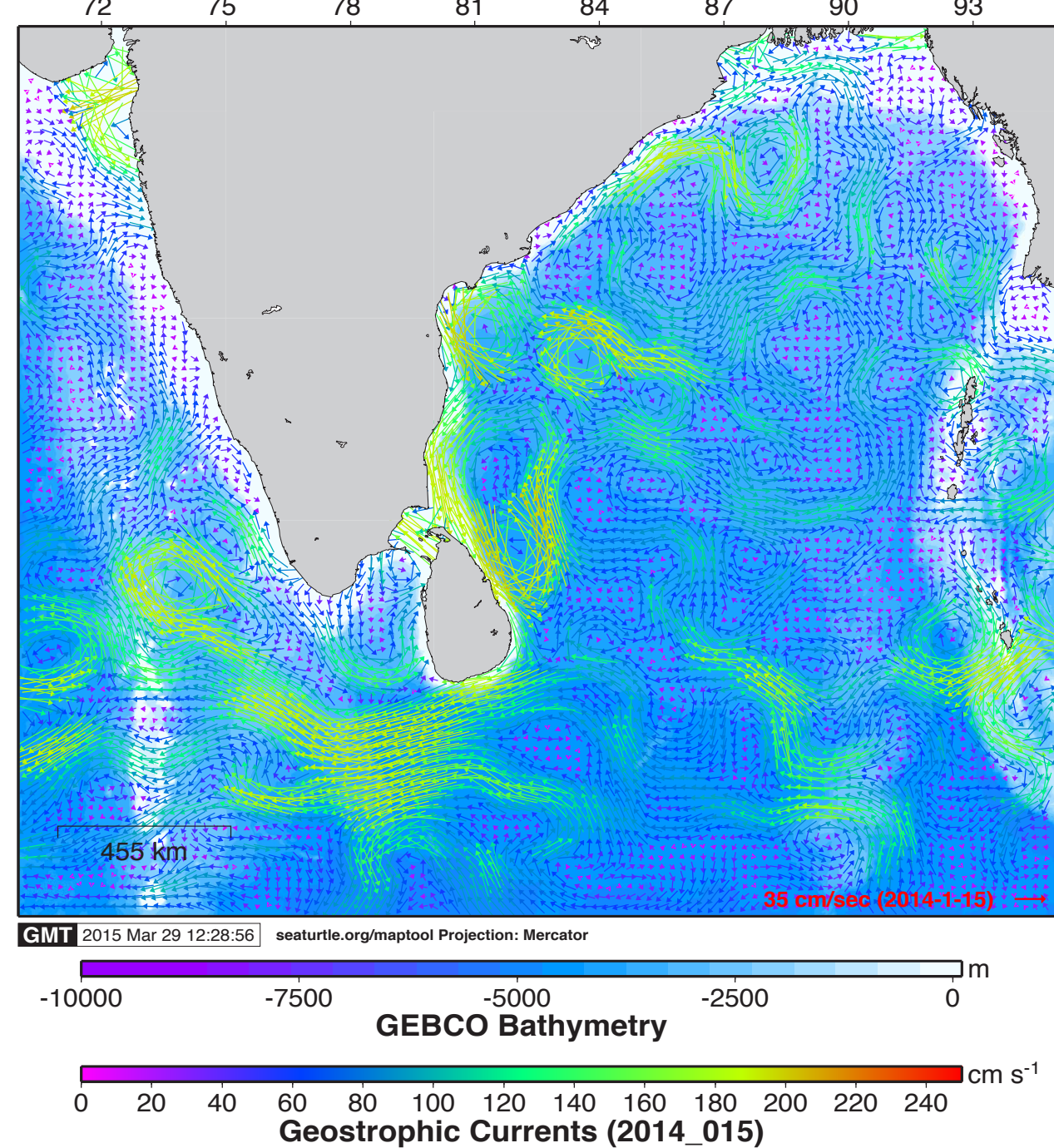


Figure 7. During the North East Monsoon currents predominately flow from East to West. Current magnitudes are strongest on the eastern and southern coasts of Sri Lanka and India, along western Indonesia, and nearby the Lakshadweep Islands.

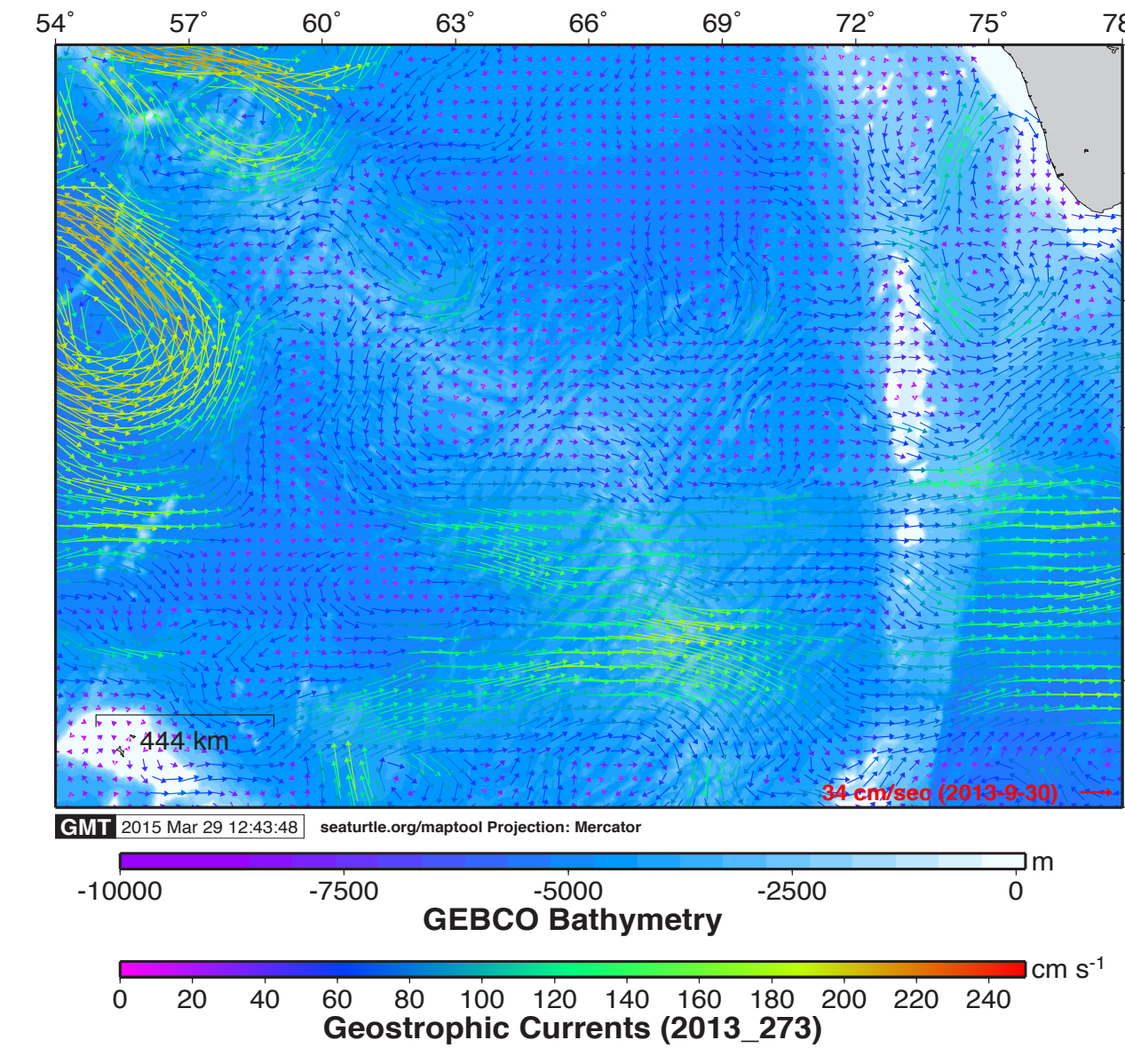


Figure 8. During the South West Monsoon, currents flow predominantly from West to East and strong currents are observed in the Arabian Sea and the western Indian Ocean, particularly North of the Seychelles and near Somalia and East Africa.

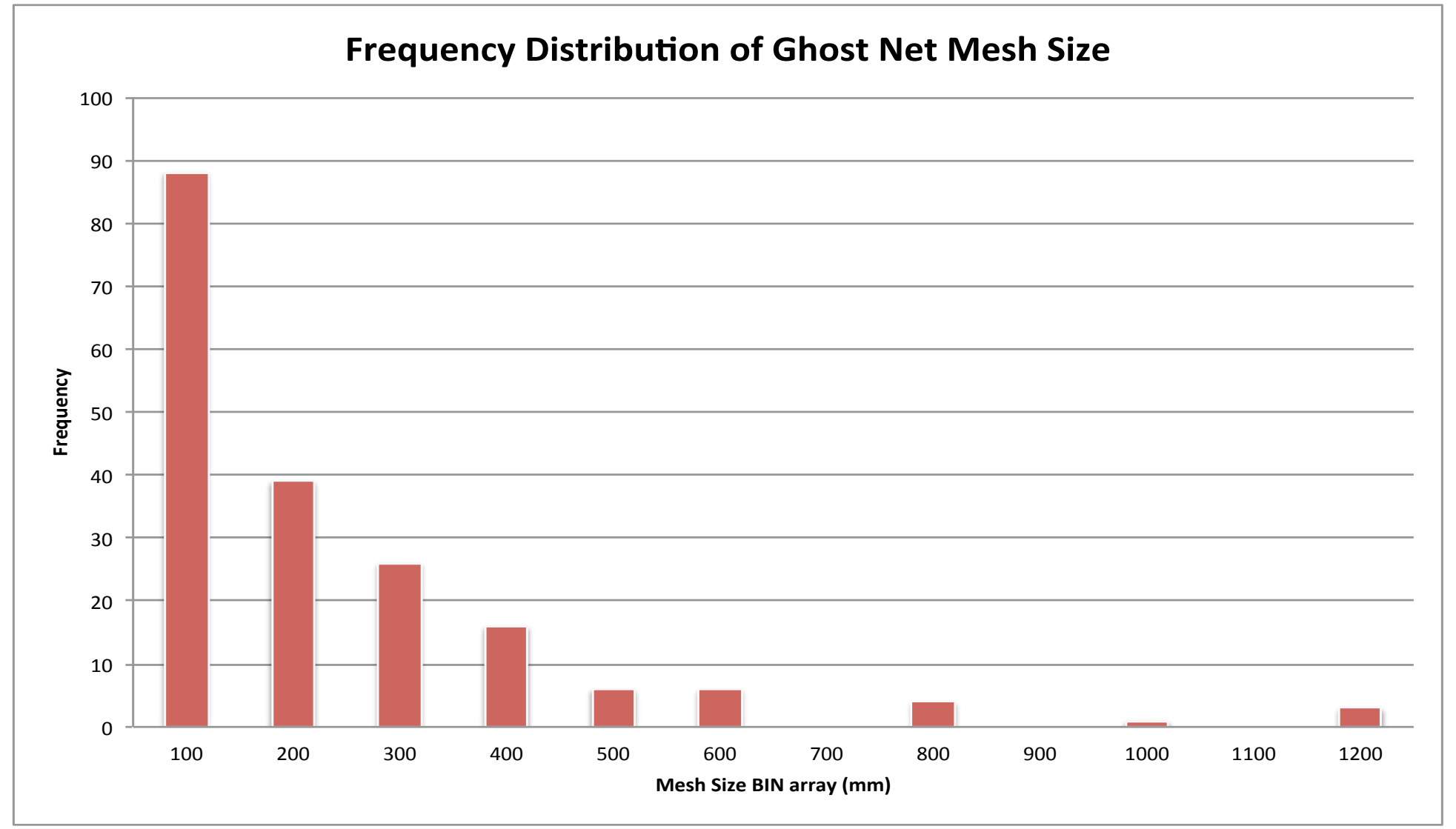


Figure 9. Stretched mesh size of 189 ghost nets. All turtle entanglements occurred in the mesh size range of 35 - 590mm.

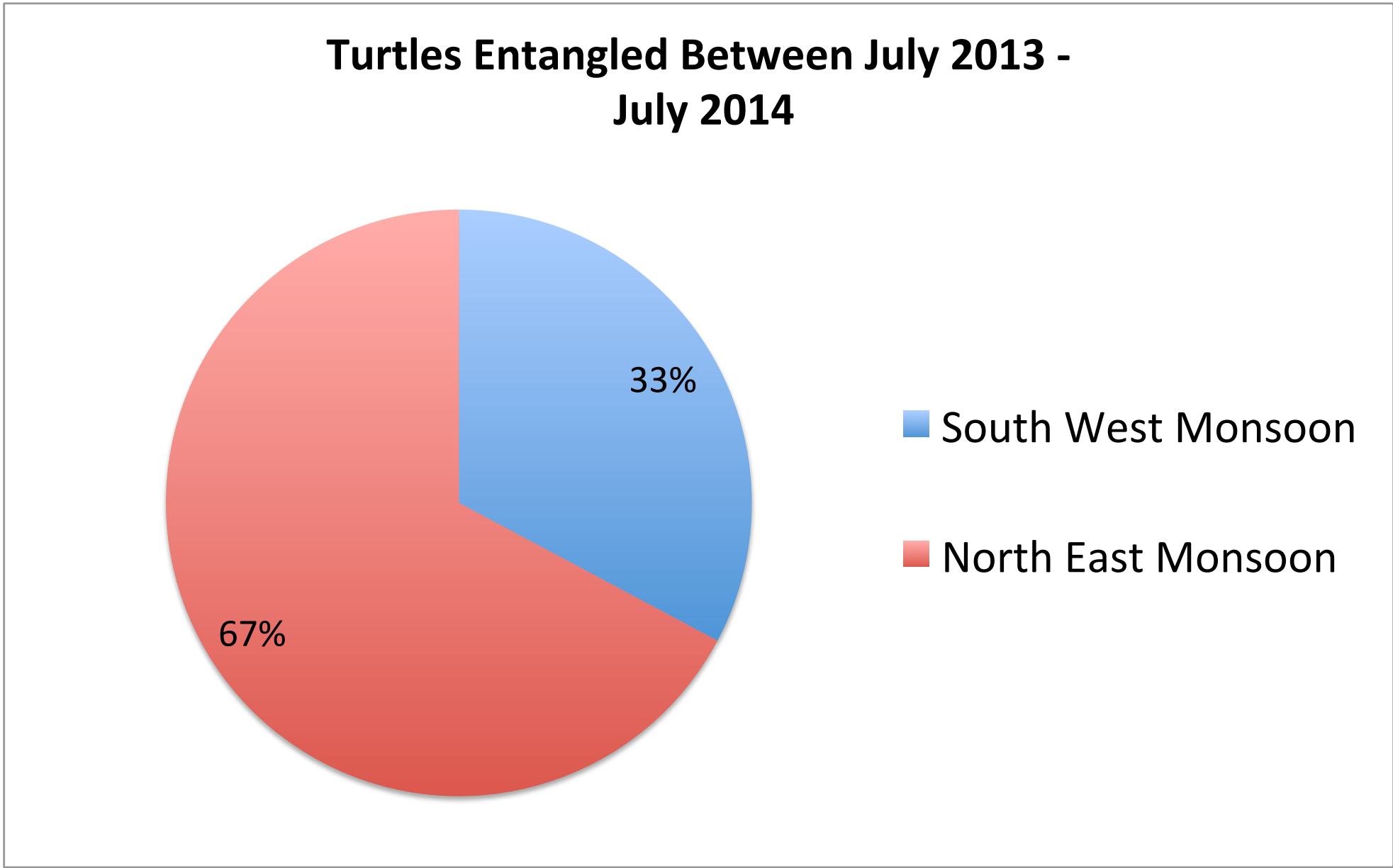


Figure 10. During the South West Monsoon (May-November) 33% (20) of ORT were found entangled when compared to the 67% (41) ORT entanglements during the North East Monsoon (December-April).

RESULTS

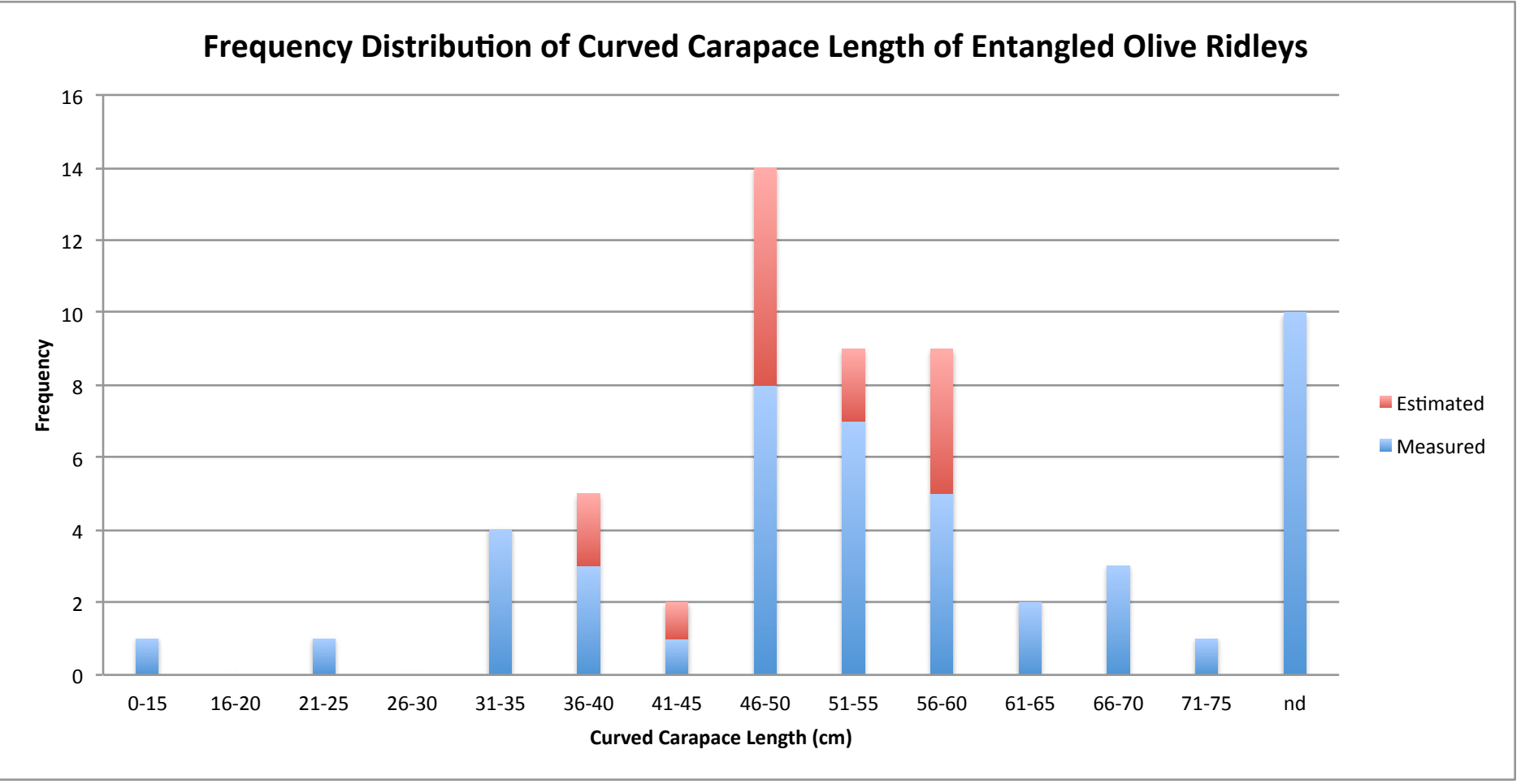


Figure 11. Curved Carapace Length was either measured or estimated to the nearest 5cm. 10 ORTs were unable to be measured and are represented as no data (nd).



Figure 12. LEFT: The use of Fish Aggregating Devices (FADs) by purse seine fisheries operating under flags of the EU is common in the western Indian Ocean. A tracker attached to a net that entangled an Olive Ridley was traced back to a Spanish purse seine fishing vessel operating out of the Seychelles and Mauritius called the *Doniène*. RIGHT: flotation devices, including plastic bottles, attached to ghost nets provide clues to their origin. Many ghost nets found during the NE Monsoon had Thai or Indian marked attachments.

CONCLUSION

Our data suggest that these ghost nets are drifting with the predominating currents and may be coming to Maldivian waters from India, Sri Lanka, and further afield from Southeast Asia during the NE Monsoon. It also suggests the nets are coming from the western Indian Ocean and Arabian Sea during the SW Monsoon. Markings on bottles and floats, as well as, serial numbers on FADs give clues to the nets' origins and support this interpretation. Entangled ORTs are most often encountered in the NE Monsoon, and sexually immature individuals make up the majority of entanglements.

RECOMMENDATIONS

We recommend a reduction in gillnet fishing in the Indian Ocean, improved net disposal facilities in ports, a system of no-blame gear loss reporting and a centralised database of Indian Ocean fishing net construction parameters be implemented. We also recommend an increase and improvement in ghost net data collection. Awareness must be raised amongst the general public and more citizen scientists be trained to recognize and recover ghost nets; additionally, we suggest that international ghost gear groups come together to standardise the data to be collected and analysed in the future.

LITERATURE CITED

1. Abreu-Grobois A. & Plotkin P. (2008) *Lepidochelys olivacea*. The IUCN Red List of Threatened Species. Version 2014.2. <www.iucnredlist.org> .Accessed on 27 July 2014.



The Olive Ridley Project is an initiative based in the Maldives actively fighting ghost nets in the Indian Ocean. To find out more please visit: www.oliveridleyproject.org