



## Mooring Line Entanglement Mitigation

*Conservation through  
research, education, and collaboration*

**- The Manta Trust**



# EXECUTIVE SUMMARY

Boat mooring and buoy lines have been widely used in the Maldives for decades. However, as the number of these lines greatly increases throughout the country due to tourism development, they are increasingly posing a serious threat to the reef manta ray population. Manta rays are obligate ram ventilators, meaning that they need to swim constantly to “breathe”. Therefore, entanglement in a mooring line by a manta ray quickly leads to asphyxiation and death. Unfortunately, manta rays cannot swim backwards, and they often cannot see a thin mooring line directly in front of them as they swim forward. Therefore, entanglements can easily occur, and mitigation measures are therefore required to address this growing threat.

Incidental capture (mostly through fisheries bycatch) is one of the greatest threats to manta rays worldwide. The conservative life history

traits of manta rays mean that populations are ill-equipped to recover from anthropogenic pressures, such as entanglement mortality. Both species of manta ray (*Mobula alfredi* and *Mobula birostris*) are now classified as Vulnerable to extinction on the IUCN’s Red List of Threatened Species. Therefore, to safeguard these vulnerable and nationally protected species, it is important that all mooring and buoy lines in the Maldives are modified to reduce the risk of manta ray entanglements. To aid these efforts, the Manta Trust has developed a few simple actions which can be taken to help prevent manta ray entanglements. Firstly, raise awareness of this issue with resort management, and work together utilising skills and knowledge from the resort’s different departments (e.g. marine fleet/launch, dive centre) to implement the following mitigation measures:

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## STEP 1

Identify all mooring and buoy lines around the island. Ensure that mooring lines are installed properly, so that there is **no excess in the line** (loose lines more easily result in entanglements). Ensure that any loose rope or loops are removed or secured (e.g. using tape or cable ties) to minimise the chance of entanglement.

## STEP 2

Make all mooring lines “manta safe” by attaching cable ties as shown in the diagram on the following page. This technique makes mooring lines more visible to megafauna, which can spot and avoid them more easily. Simply attach cable ties around mooring ropes at 1 ft. intervals, so that the ties extend outwards at a right angle from the rope. Simply affix around the rope - there is no need to thread them between rope twines. In order to maximise visibility of the rope from all sides, attach each cable tie at a roughly 45 degree angle from the previous tie (so that it looks like a DNA helix).

The cable ties will become covered in algae over time - this will further increase their visibility in the water column. We recommend using the largest cable ties available - heavy duty, 24-26 inches in length ideally. These can be purchased relatively cheaply, making this a very simple and inexpensive measure that can help to mitigate entanglements in the future, whilst having no negative impact on the functionality of the mooring lines.

## STEP 3

**Prioritise lines** that are in areas where the most manta ray activity occurs – e.g. on house reefs close to channels where feeding animals are sighted.

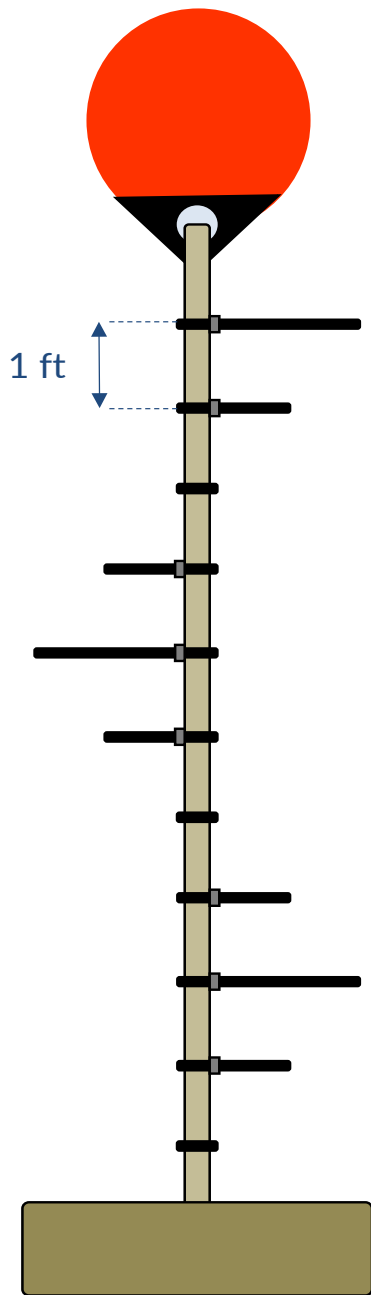
## STEP 4

**Educate the resort staff and guests** about the measures you have taken to make your mooring lines manta safe.

Cover Image Credit: Karin Nistler



# INSTALLMENT DIAGRAMS



Attach heavy-duty cable ties (24-26 inches in length) around mooring ropes at 1ft. intervals, so that the ties extend outwards at a right angle from the rope.

Attach each cable tie at a 45° angle from the previous tie, in order to maximise visibility of the rope from all sides.

