

# USE OF COMPREHENSIVE LIMB SALVAGING PROTOCOL TO REDUCE INCIDENCE OF SURGICAL AMPUTATION IN OLIVE RIDLEY SEA TURTLES (*LEPIDOCHELYS OLIVACEA*) ENTANGLED IN GHOST GEAR IN THE INDIAN OCEAN

Mariana Fragoso<sup>1</sup>, Tristan Neto<sup>1</sup>, Maximilian M. R. Polyak<sup>1 2</sup>

Olive Ridley Project, UK<sup>1</sup>; Sea Turtle Rescue Alliance, UK<sup>2</sup>



OLIVE RIDLEY  
PROJECT

Registered Charity in the UK #1165905

## Introduction:

Ghost nets (discarded or abandoned fishing gear) pose a significant threat to olive ridley turtles in the Indian Ocean (Fig. 1). These entanglements often result in severe limb and neck injuries, affecting the turtles' ability to swim, forage, and survive. At the Marine Turtle Rescue Centre (Baa Atoll, Maldives), ghost net-related injuries are a leading cause of admission. To address this, we developed a Limb Salvaging Protocol (LSP) to preserve limb function and reduce the need for amputations in critically injured sea turtles.

## Methods:

The LSP is a multimodal, holistic approach designed to save and restore function to damaged limbs. This protocol includes:

- **Rapid Assessment:** Each patient undergoes a thorough physical examination, blood work, imaging studies, and diagnostic testing to assess the severity of injuries and overall health.
- **Supportive Care:** Once assessed, immediate care is provided, including pain management, wound care, nutritional support, and essential medical therapies to stabilize the patient.
- **Surgical Intervention:** In cases of severe injury, surgical procedures are performed (Fig. 4), followed by tailored physical rehabilitation methods. These include Targeted External Weight Therapy, Physiotherapy and Kinetic Buoy Training, which aim to promote healing and improve limb function.

## Discussion:

The critical success of the LSP lies in the integration of advanced and regenerative therapies designed to optimise healing and function restoration:

- **Photobiomodulation Therapy:** This therapy, using specialised lasers, promotes tissue healing and pain relief (Fig.2).
- **Platelet-Rich Plasma** (Fig.3) and **Stem Cell Therapy:** These regenerative treatments accelerate wound healing by utilising the patient's own blood components, stimulating tissue regeneration and reducing recovery time.
- **Acupuncture:** Used to enhance mobility and reduce pain, acupuncture is integrated into the therapy to support overall recovery.
- **Continuous Monitoring:** Allows for real-time assessment, ensuring therapies are adjusted based on each turtle's specific needs.

## Results:

### Nooru



Fig. 5 – Sequence of Nooru's right hind flipper progression on days 6, 12, 15, 20, 27, 57, and 137 post admission.

### Iru



Fig. 6 & 7 – Sequence of Iru's right hind and front flippers progression on days 4, 24, 35, and 60 post-admission.

### Bulbul



Fig. 8 – Sequence of Bulbul's right flipper injury progression on days 5, 27, and 130 post-admission.

### Zeliya



Fig. 9 & 10 – Sequence of Zeliya's right front flipper and neck injury progression on days 12, 35, and 60 post-admission.



Fig. 1 – Rescue of Bulbul & Iru from ghost gear entanglement on 16/12/2023.



Fig. 2 – Photobiomodulation therapy applied to Zeliya, an olive ridley turtle patient.



Fig.3 - Platelet-Rich Plasma Therapy applied to Iru, an olive ridley turtle patient.



Fig. 4 – Serial debridement surgeries performed on Zeliya.

## Conclusion:

To date, 15 olive ridley sea turtles have undergone treatment with the LSP, demonstrating successful outcomes in preserving limb function and mobility, even in severe ghost net entanglement injuries that might otherwise require amputation (Figs. 5-10). With an average hospital stay of 165 days, the protocol represents a significant advancement in sea turtle care in the Indian Ocean, where ghost net-related injuries are a leading cause of admission. The LSP offers a promising approach to improving recovery and mobility, and this marks the first report of its application to this species, providing a valuable model for enhancing the quality of life for injured sea turtles and contributing to broader conservation efforts.