

# **Enhancing Photo-Identification of** Indo Pacific Bottlenose Dolphins (Tursiops aduncus):



A 360° approach integrating boat-based and underwater photography for improved accuracy and sighting counts in the Northern Red Sea, El Gouna, Egypt.

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### <u>Introduction</u>

Photo-identification is a key, non-invasive method for studying marine mammals, such as dolphins. Traditionally, identification efforts have relied on dorsal fin photographs taken during boat-based surveys; however, this method has limitations. Dorsal fin identification features can change over time, may be obscured, or appear very similar between individuals. This study was conducted in the Northern Red Sea, El Gouna, Egypt, an area under continuous monitoring by Dolphin Watch Alliance (DWA) since 2009. It explores whether supplementing boat-based surveys with underwater photography can enhance identification accuracy for Indo-Pacific bottlenose dolphins (Tursiops aduncus). By capturing a 360° view of each dolphin's physical features, the aim is to improve individual recognition and group size estimates, ultimately supporting more accurate population assessments and effective conservation strategies.

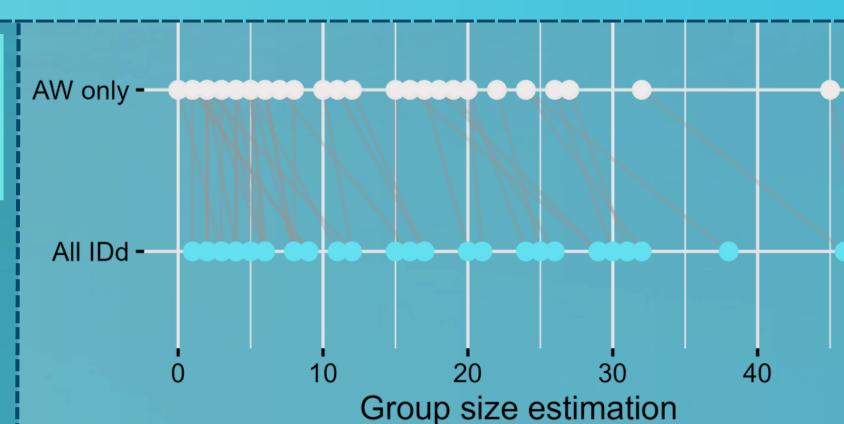
# **Key Takeaways & Results**

# **Improved Group Size Estimates**



<u>Incl. UW</u> <u>versus</u>	Sightings	Improved	Mean increase	T-test& Wilcoxon
AW-only	41	31 (76%)	4.02	p < 0.001

Supplementing Boat-Base photography (AW) with Underwater images (UW) identified significantly more dolphins than boat-based identification alone  $(t(40) = 6.28, p = 1.90 \times 10^{-7}; 95\% CI [2.73, 5.32])$ : Using boat-based images alone results consistently in and underestimation ( $\sim$ 4.02 :  $\approx$ 28.2%).



Each line represents one sighting, connecting the number of dolphins identified by boat-based only to the combined method.

# Identification Success by Age Class

Succes Rate	YOY	Calf	Juvi.	Sub.	Adult
AW- only			73.8%		

All five age classes show highly significant gains when underwater images are included, especially young dolphins (YOY and Calves), which are the hardest to identify with boat-based imagery alone.

# **Further Benefits of Combining Methods**

- Larger groups benefit most from underwater imagery (r = 0.625, p < 0.001).
- UW inclusion matches field counts, boosting accuracy (t(36) = -1.26, p = 0.20).
- UW inclusion rescues low-confidence cases disproportionately ( $\chi^2$ , p  $\ll$  0.01).
- Moderate AW–UW agreement; each adds unique IDs (Cohen's κ).

# Methodology

#### **Survey Years Focussed on 2019 + 2023**

# **Field Data Collection**

**Boat-Based & Underwater observation** 

**Field Data:** 

Group size estimates, time spend, environmental data

**Photo-ID Image Collection:** Boat-Based & 360° Images via divers/snorkellers

#### **Image Processing:**

Individual identification and processing variable collection

### Statistical Analysis (R)

T-test/Wilcoxon tests, Pearson correlation, Cohen's Kappa, Logistic regression and different plots.

This dual approach leads to more accurate population assessments which will strengthen long-term monitoring results and conservation of Indo-Pacific bottlenose dolphins.





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