Diel foraging behaviour of Humboldt penguins *Spheniscus humboldti* at Tilgo Island, Northern Chile

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Background

- Humboldt penguins are distributed from Peru to Chile[1]
- Their populations have decreased over the last decades[1,2]
- At Tilgo Island, ~2000 penguins breed every year[3,4]
- There is an overlap between the foraging areas used by penguins and a proposed industrial project[4,5] (Fig. 1)

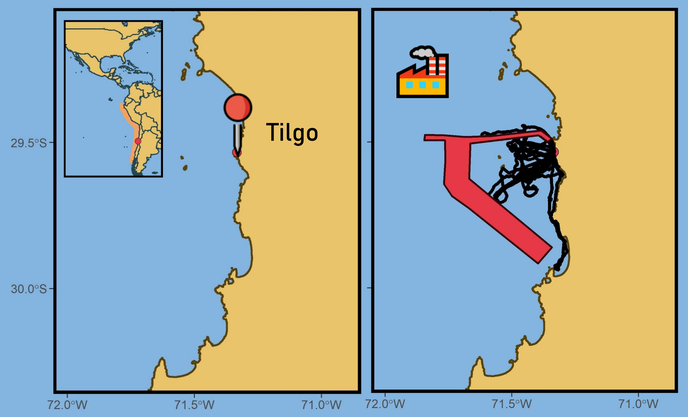

Figure 1. Left: Tilgo Island location. Right: foraging trips of Humboldt penguins in black and navigation route of the proposed industrial project in red

Methods

Knowing the diel (on a period of twenty-four hours) foraging behaviour of Humboldt penguins (Fig. 2) might help prevent the overlap with human activities

Using GPS and TDRs on chick-rearing Humboldt penguins at Tilgo Island, we aim to:

- Obtain information on the diel foraging behaviour and diving depth of penguins at Tilgo Island

Figure 2. GPS devices (CatLog-S) and time-depth recorders (TDR, model G5+) were attached to the back of the bird using water resistant tape. Eleven individuals carried GPS and eight of these same individuals also carried TDRs

Results

- Humboldt penguins did not start or end their foraging trips at specific times of the day (Fig. 3)
- Many trips started during daylight but penguins spent a considerable time at sea at night
- Humboldt penguins were slower at night than during the day
- Penguins dived to shallower depths at night than at day (Fig. 3)

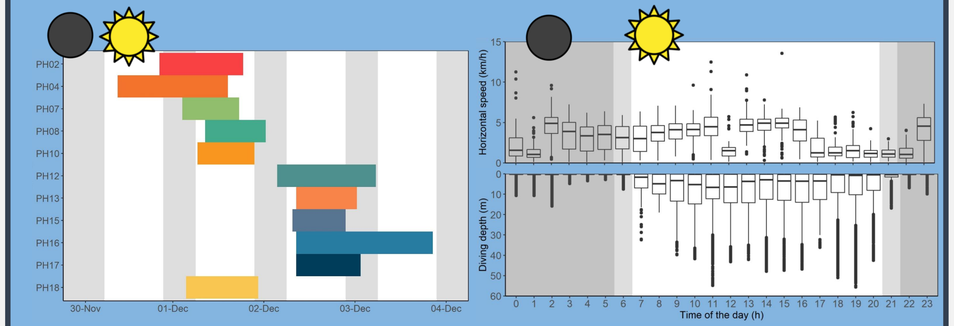

Figure 3. Left: departure and arrival times of Humboldt penguins to Tilgo Island, each color represents an individual. Right: speed (upper panel) and diving depth (lower panel) of Humboldt penguins according to the time of the day. Grey background represents nighttime and white background represents daytime

Remarks

- Humboldt penguins behaviour mirrors the behavior of their main prey, anchovies. Anchovies follow zooplankton diel vertical migrations, and at nighttime anchovies are more loosely aggregated, and slower [6,7,8]
- Human activities might overlap with penguins activities at any time of the day. Penguins might be particularly vulnerable at nighttime when they are slower and at shallower depths
- Foraging information of Humboldt penguins should be taken into account to prevent detrimental impacts by human activities to breeding Humboldt penguins

Further reading, acknowledgements & references: www.miriam-lerma.com/blog/bls7