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Progress Report for 2023 FAR Grant

Fear, flight and fitness: The adaptive significance of escape behaviour in Hooded Plovers *Thinornis cucullatus cucullatus*

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INTRODUCTION

Escape responses in birds are critical to avoid predators and are therefore expected to be under strong selection to improve survival. Previous escape behaviour work has assumed that differences in escape responses between individuals and species have an adaptive evolutionary basis. For example, larger birds tend to be more 'flighty' than smaller birds, which is argued to be because they require more time to take off and therefore escape from the predator. However, explicit tests of the adaptive basis of escape behaviour, and the way in which environmental and biological characteristics shape this behaviour in an evolutionary context, are rare.

This research project is investigating the adaptive nature of flight initiation distances (FID; i.e. the distance at which they initiate escape in response to an approaching threat) of the threatened Hooded Plover *Thinornis cucullatus cucullatus*. Hooded Plovers face a plethora of threats in the coastal environment, with hatching eggs and rearing chicks to fledging being the two most heavily impacted life history stages. Eggs typically fall victim to predators as well as trampling by humans, dogs and motor vehicles. Regarding chicks however, one of the greatest threats is disturbance. Disturbance compromises both parental care, i.e. thermoregulation and predator defence, and chick foraging ability, as they must self-feed from hatching.

The research addresses a key issue in escape ecology, by examining how escape response is linked to survival and individual fitness (longevity and reproductive success) in environments associated with different levels of human impact and predation pressure, i.e. what causes variation in FID. Understanding these relationships is a crucial aspect for identifying how bird species adapt to human-induced disturbance, and whether they can mitigate these impacts by evolving their anti-predator responses. By examining their capacity to adapt to different management regimes, and the consequences for survival, it will also provide insights relevant to the conservation of this threatened species.

METHODS

The eastern Hooded Plover is a threatened beach-nesting bird whose coastal habitat extends from the NSW coast through SA on mainland Australia. Hooded Plovers are territorial with small home ranges, monogamous, and prolific yet unsuccessful breeders. They are an exceptional study species for escape response research as they are highly reactive to potential predators i.e. humans. Additionally, thanks to intensive schemes by volunteers and conservation organisations such as Birdlife Australia, there are a high number of banded individuals that are closely monitored, making it possible to link behavioural observations with survival and reproduction outcomes.

I have undertaken an extensive fieldwork survey of eastern Hooded Plover escape behaviour (FID) at sites across south-eastern Australia (see Fig. 1). Escape behaviour collection follows standard FID procedures where a person approaches the bird until they begin to escape. Following the approach, the distance between the approaching person and the bird is measured using a laser rangefinder as well as the initial distance between the approaching person and plover prior to approach (known as start distance). A range of additional variables are recorded (temperature, wind speed, date, time, location etc.).

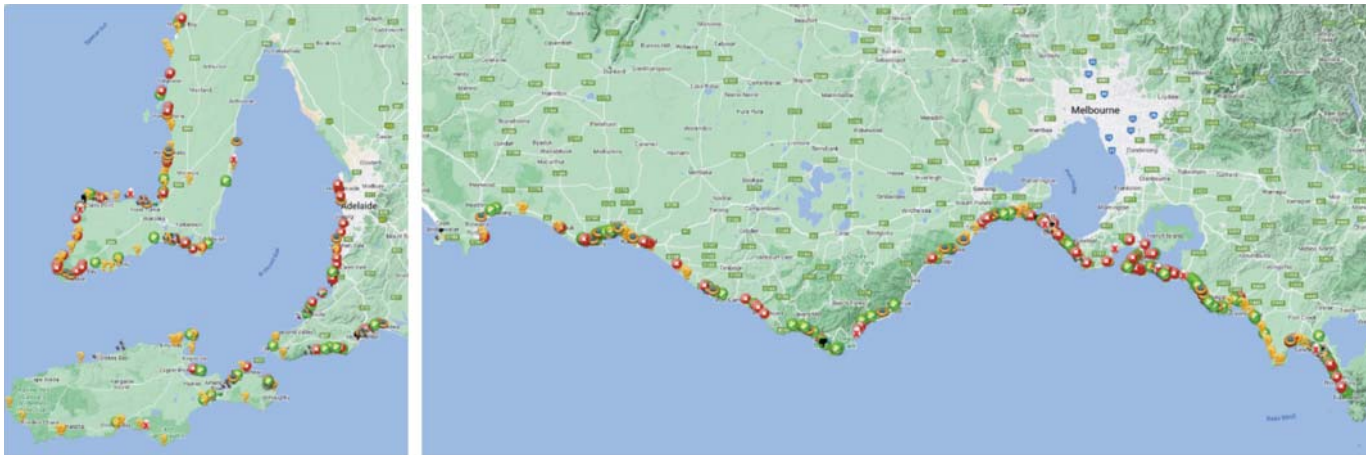

Figure 1. *Sampling locations (SA left, VIC right).*

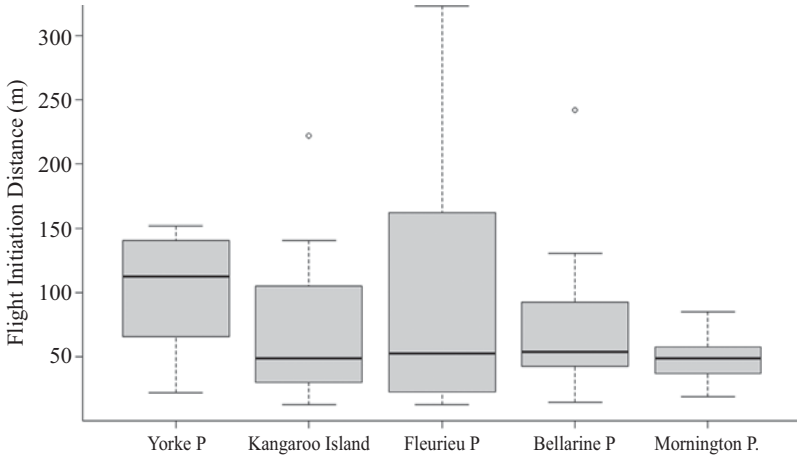

Figure 2. *Preliminary results: mean FID differs between locations. Location with the lowest visitation is Yorke Peninsula, the location with the highest visitation is Mornington P (P = Peninsula).*

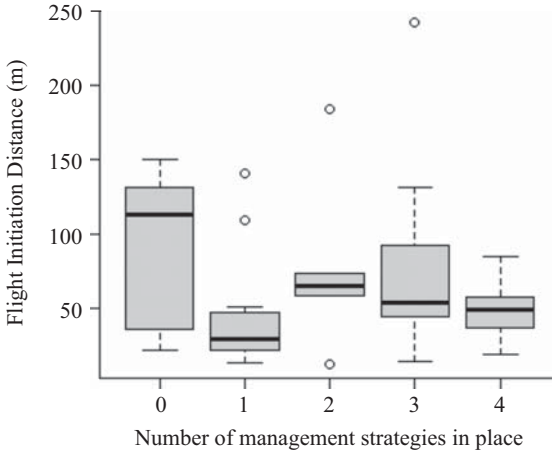

Figure 3. *Preliminary results: indicate areas with hooded plover management have lower FIDs. Hooded plover management strategies include permanent beach access signs, temporary signs on the beach, temporary fencing on the beach/dunes, and temporary shelters on the beach. In the graph 0 refers to no form of management at the location, 1 refers to one form of management from the list of management strategies, 2 refers to the use of two forms of management in place, 3 refers to three types of management in place, and 4 refers to all management strategies in place at the location.*

During the current breeding season (September 2023–March 2024) I aim to complete all data collection and begin a full analysis. FID data collected will be used to analyse differences between individuals within populations and between populations as well between locations with different management strategies implemented, human usage and predators.

RESULTS

Thus far I have collected 116 FIDs (77 banded, 39 un-banded) from Yorke Peninsula, Kangaroo Island, Fleurieu Peninsula, Far West Vicotria, Shipwreck Coast, Otway National Park, Bellarine Peninsula, Mornington Peninsula, and Bass Coast.

Preliminary data analysis suggests differences in FID do exist in relation to management measure and ease of site access (which can be extrapolated to human visitation) (see Figs. 2 and 3). Areas where hooded plovers have longer FIDs tend to be less visited, difficult to access or have intense management regimes hence, the birds are flightier than in areas with less intense management, have high rates of human visitation or are easy to access. This may provide important insights for conservation of the species as the data indicates something interesting is happening with FIDs.

Overall, this research will provide insight into how different human and predator pressures influence escape behaviour, and how this relates to the survival and reproductive success of Hooded Plovers. Being a threatened species, understanding the influence of human disturbance in a plastic and genetic context are key to informing management and conservation practices, particularly to ensure appropriate and meaningful implementation of buffer zones for planned development and ongoing threats.

The ABSA FAR grant has enabled me to conduct fieldwork in key areas of interest: Mornington Peninsula, Bellarine Peninsula and Bass Coast as well as contribute to the ongoing monitoring and conservation of Hooded Plovers. I thank the Association for its generous support in this project.

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