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While the western honey bee (*Apis mellifera*) is well studied as managed livestock, relatively little is known about unmanaged populations of this important pollinator. Across Africa, the nesting ecology of wild and unmanaged honey bees remains understudied. In the Eastern Cape Province, South Africa, many agricultural lands have been converted to nature reserves, on which land management decisions are rarely made with pollinators in mind. We located wild and unmanaged honey bee colonies around the town of Makhanda using beelining techniques, with which we followed foragers from stands with sugar water to their nest entrances. Once located, we recorded nest natural history data such as cavity type and entrance orientation. Additionally, we monitored nest vacancy and damage at three time points over 12 months. We assessed seasonal changes in nest vacancy and damage by cavity type using generalized linear mixed effect models. We located 127 wild and unmanaged nests, 91 of which were located via beelining. Nests in the ground were most prevalent (69.0%), followed by nests in plants (23.8%), manmade structures (5.6%), and rock faces (1.6%). By the end of the study, over half of all nests were vacated. Nests in the ground were vacated and damaged more frequently than were nests in plants after 4-6 months of monitoring ($p < 0.05$). While the western honey bee is often described as tree-dwelling, we demonstrate that wild and unmanaged nest natural history may be regionally specific. Within our study area, wild and unmanaged colonies may rely on other animals, such as aardvarks, to create nest sites in the ground. However, nests in the ground may be more prone to flooding, predation, and other disturbances compared to plant-based nests. Secure nest sites may be a scarce resource in our study area or nest site selection may be limited by time and energy costs. High overall nest turnover may reflect harsh environmental conditions leading to colony abscondment or death. Insights from locating and monitoring wild and unmanaged populations of pollinators are essential for informing local land management decisions and conservation initiatives.

Beelining in the bush: Wild honey bee nest natural history and turnover in South Africa

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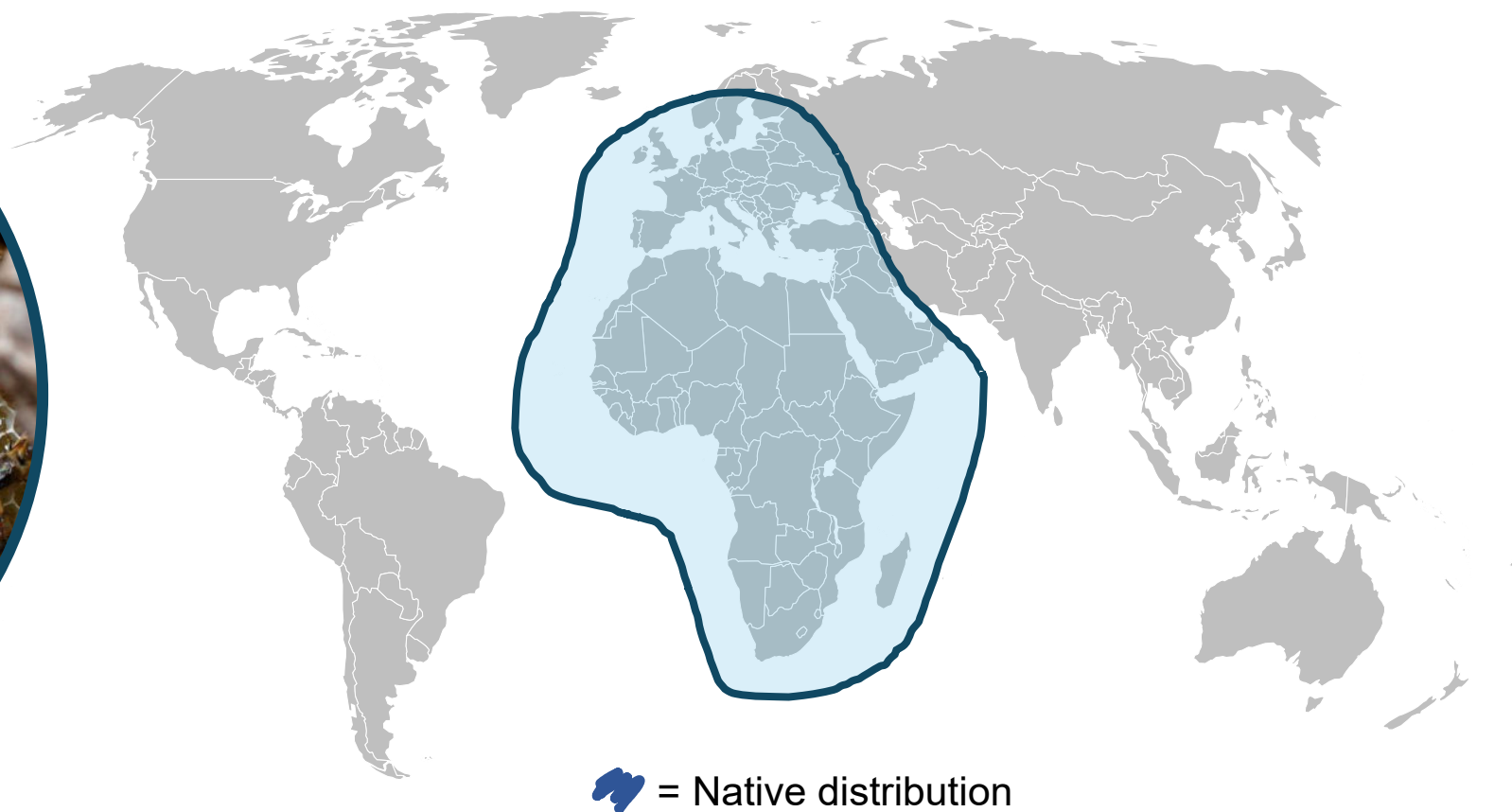
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Introduction

Apis mellifera

Western honey bee



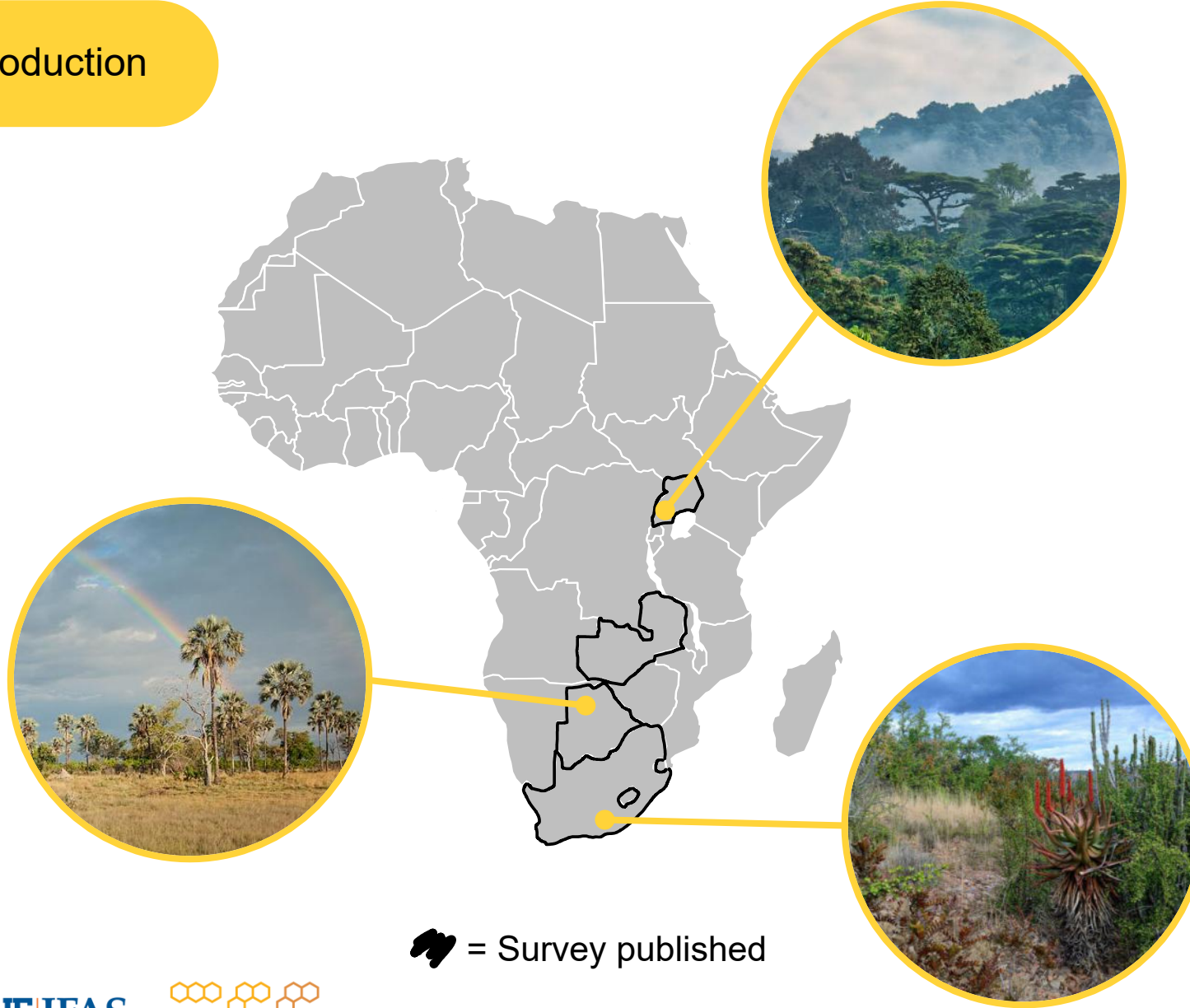
Introduction



Need for research of wild honey bees in Africa

- Investigating local nesting strategies can inform conservation initiatives and land management decisions.
- Wild honey bee populations fuel beekeeping practices.

Introduction



 = Survey published

Need for research of wild honey bees in Africa

- Few published surveys of wild honey bee colonies
- Limited surveys by land area
- Lack of long-term monitoring of nest occupancy

Objectives

We characterized the local nesting strategies of wild honey bees in the Eastern Cape Province, South Africa by:



Describing nest natural history features



Monitoring seasonal changes in nest occupancy and damage

Initial surveys to locate nests
Spring and Summer
October 2023 – February 2024



Revisit #1
Fall
March 2024

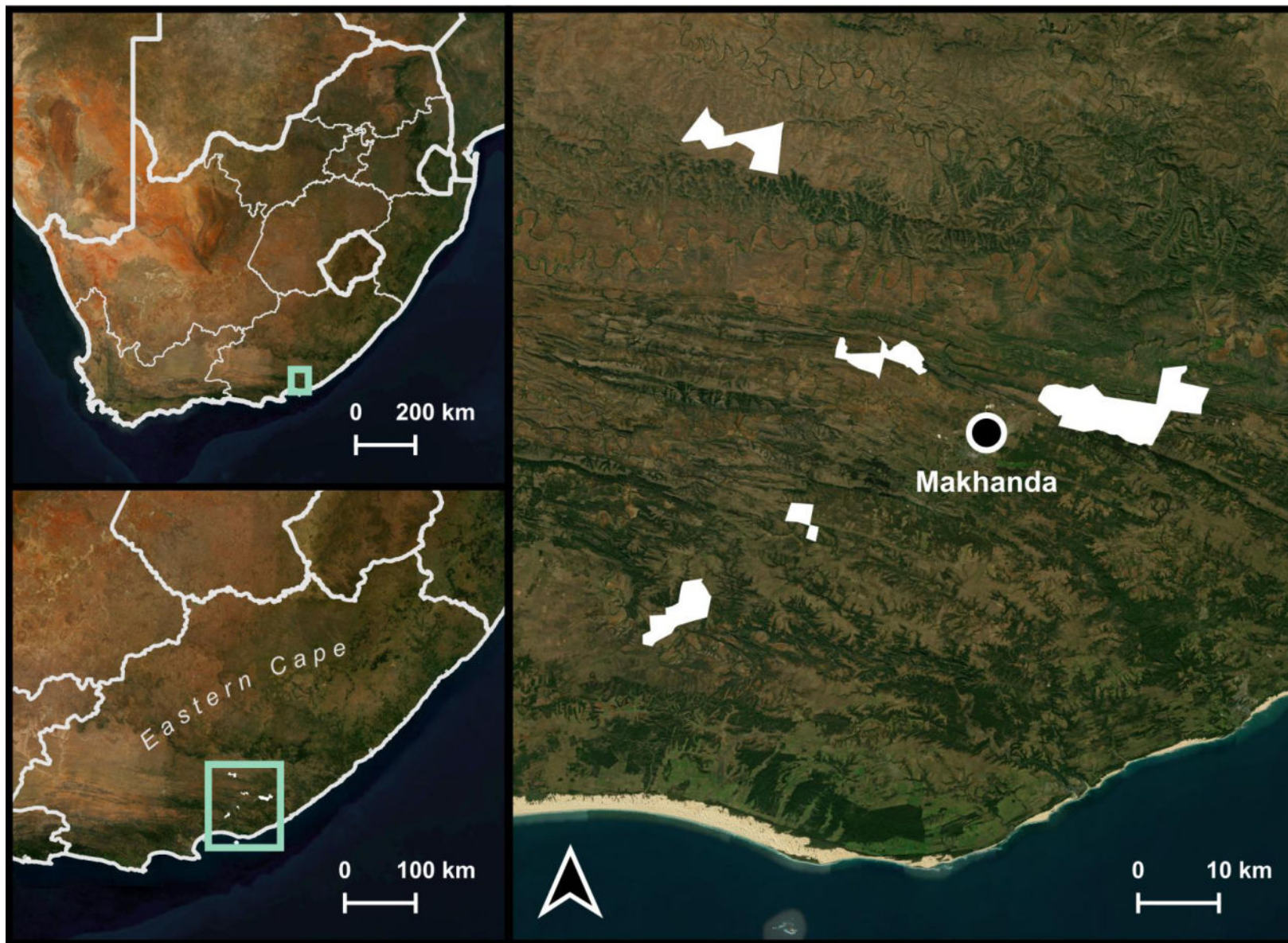


Revisit #2
Winter
August 2024

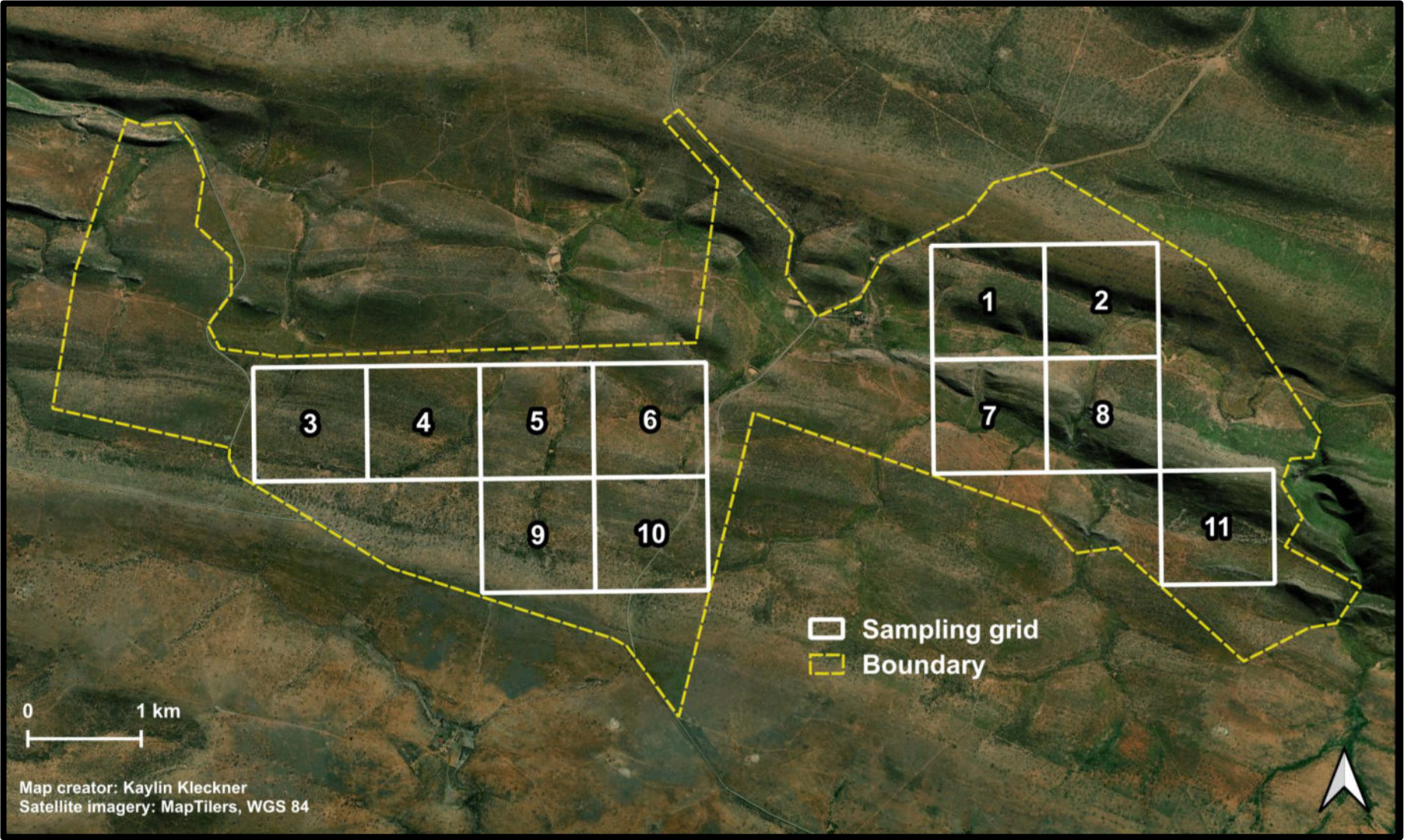


Revisit #3
Summer
January 2025

Methodology



Map creator: Kaylin Kleckner; QGIS v3.32; Geographic Coordinate System: WGS84; 1:507,000
Layer sources: (1) Satellite imagery - MapTiler, (2) South Africa Province Boundaries - South African Municipal Demarcation Board



Methodology

Beelining: Following foragers from a resource to their nest entrance



1. Set up stands with sugar water to recruit foragers



2. Identified direction foragers left stand towards nest



3. Walked along beeline, frequently stopping to look and listen

Methodology



1 km² grid boundary



Stand w/ sugar water

Methodology

-  1 km² grid boundary
-  Stand w/ sugar water
-  Beeline
-  Nest in the ground
-  Nest in a tree

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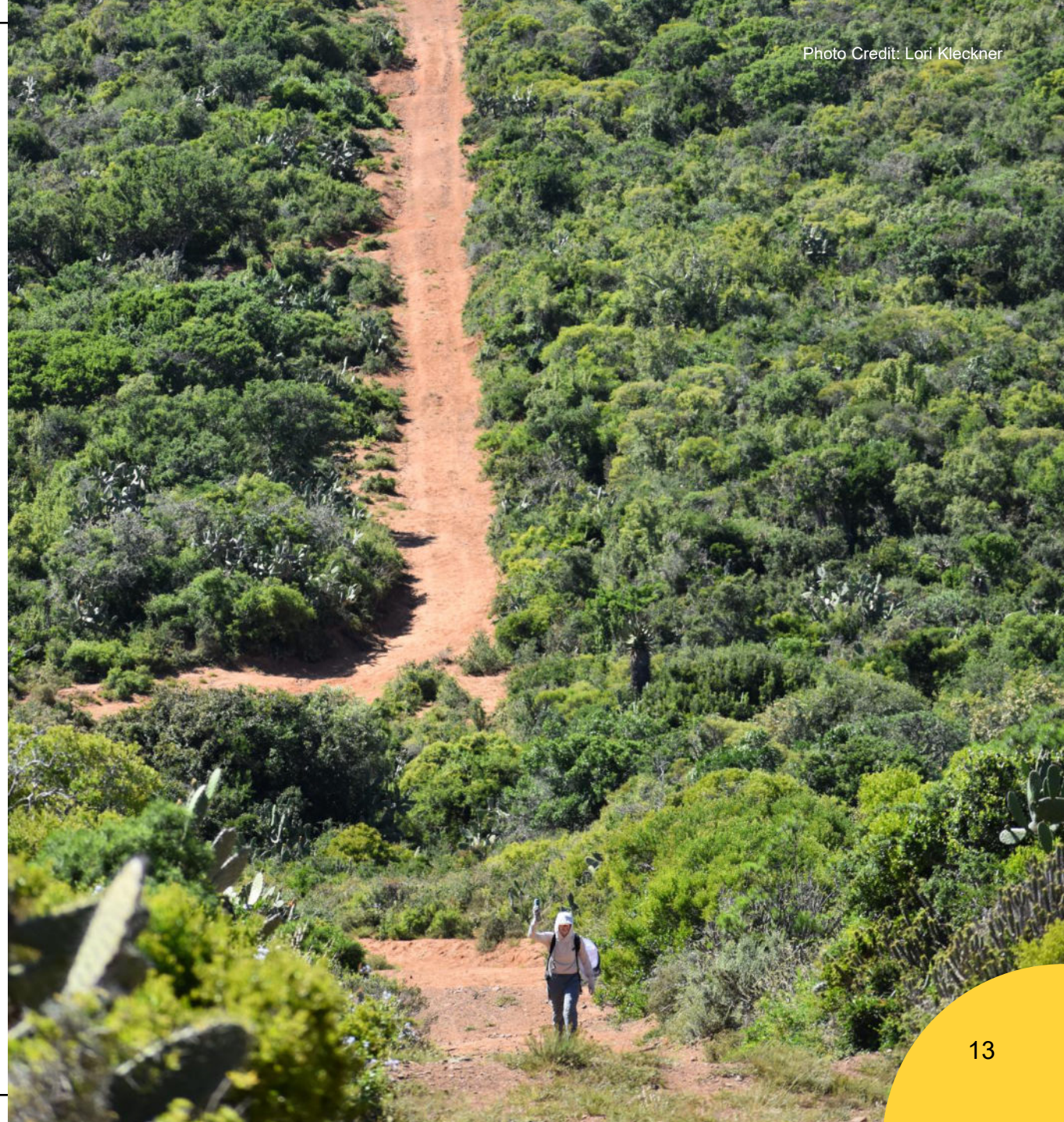
Results

16 km² surveyed on foot

127 nests located

91 nests located beelining

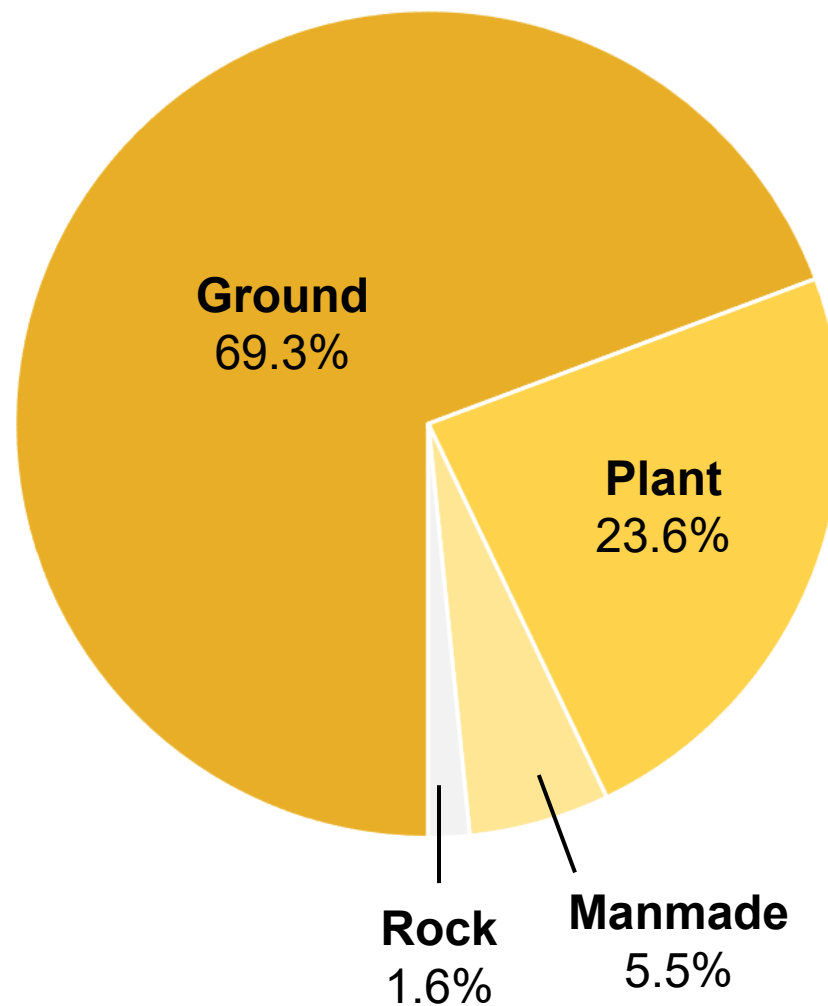
0-13 nests/km²



Results

Wild honey bees predominately nested in ground cavities, often dug by small mammals.

Cavity type





Empty nest $\neq$ Dead colony

Occupied nest $\neq$ Same colony

Results

At the end of the 12 month study period:



51.2% of all nests
were vacated

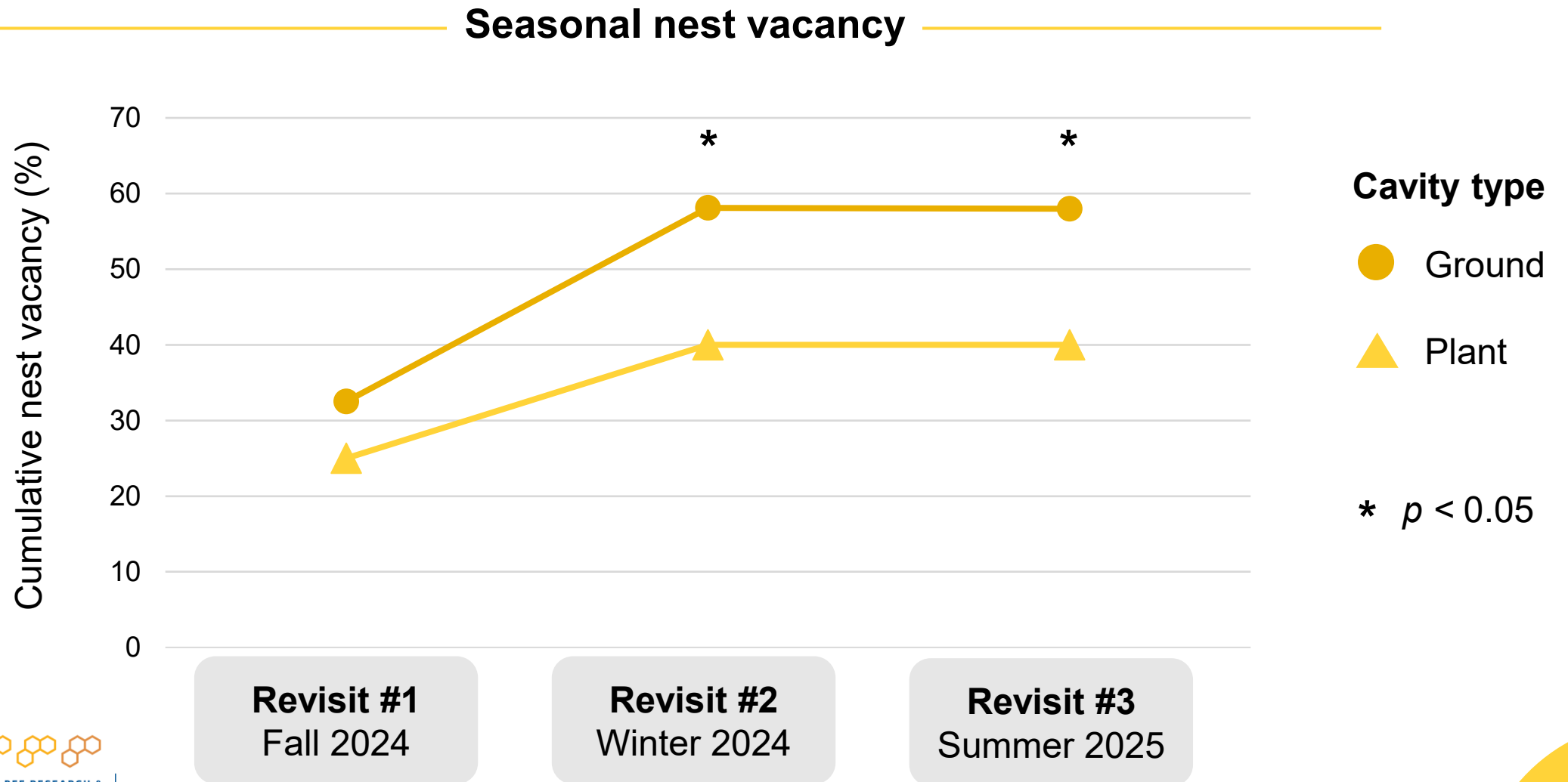


20.3% of all nests
were damaged



Results

Ground nests were vacated significantly more often than were nests in plants after 4-6 months.



Discussion

- Ground nests were most predominant in our study area, yet frequently vacated.
- Ground nests may be most abundant or easy to locate, yet less secure than plant nests.
- Our results challenge the common notion that wild *Apis mellifera* are tree-dwelling.

Conserving wild honey bees across their expansive range requires knowledge of local nesting strategies.





Thank you!

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