

Ecosystem engineering of African savanna grasslands by the common hippopotamus

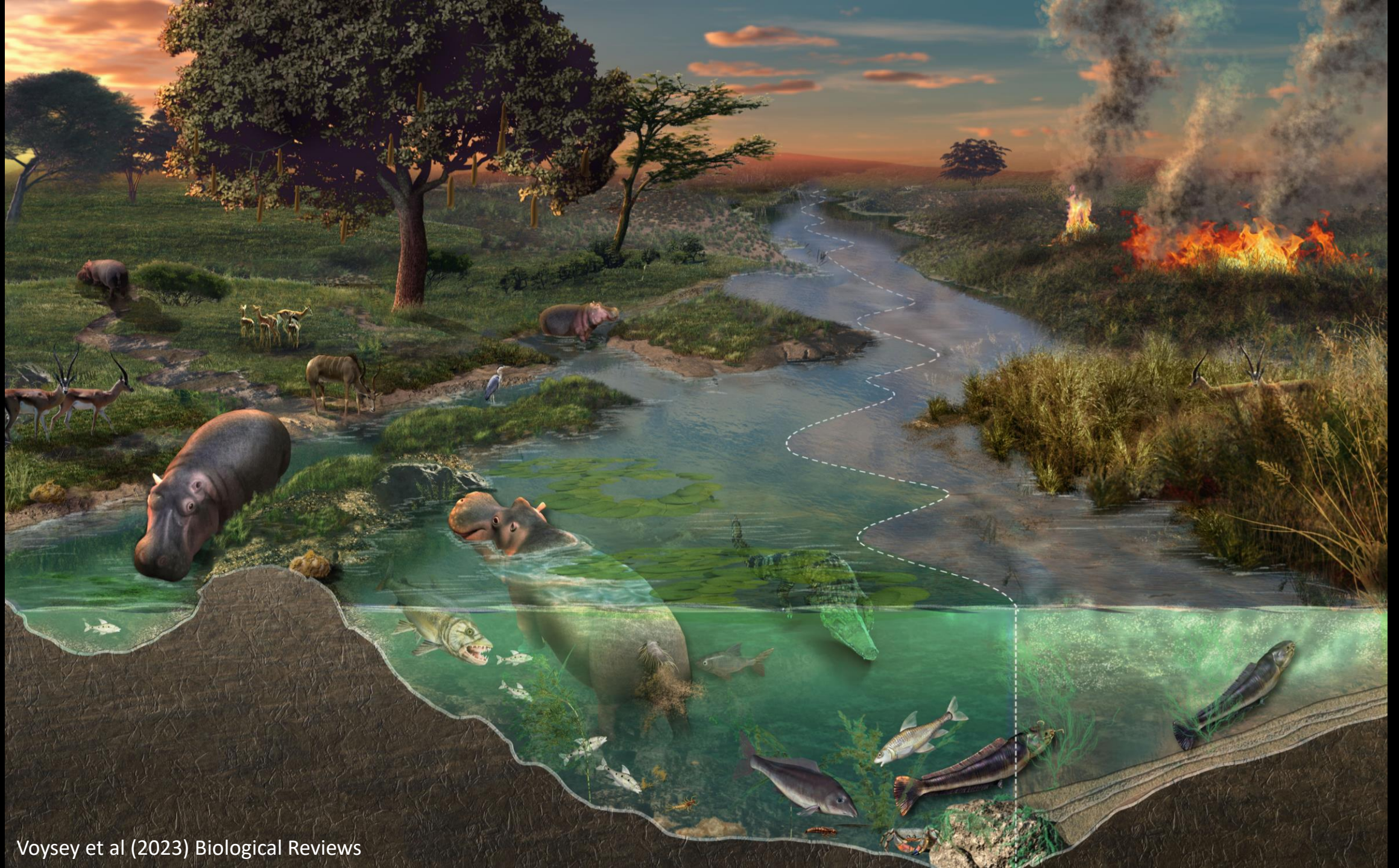
Michael Voysey

Together with Andrew Davies & Nico de Bruyn

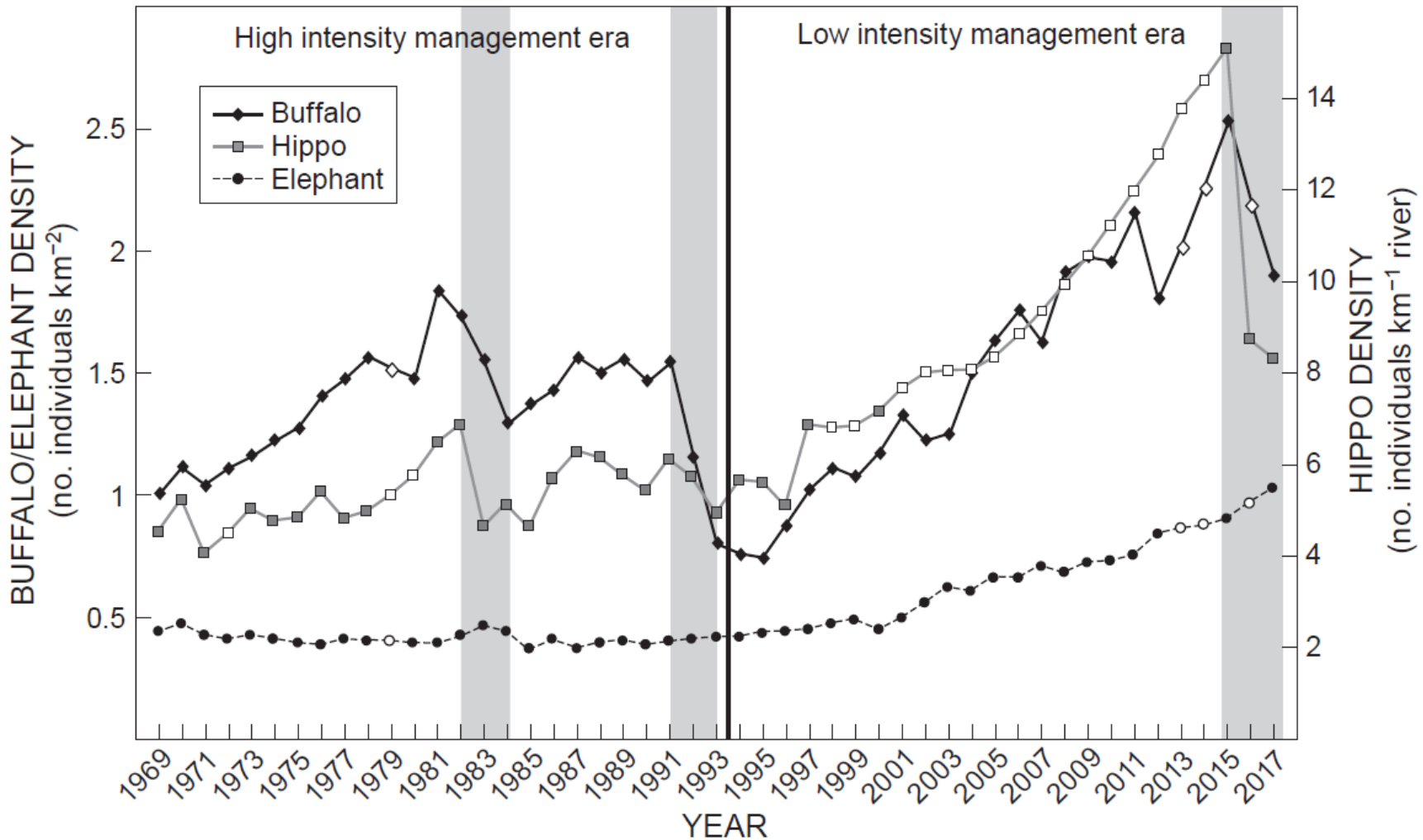


Harvard University

Department of Organismic and Evolutionary Biology



Long-term hippo population trends in KNP



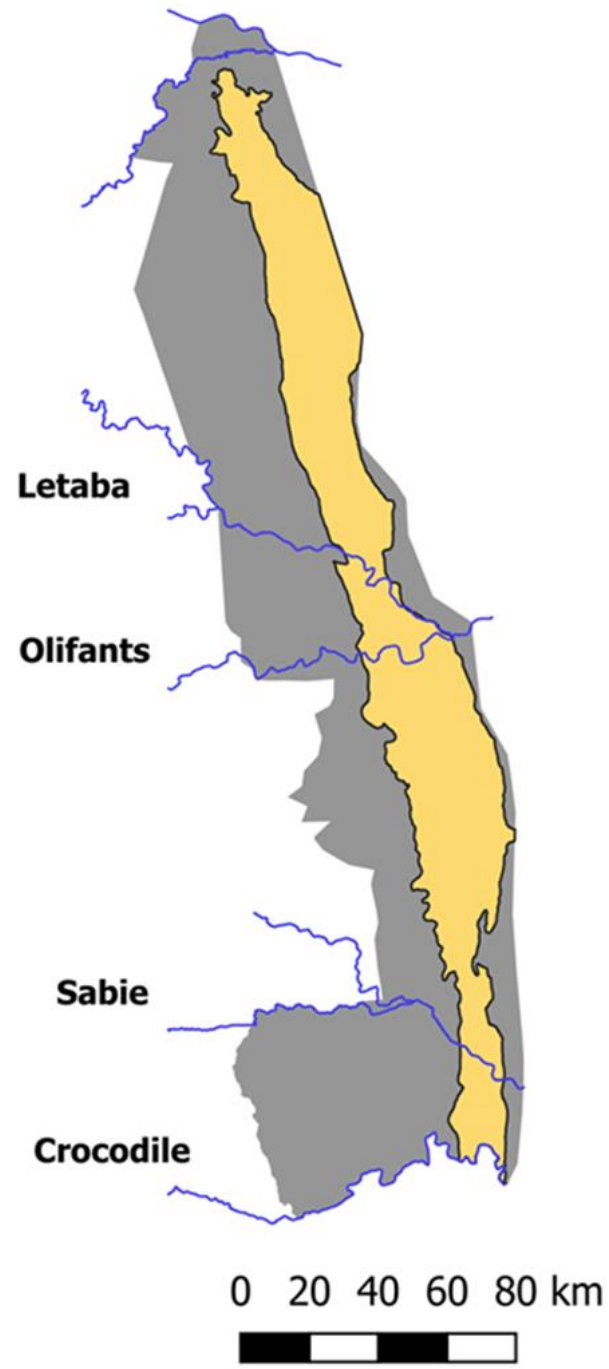
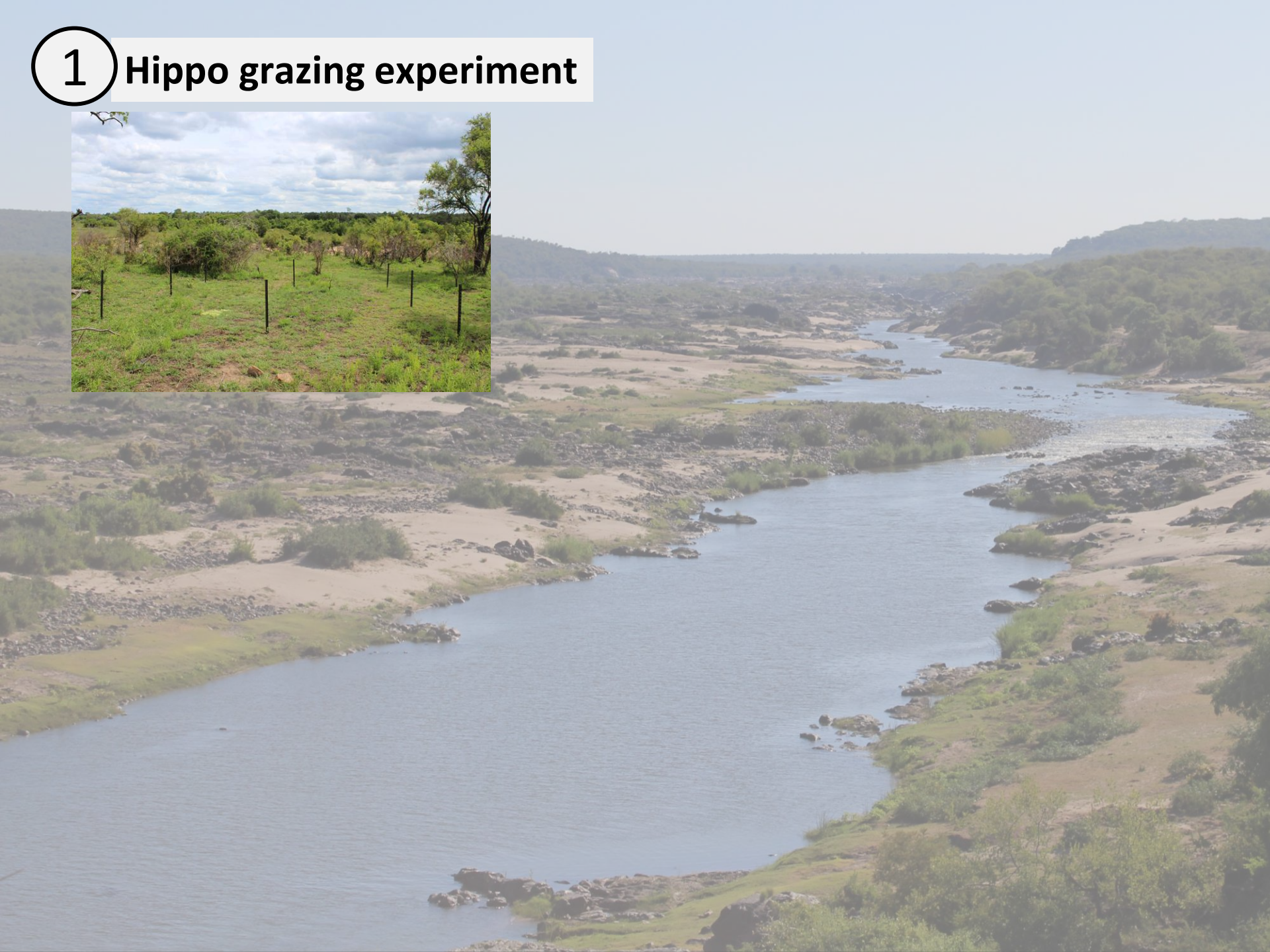
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1. Evaluate the role that hippos play in grass biomass removal and grazing lawn maintenance.
2. Map grassland structure at the landscape-scale and assess how hippo distributions and aggregations shape grassland heterogeneity.

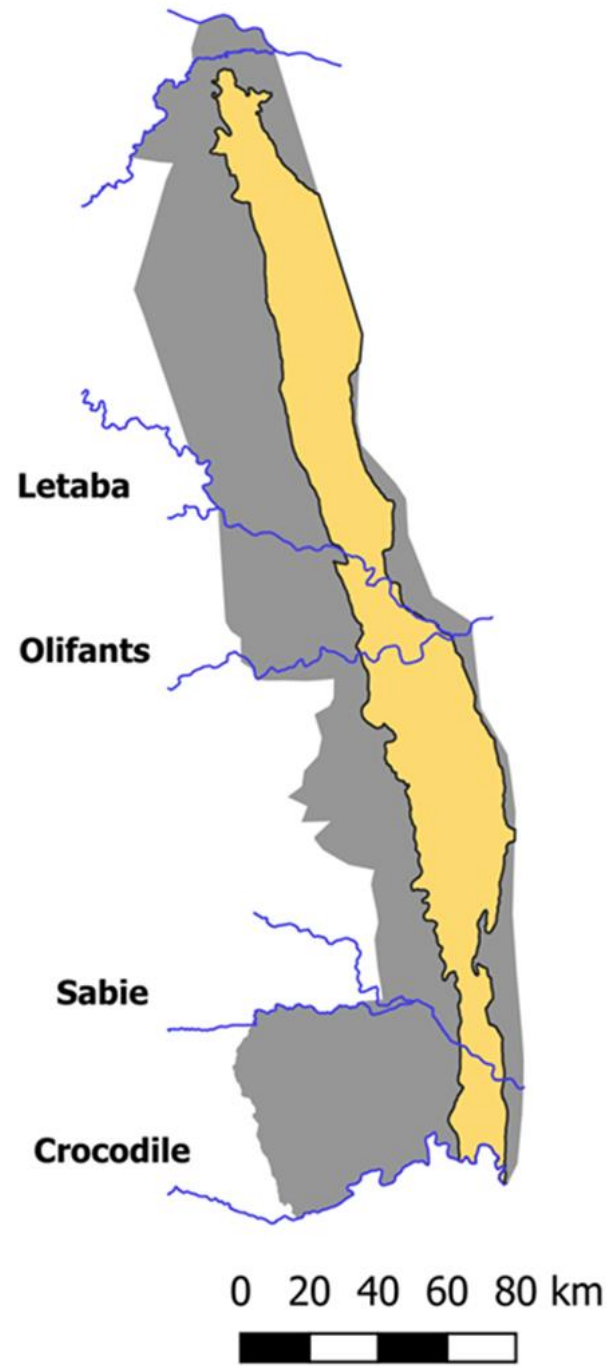
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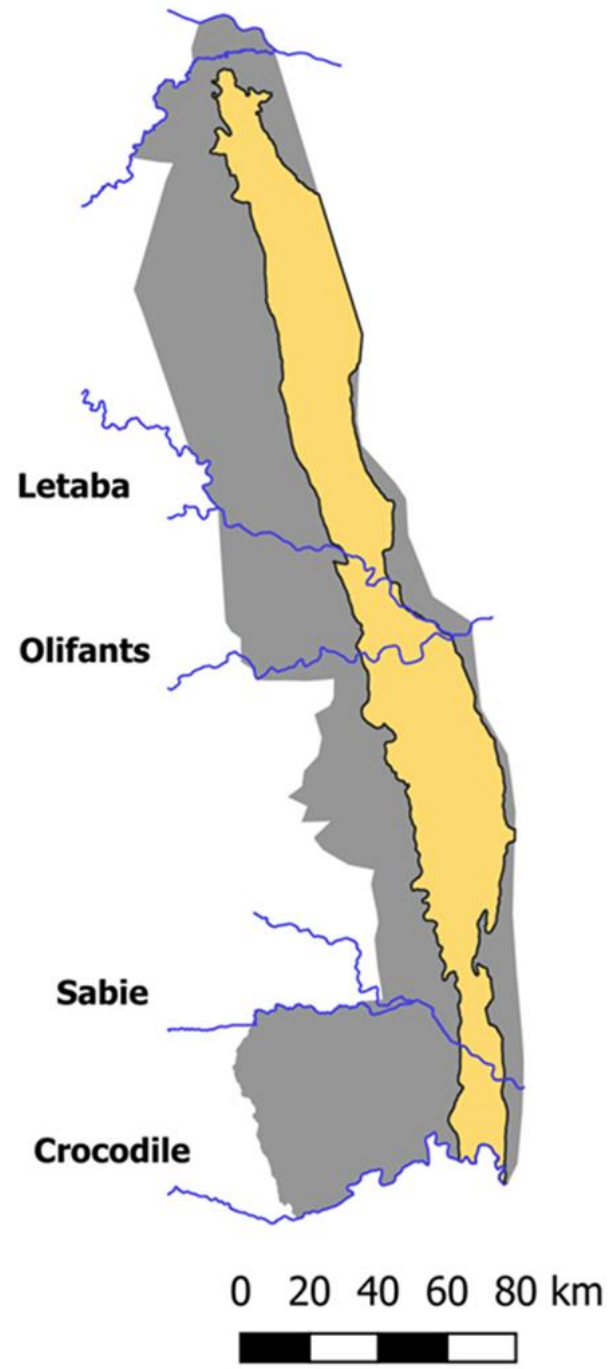
1 Hippo grazing experiment



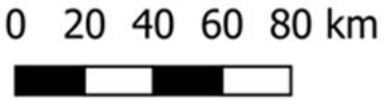
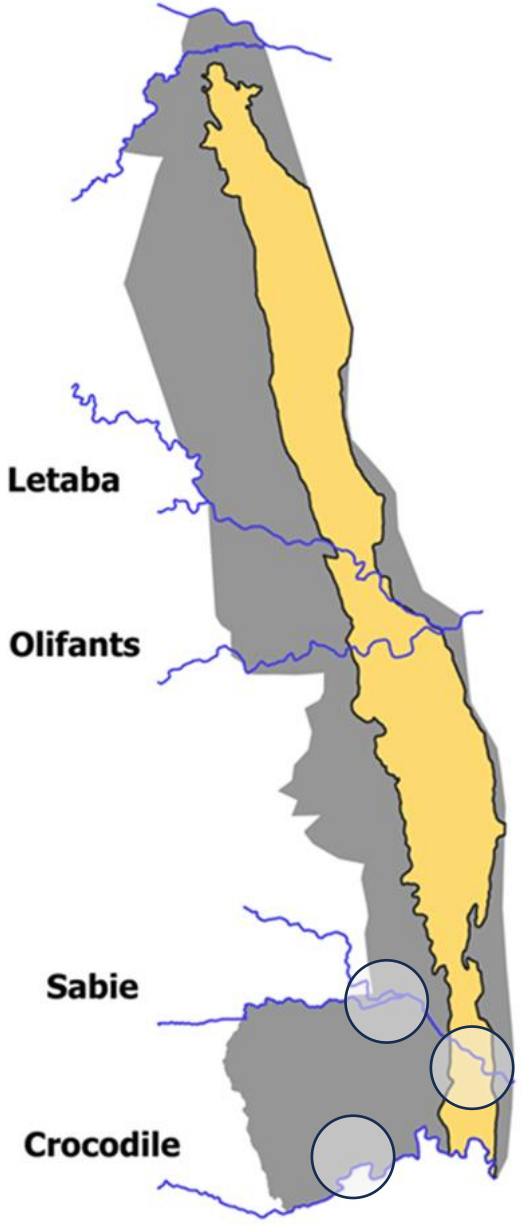
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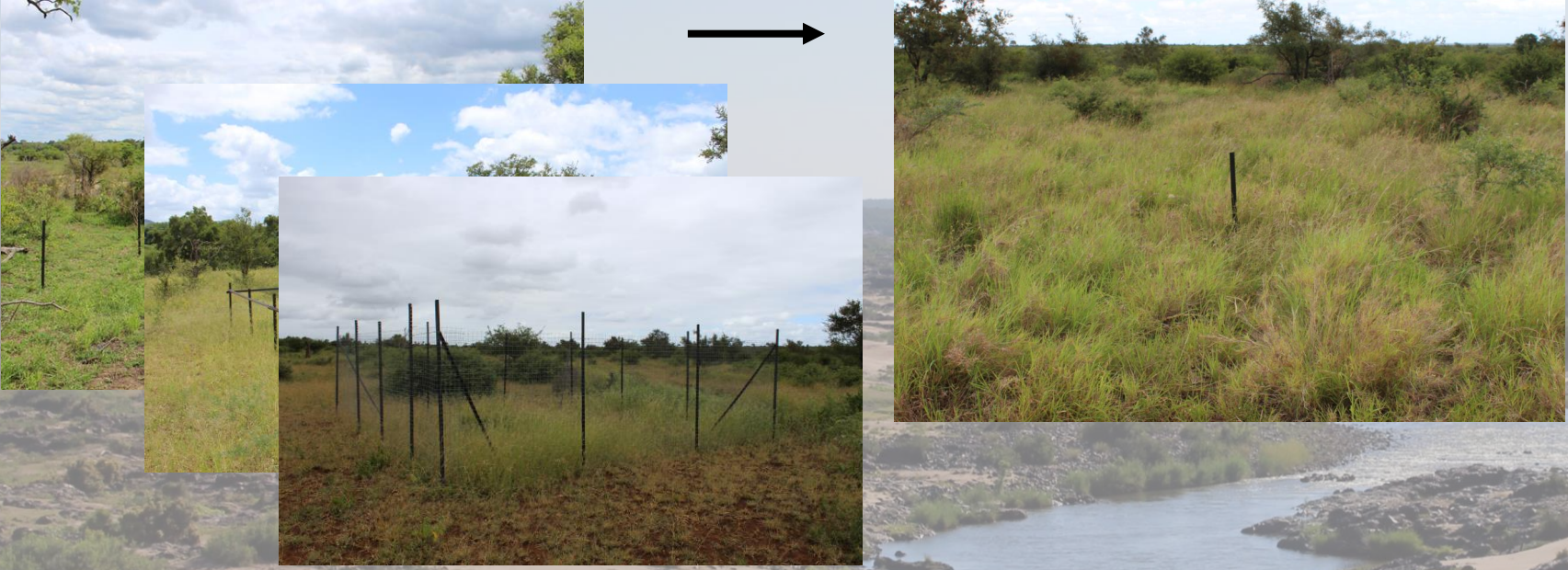
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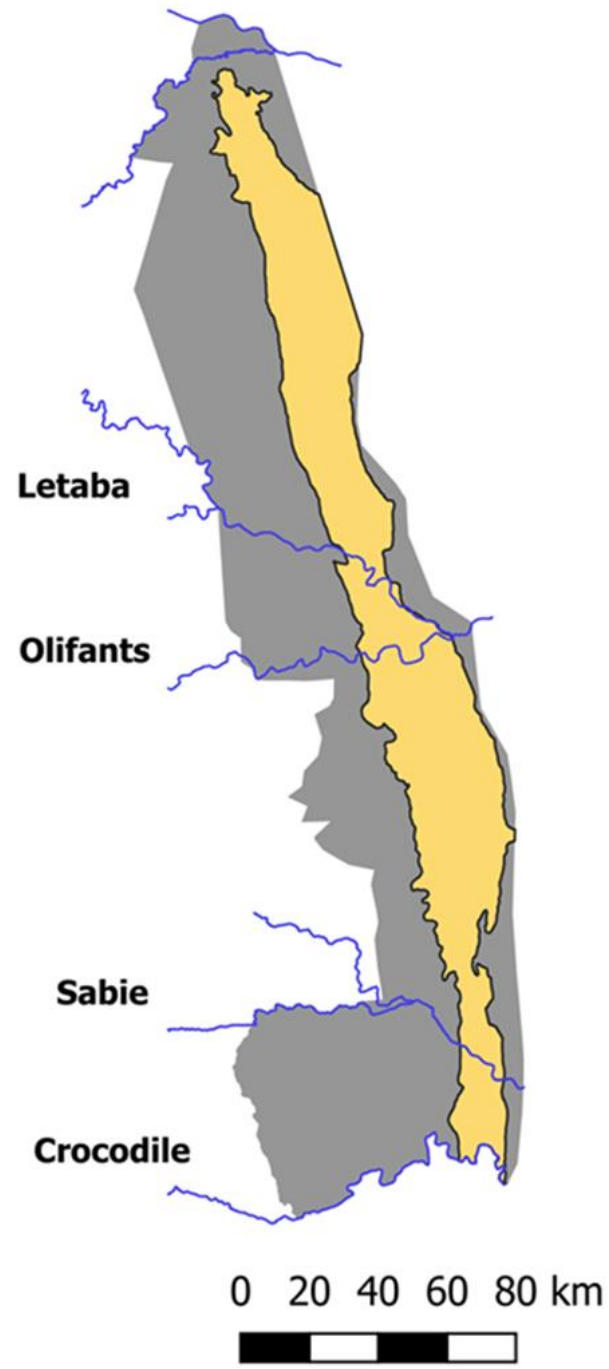
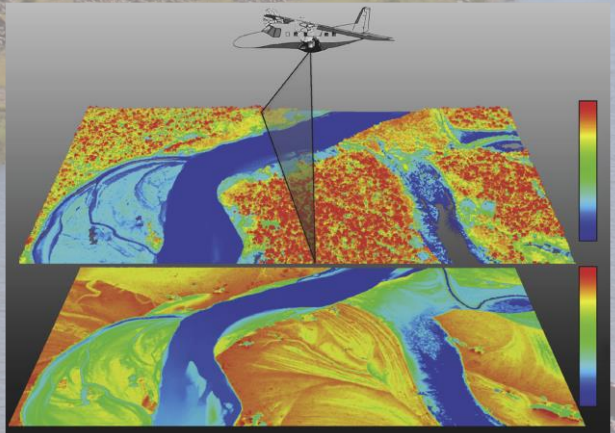
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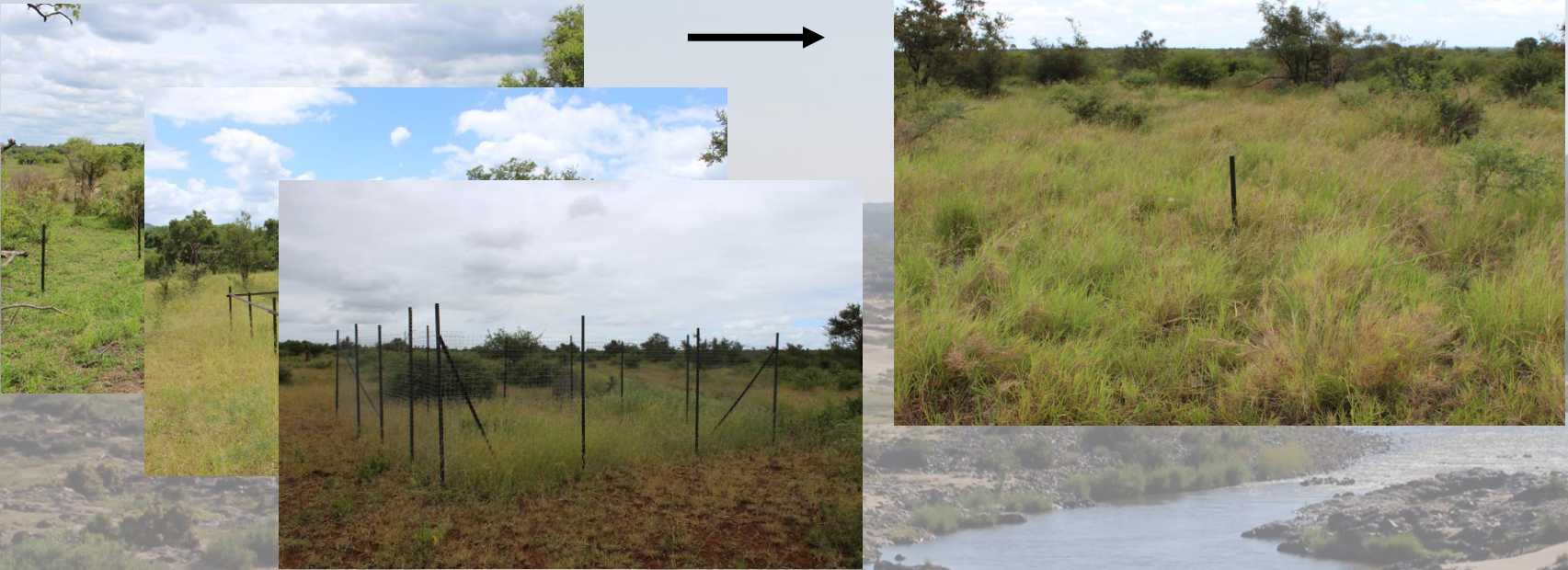
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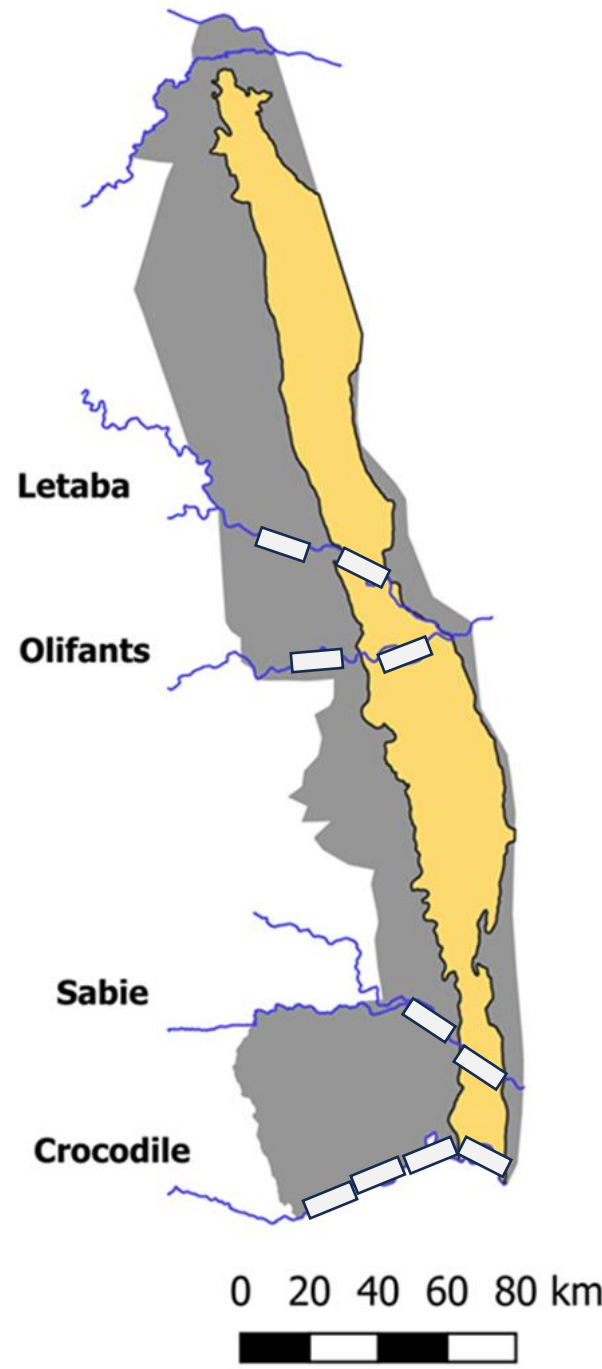
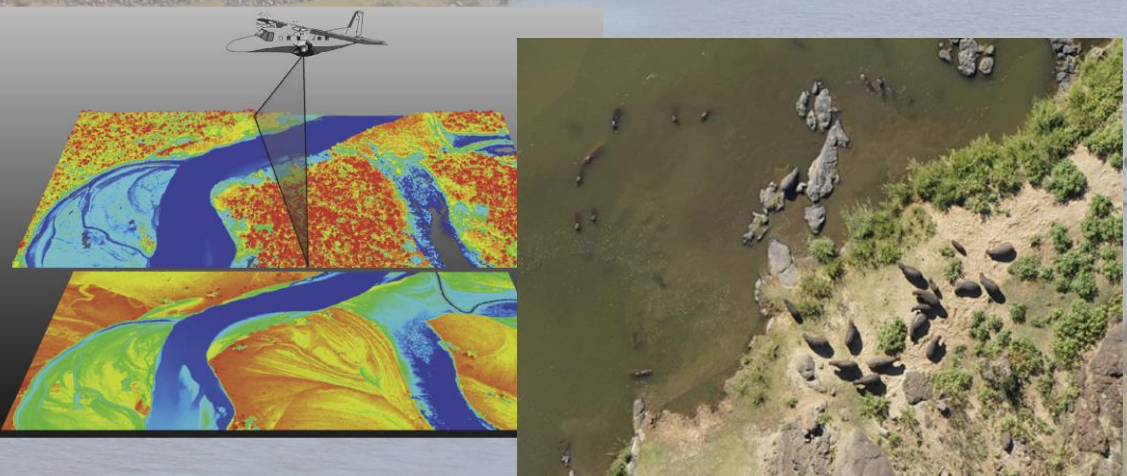
2 Landscape surveys of hippos and grasslands



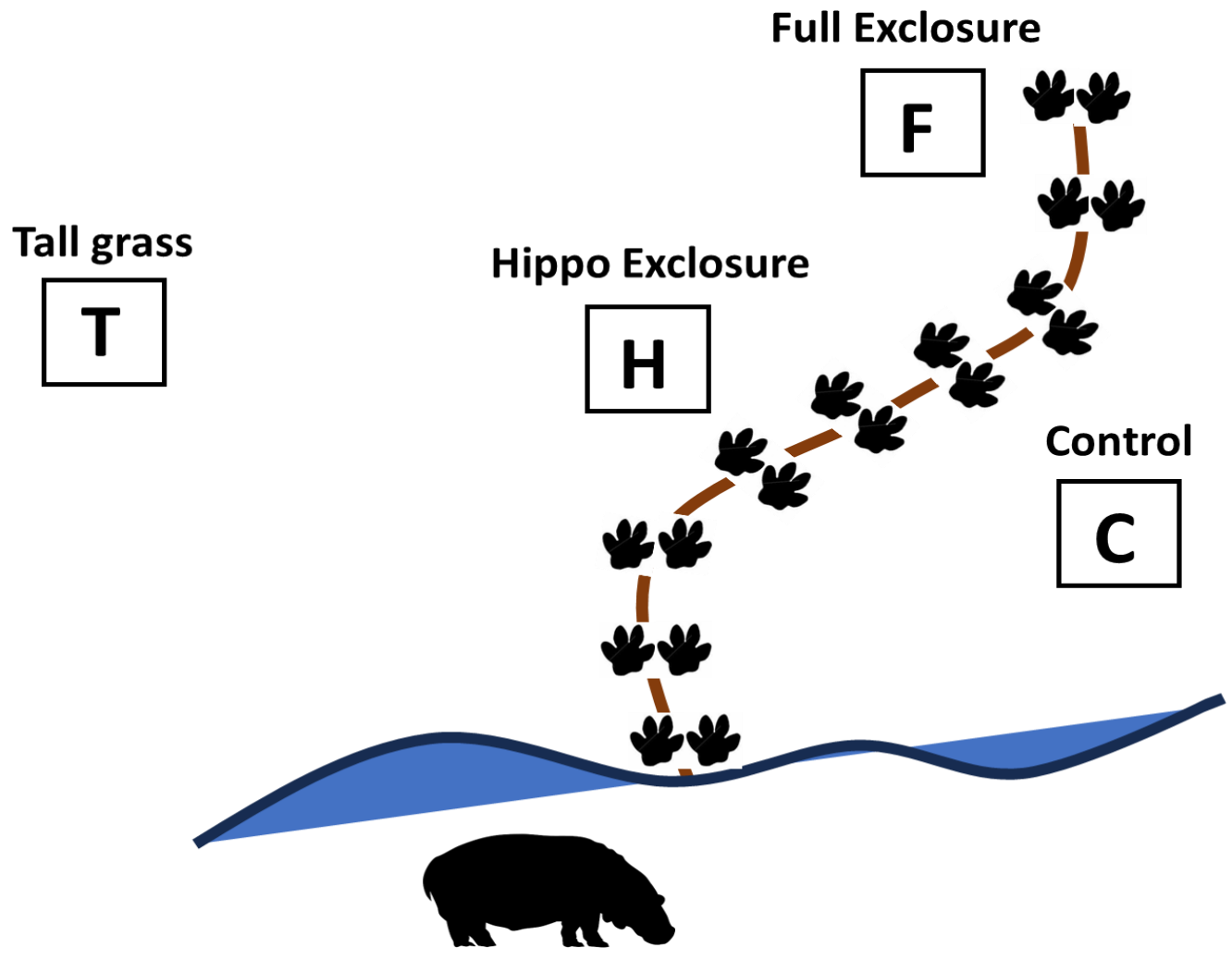
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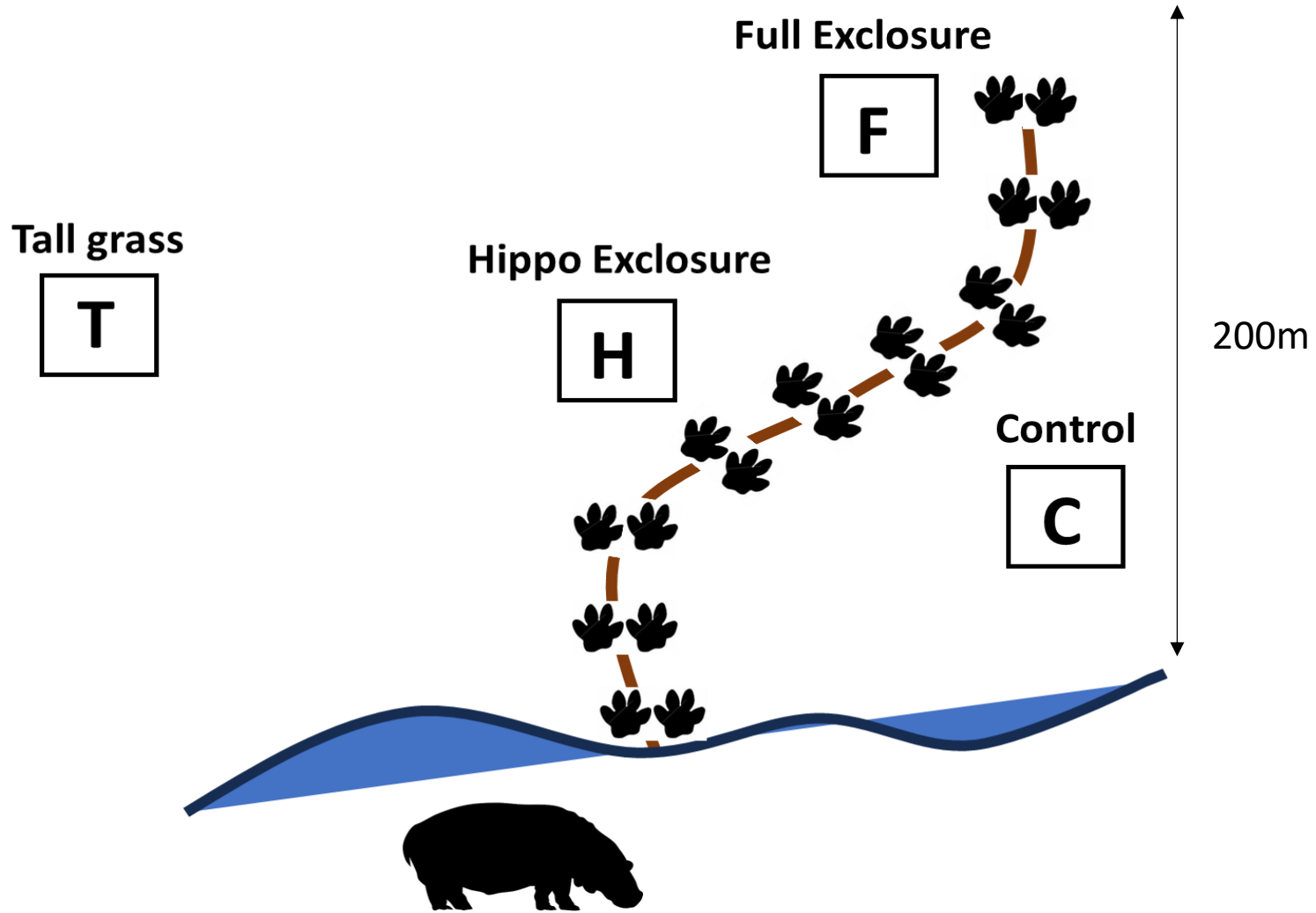
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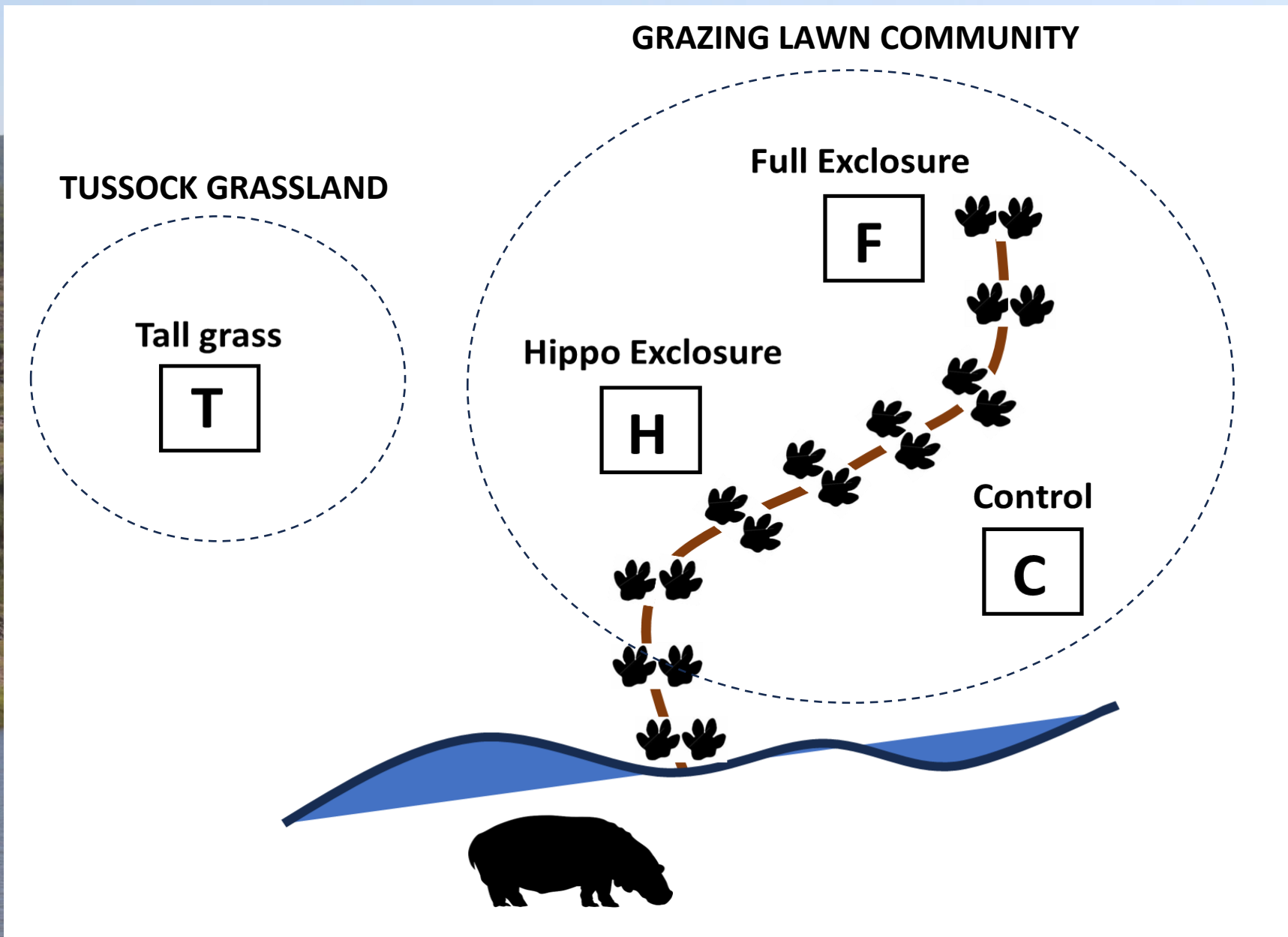
1 Hippo enclosure experimental design:



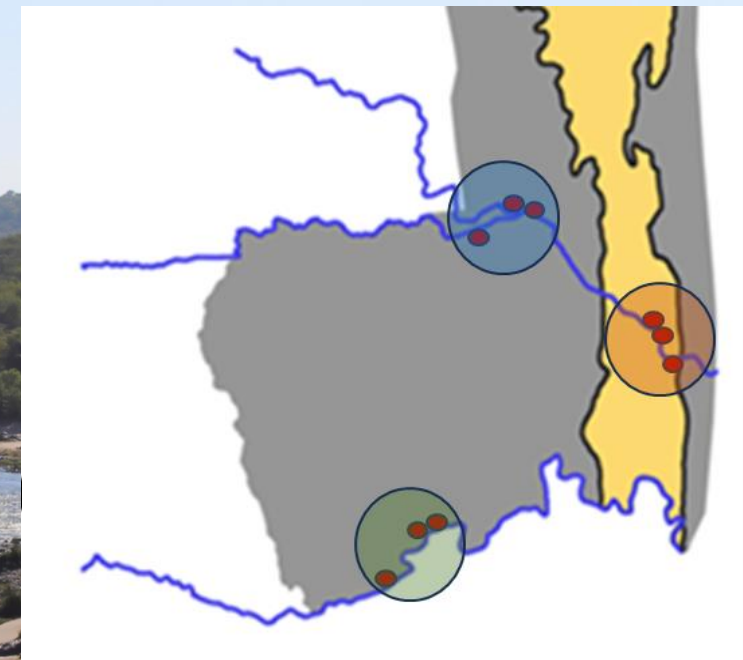
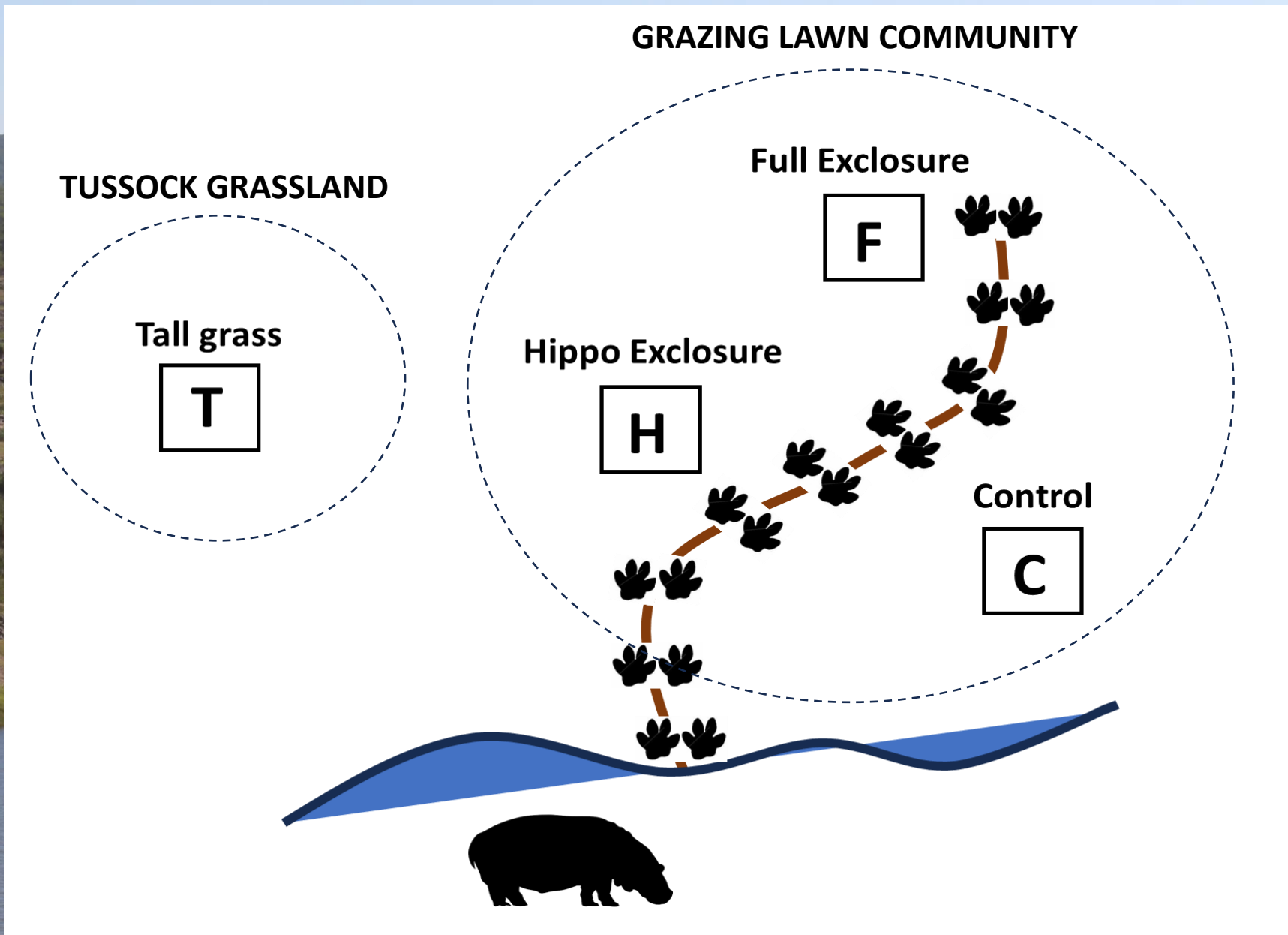
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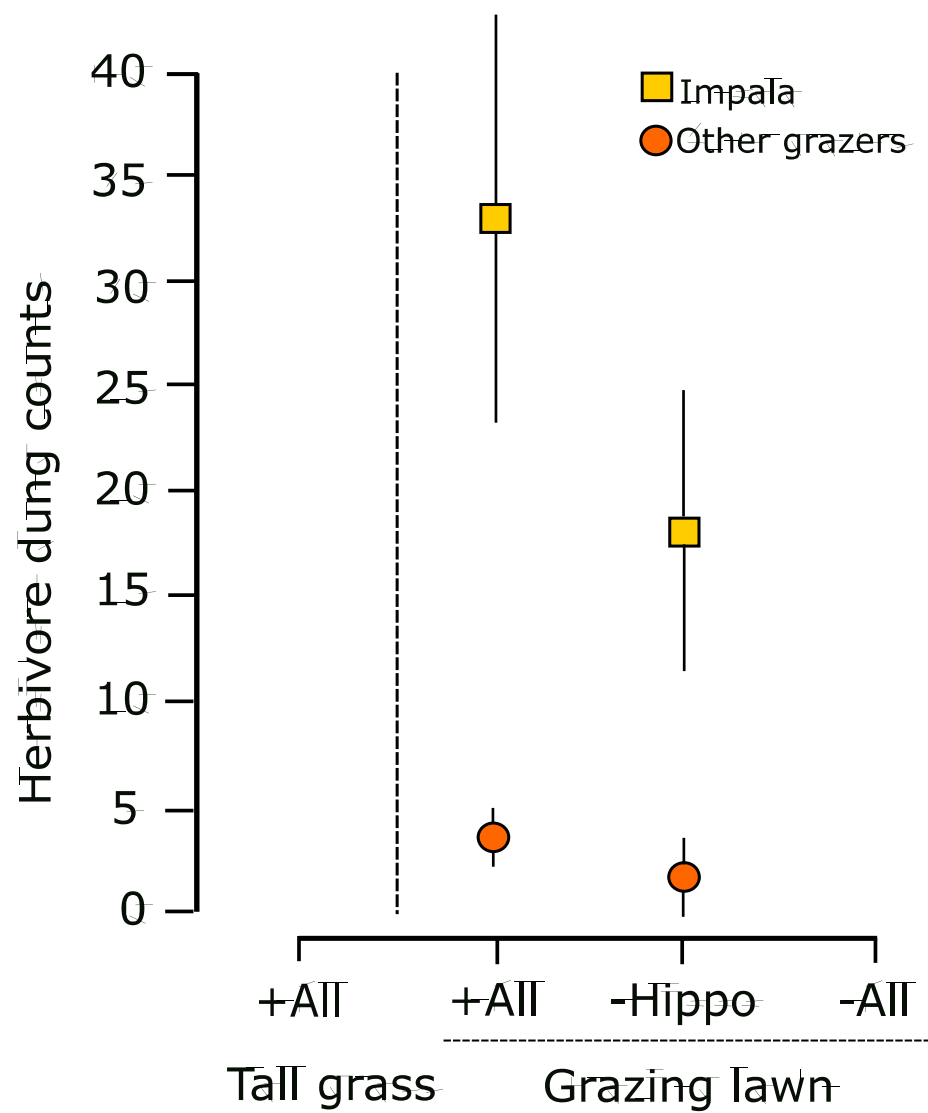


Exclosure effectiveness for hippo?





Grazer utilization of exclosure treatments



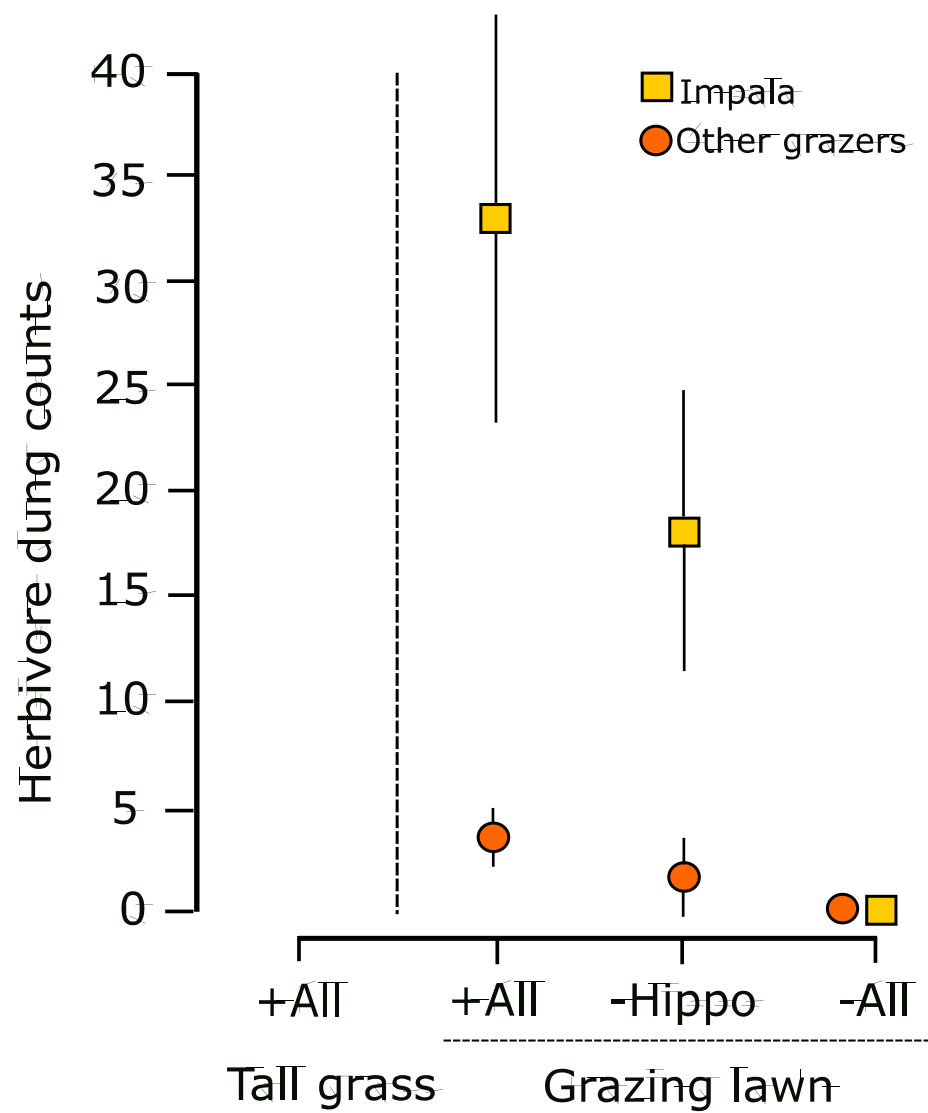
Full exclosure treatment on a hippo lawn



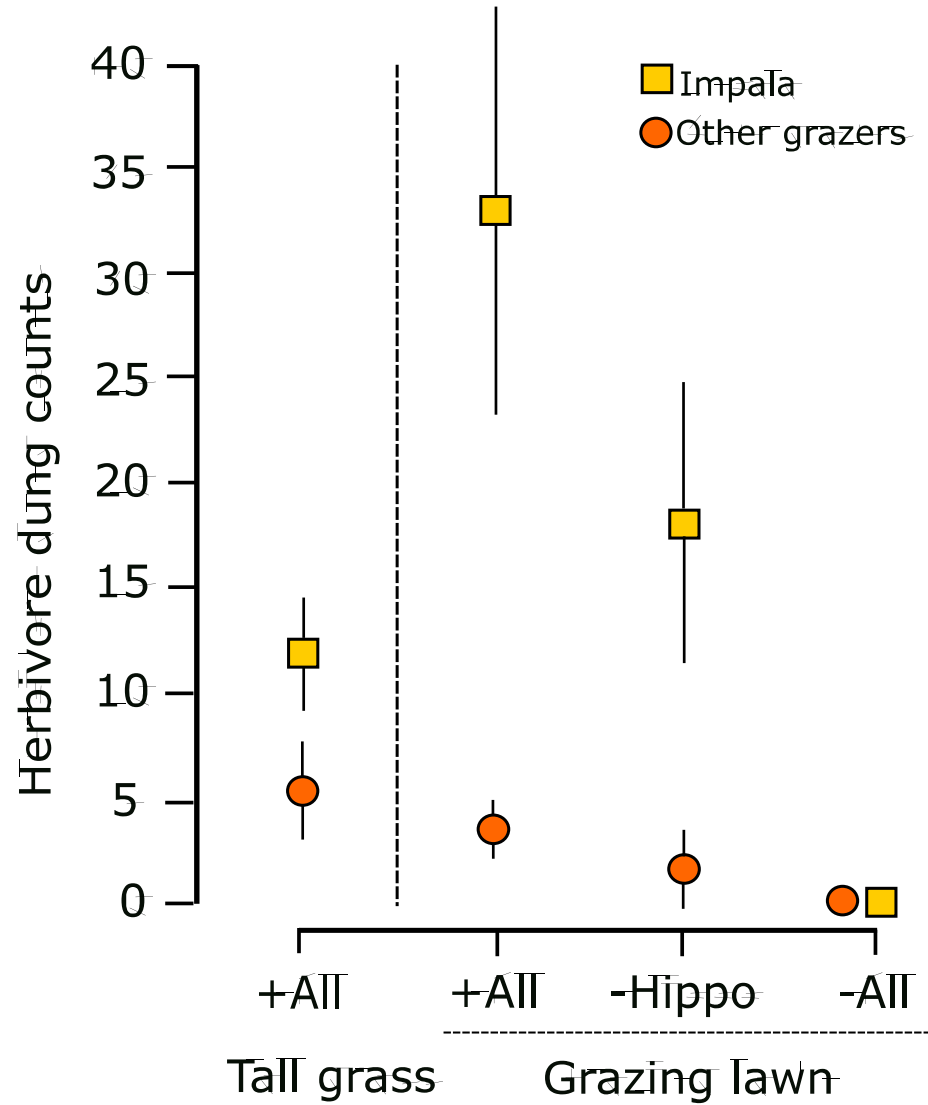
Full exclosure treatment on a hippo lawn



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Why do hippo grazing lawns matter?

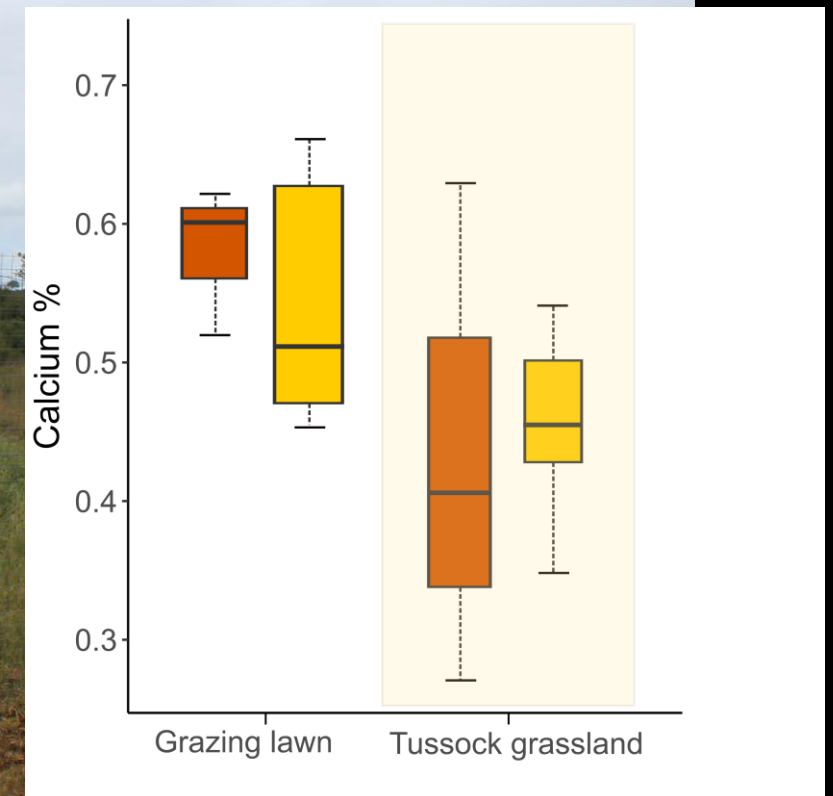
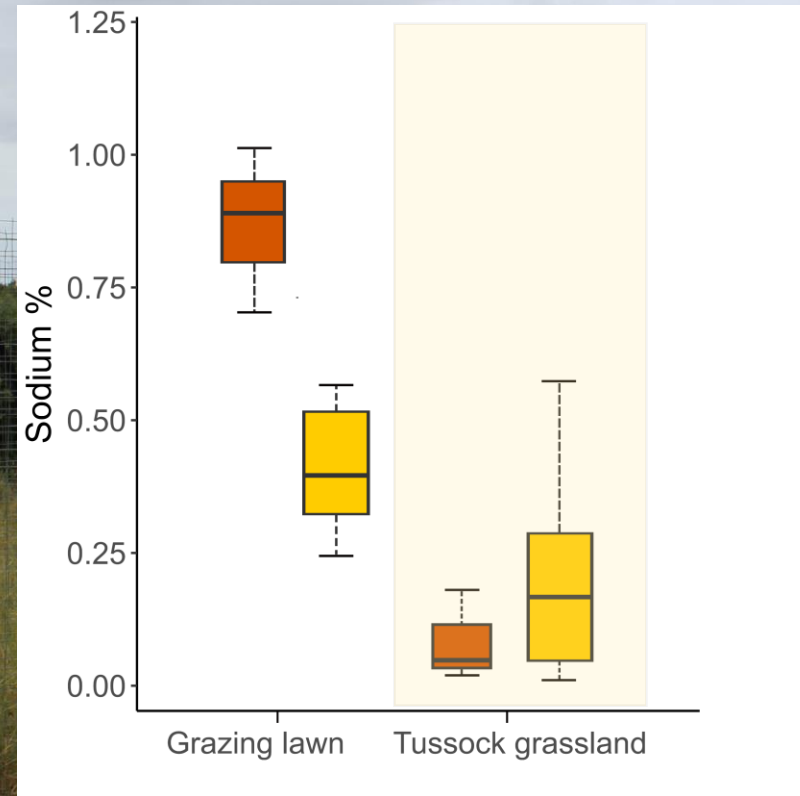
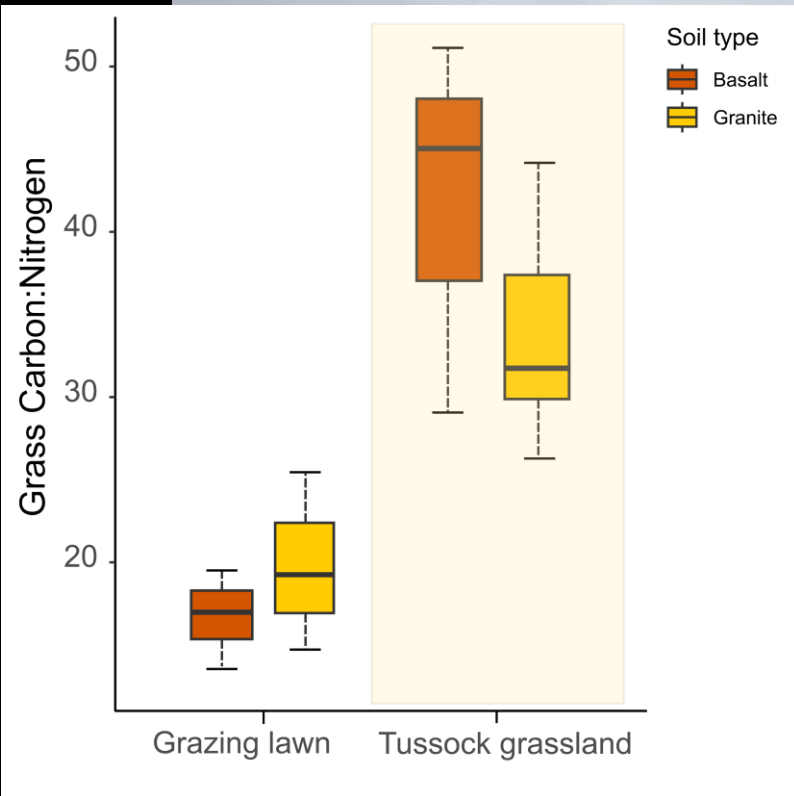
Hippo lawn



Tussock grassland

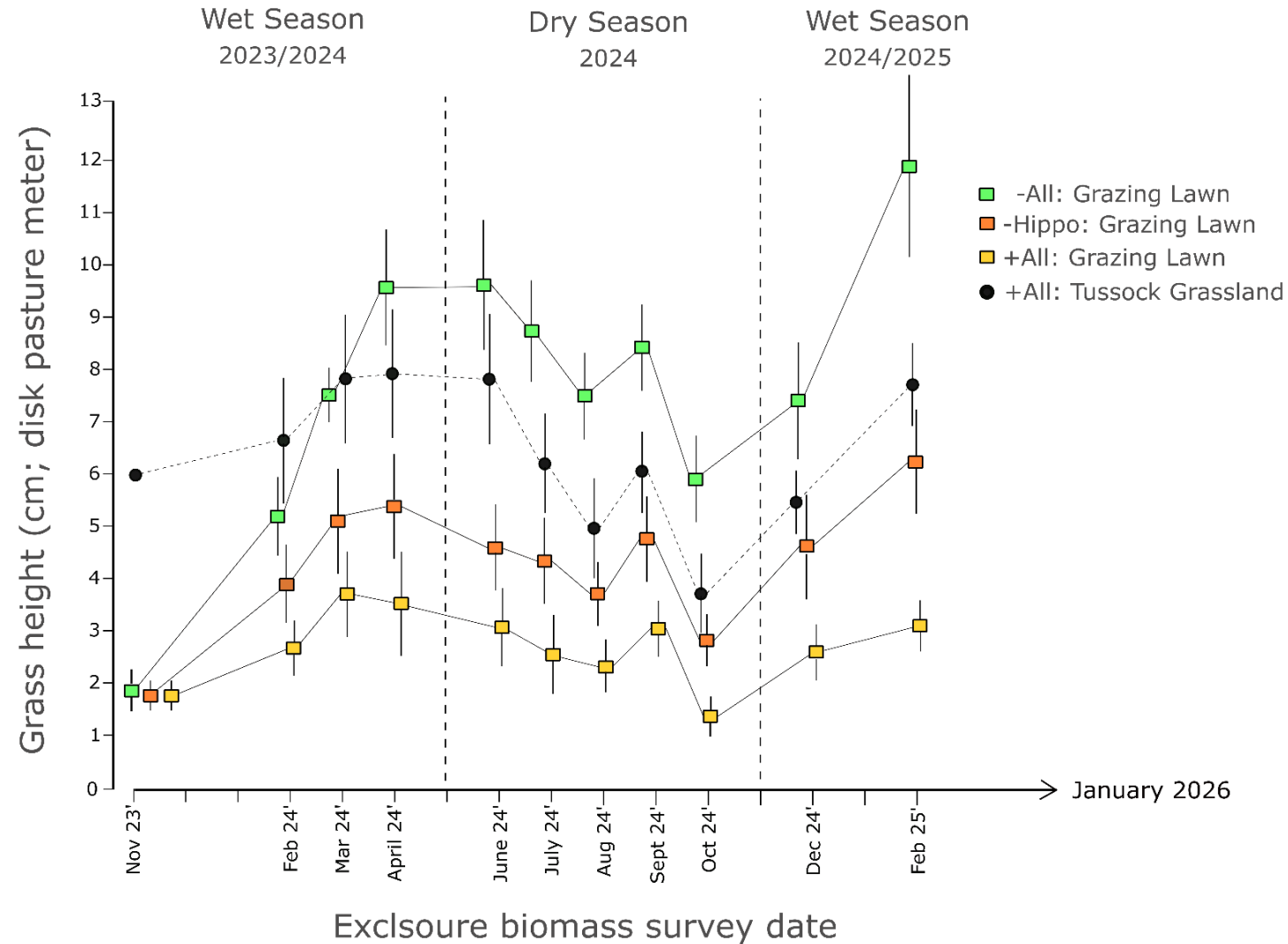


Foliar nutrient content of hippo grazing lawns and tussock grasslands



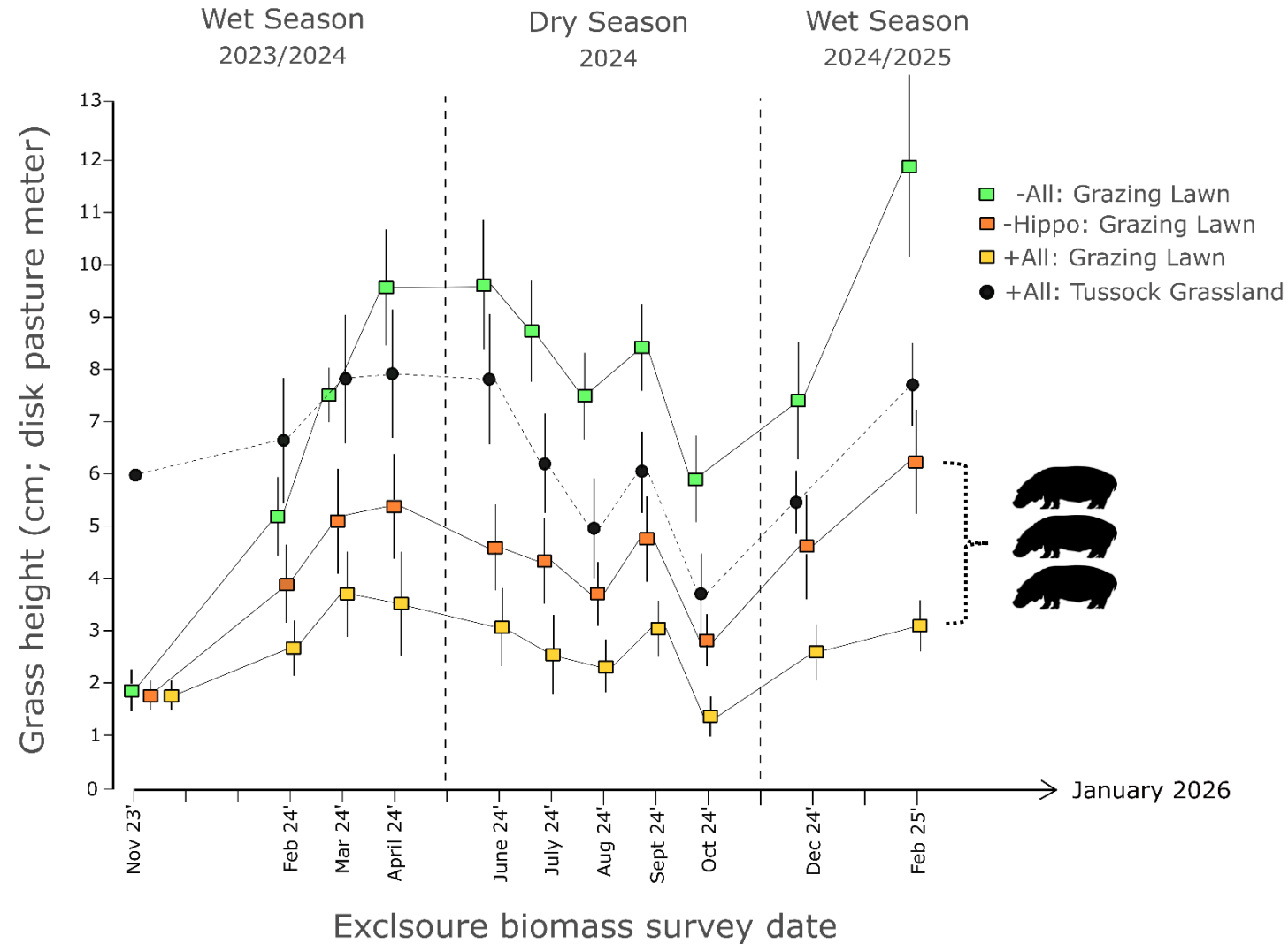
Grass biomass inside exclosures

All three landscapes:



Grass biomass inside exclosures

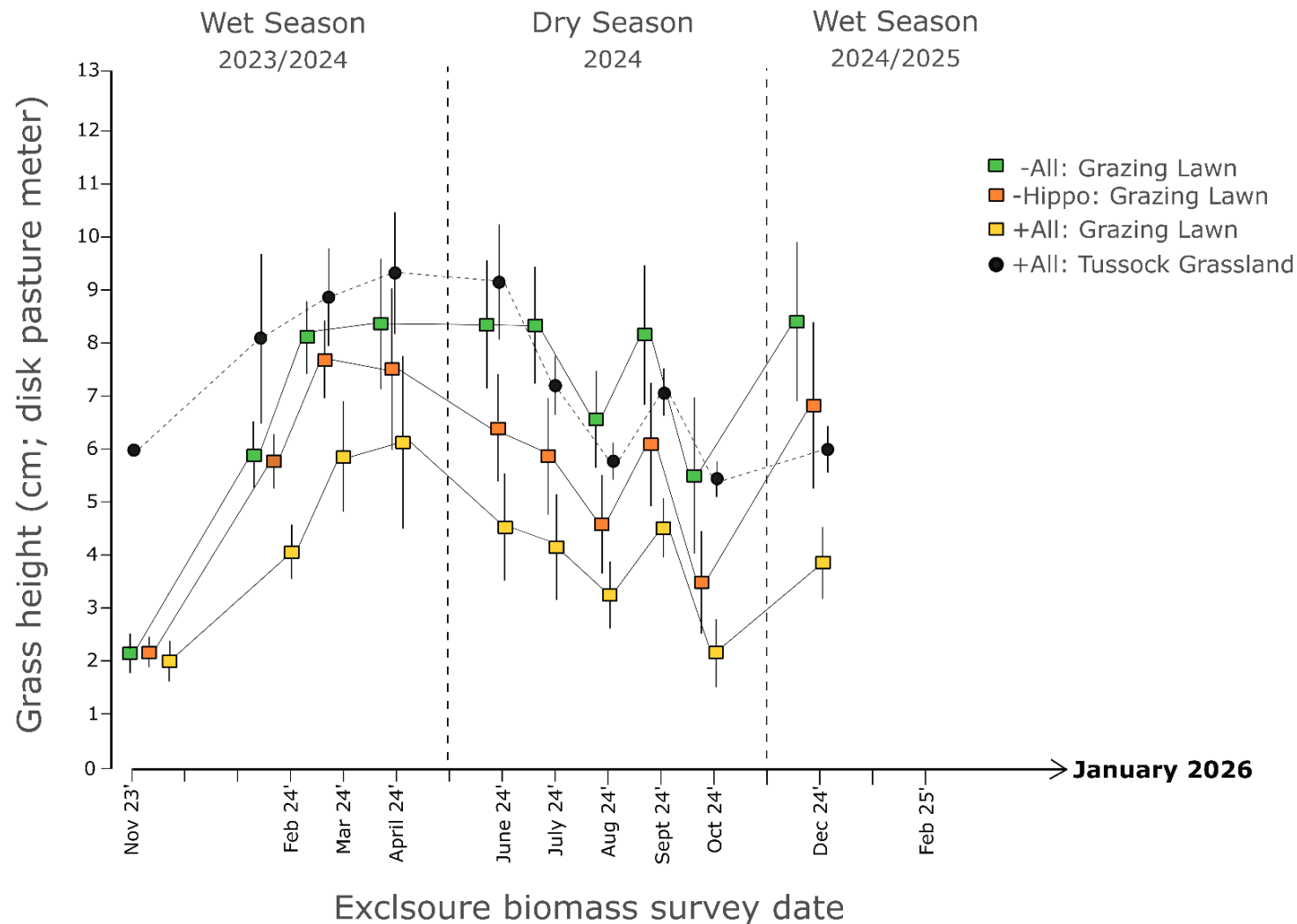
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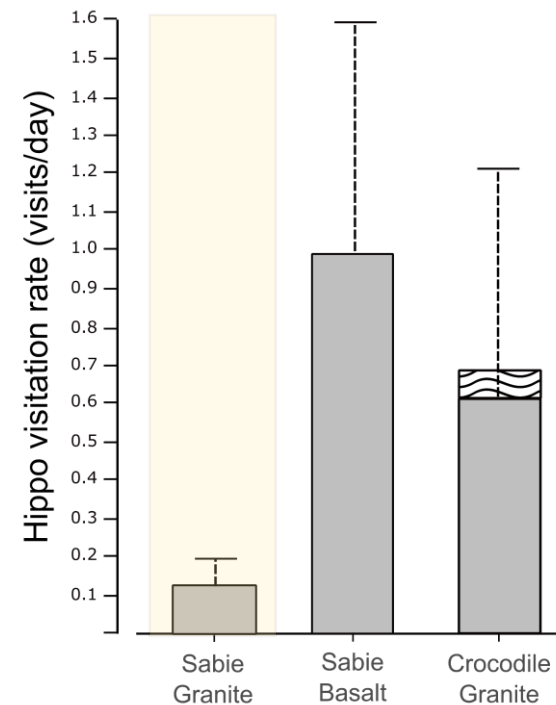
Grass biomass inside exclosures

Sabie granite landscape:

MAP = 550mm
82% Sand 14% Clay



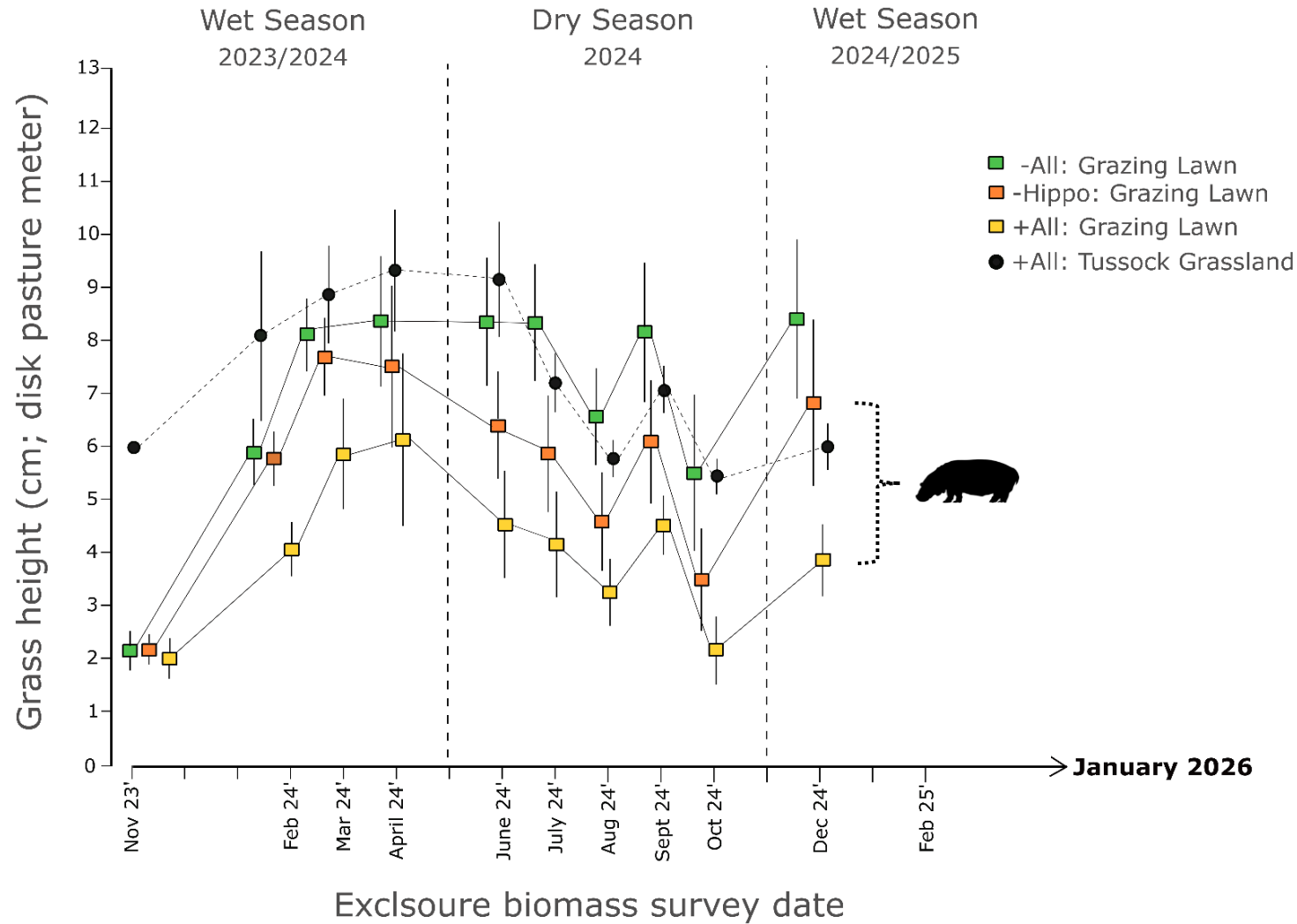
Hippo visitation rate



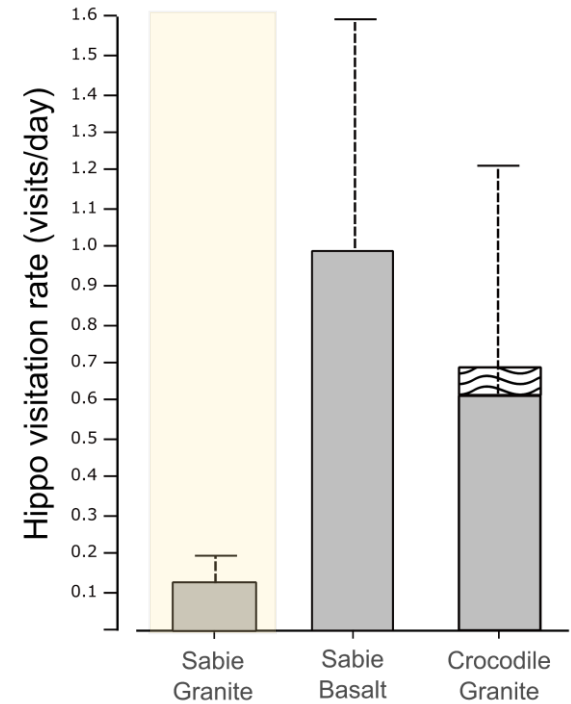
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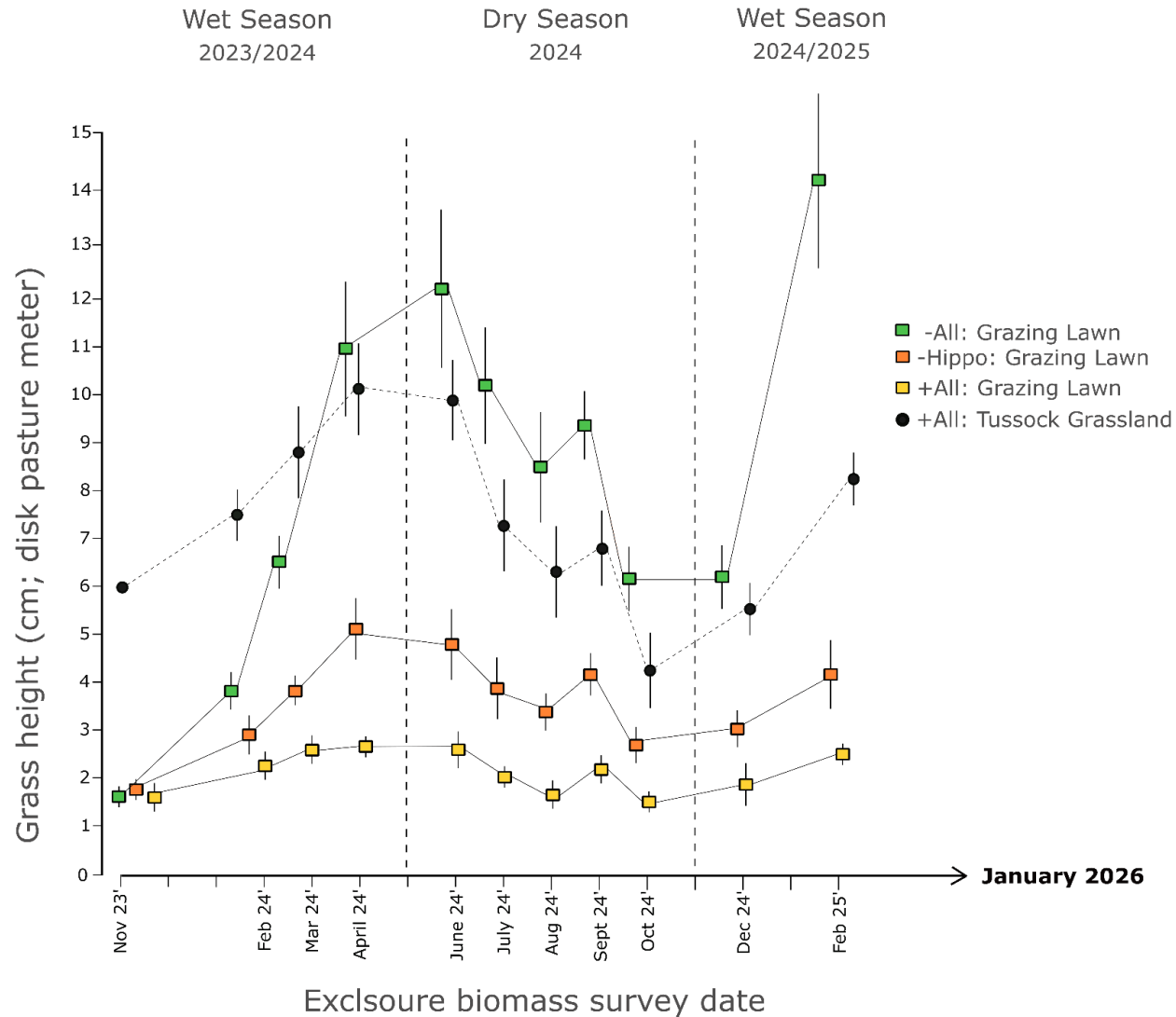
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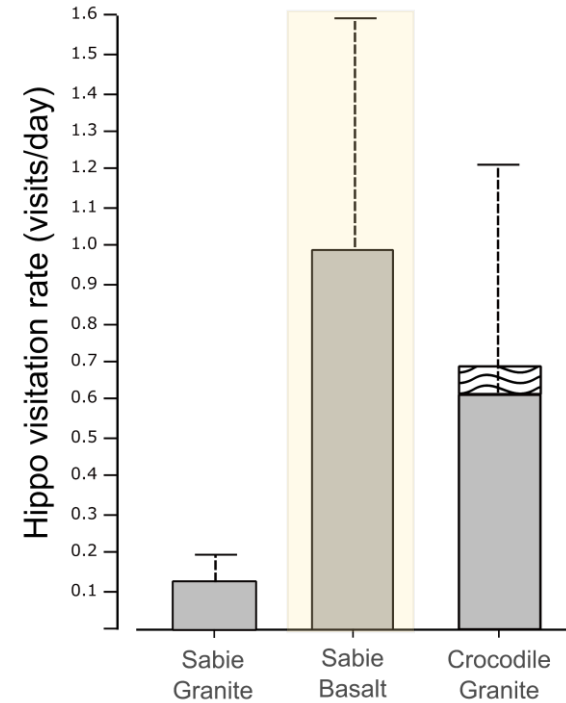
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Sabie basalt landscape:

MAP = 603mm
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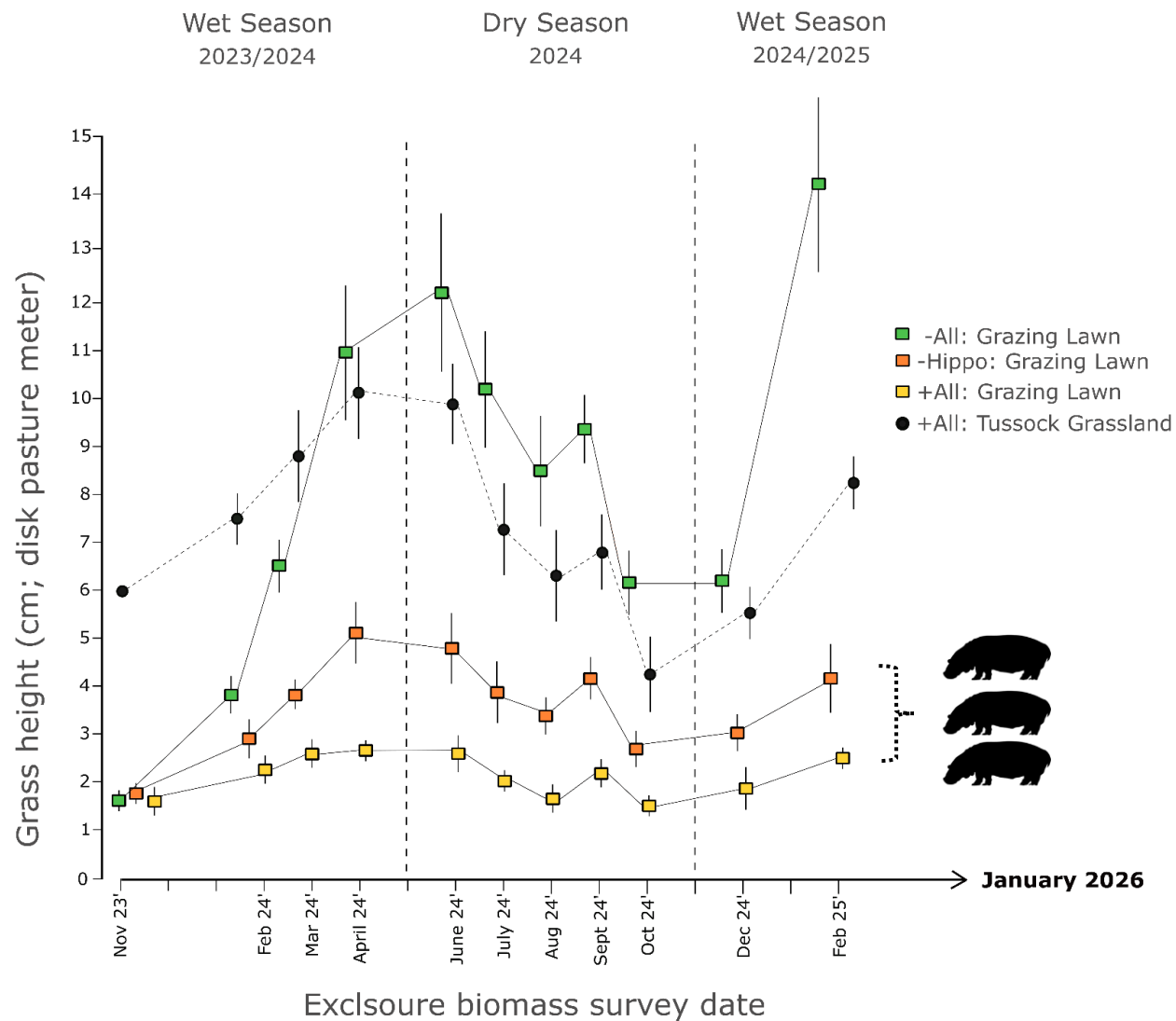
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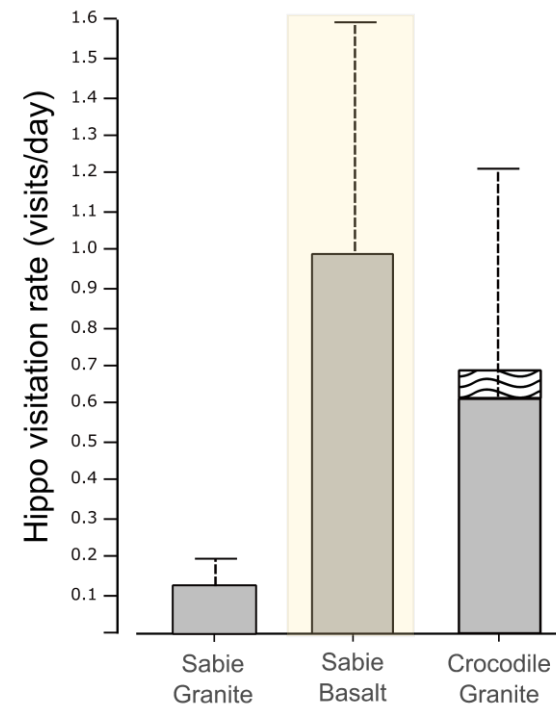
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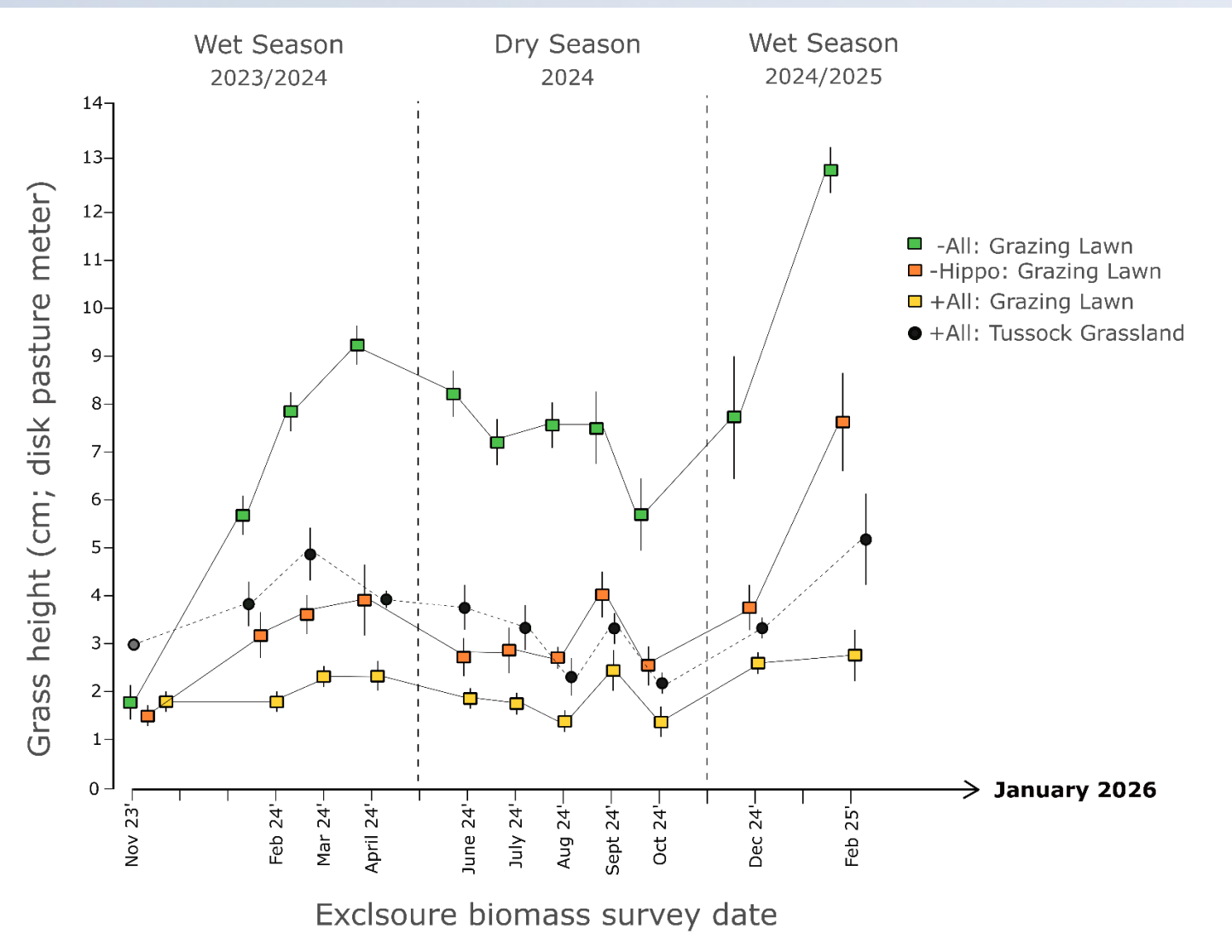
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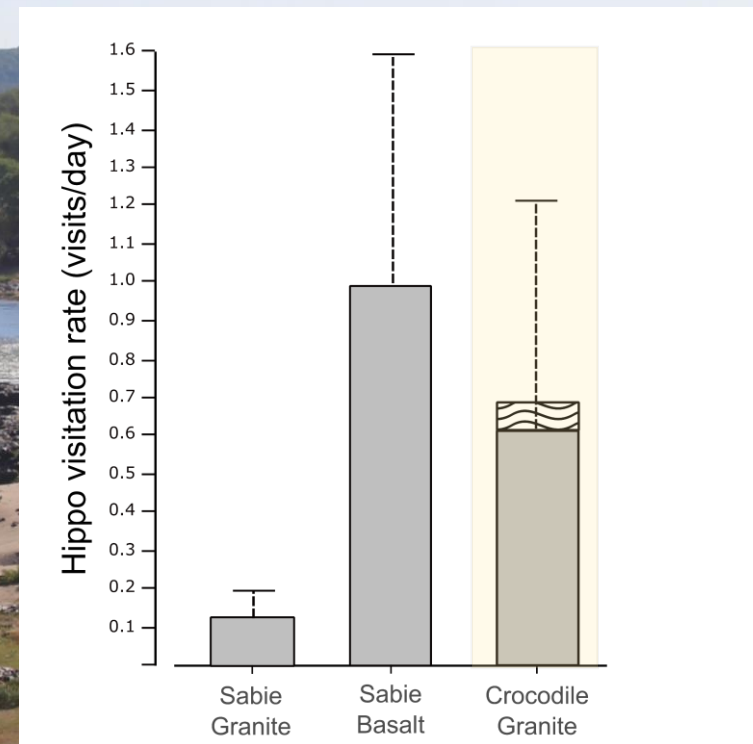
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Crocodile granite landscape:

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81% Sand 13% Clay



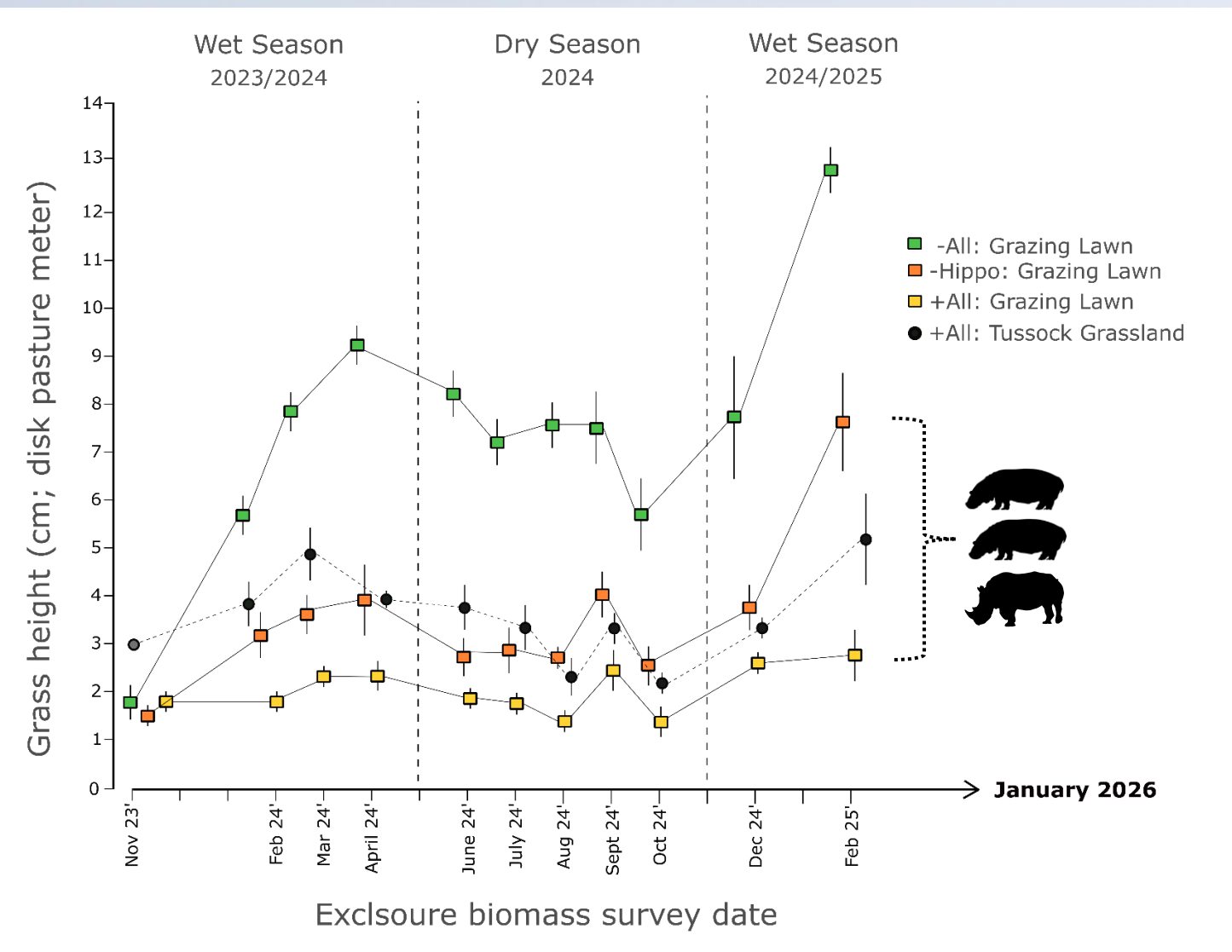
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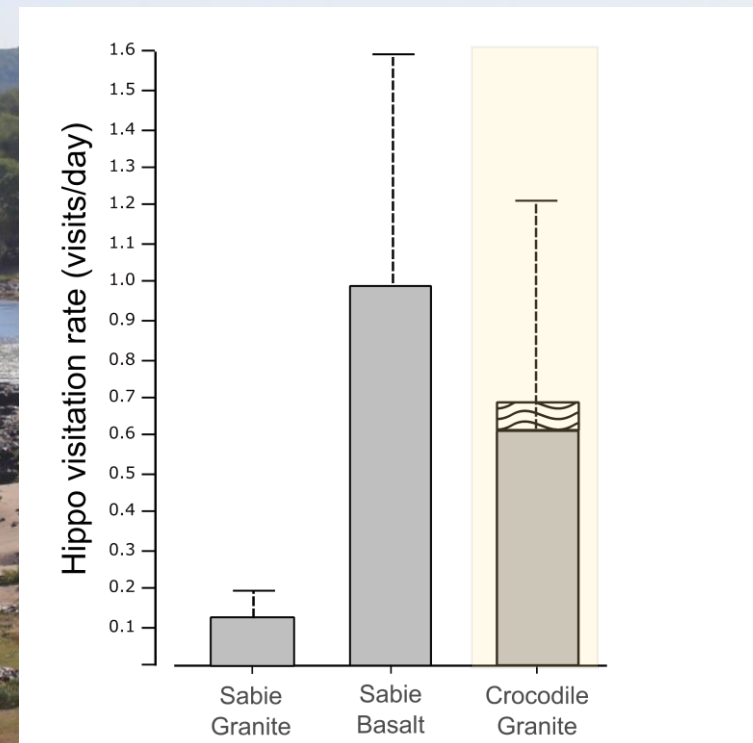
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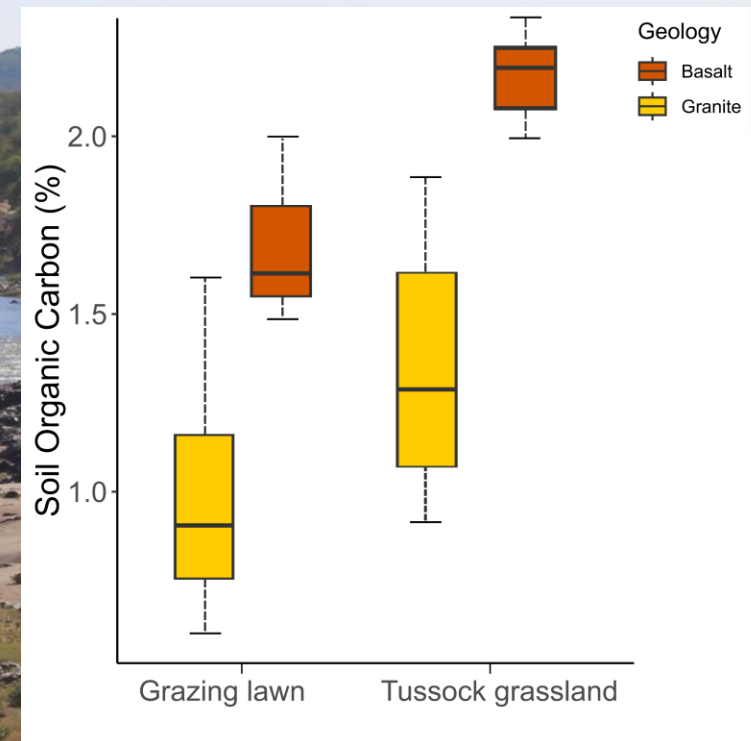
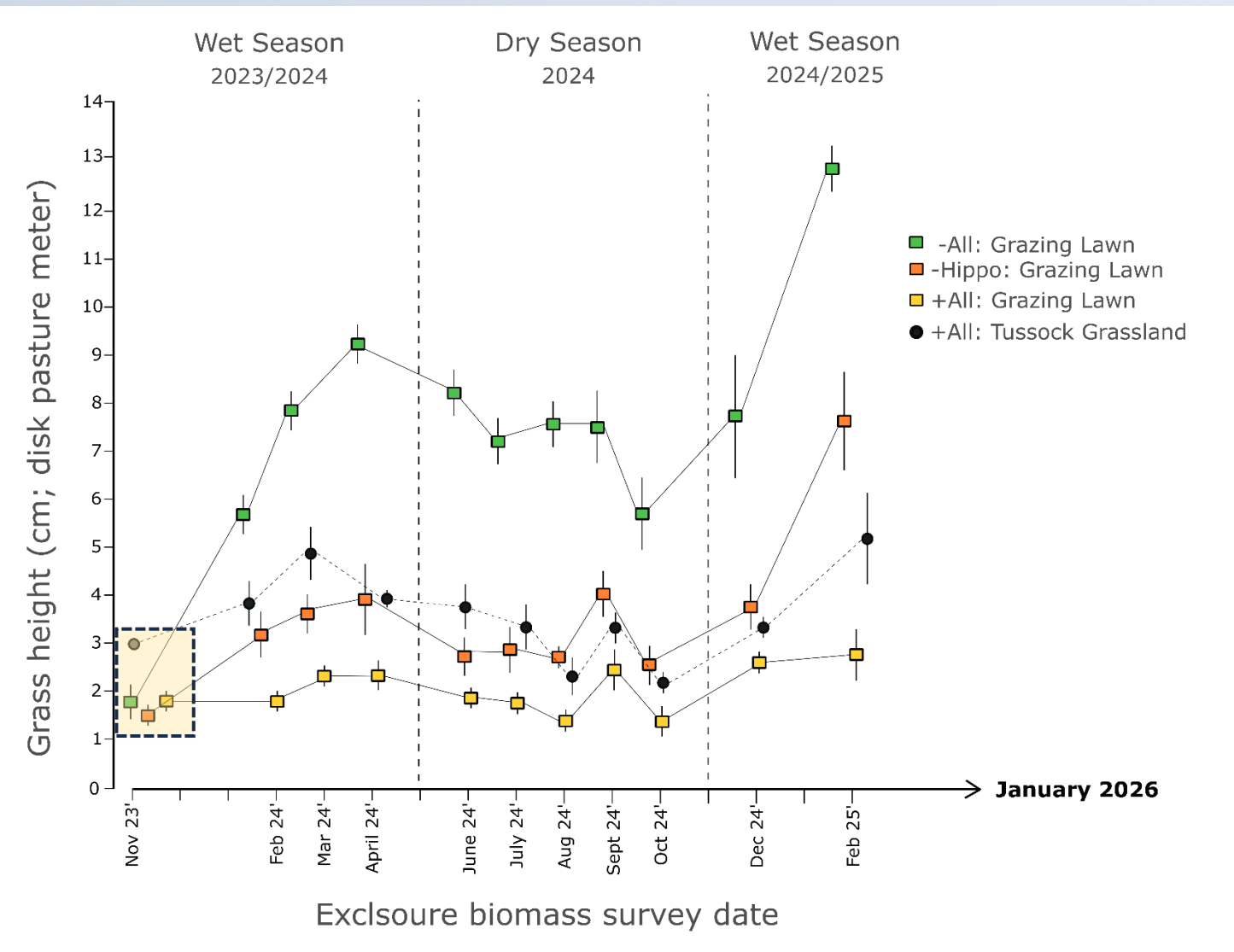
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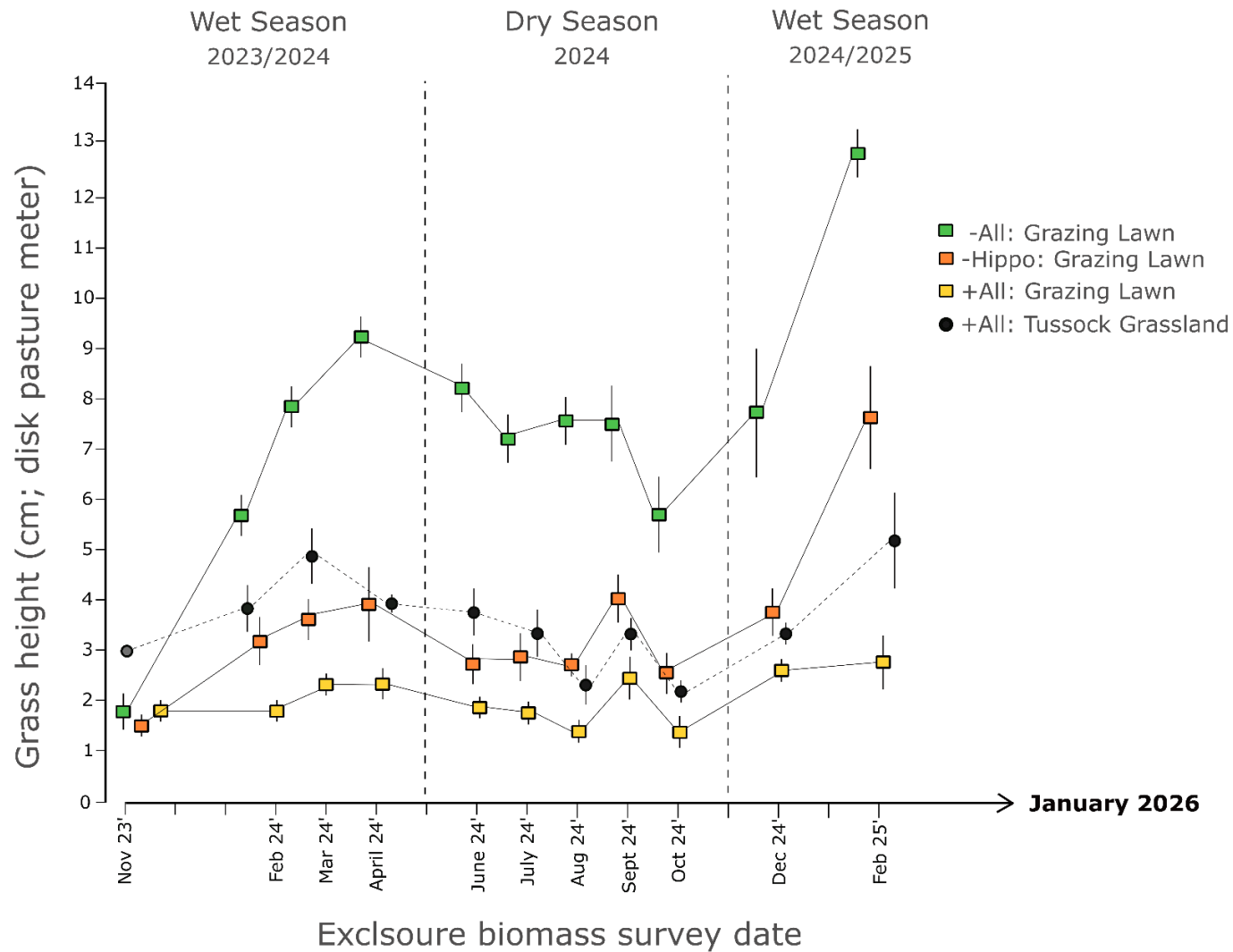
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Aquatic food chains



Landscape mapping of hippos and grasslands

Ten priority riparian landscapes

- Dry and wet seasons
- Varying hippo densities
- Crocodile, Sabie, Letaba and Olifants

Drone-based hippo counts

- Pod size and composition
- Habitat selection

1800 individual hippos successfully counted and mapped over 112 km of river

Hippo densities ranging from 6.2 to 42.89 animals/km

Mean pod size ranging from 2 to 176 individuals



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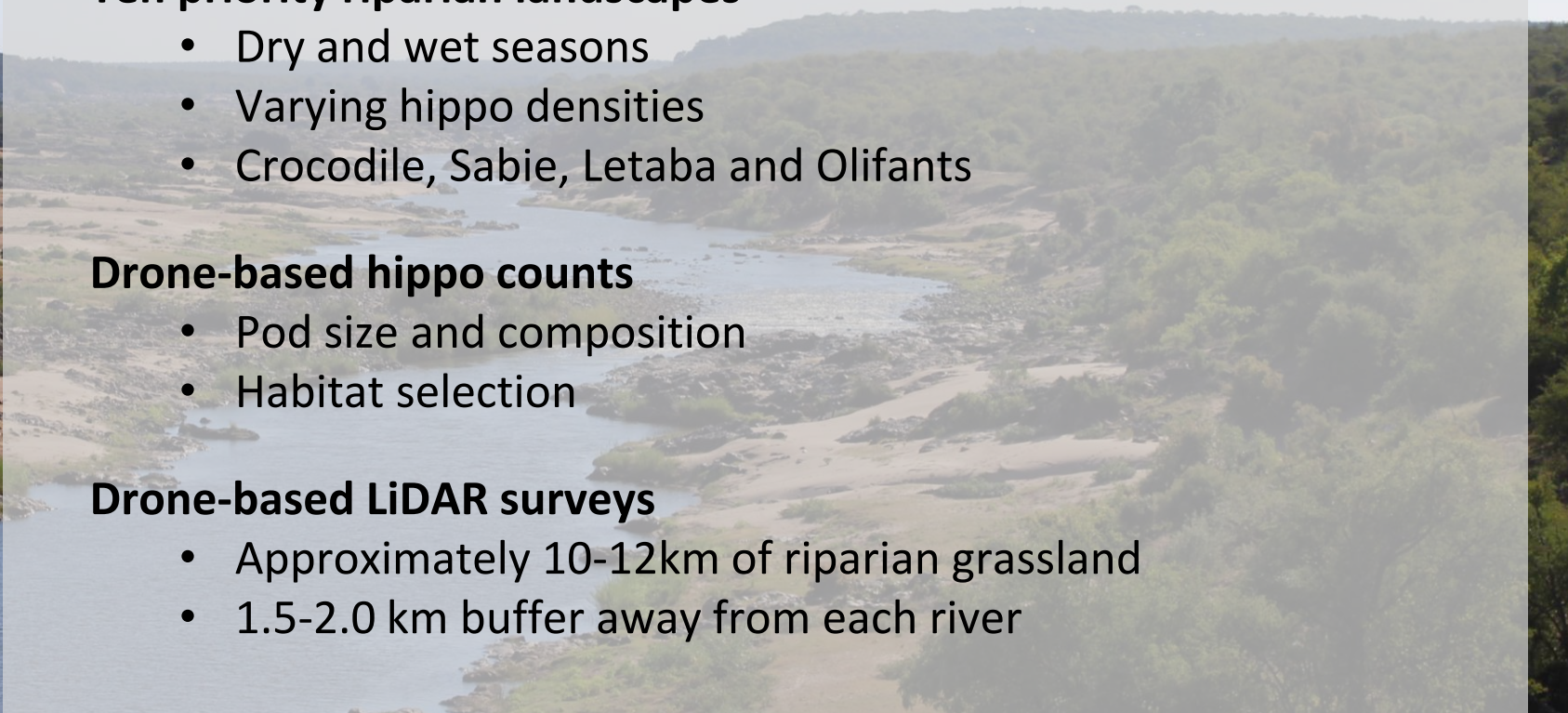
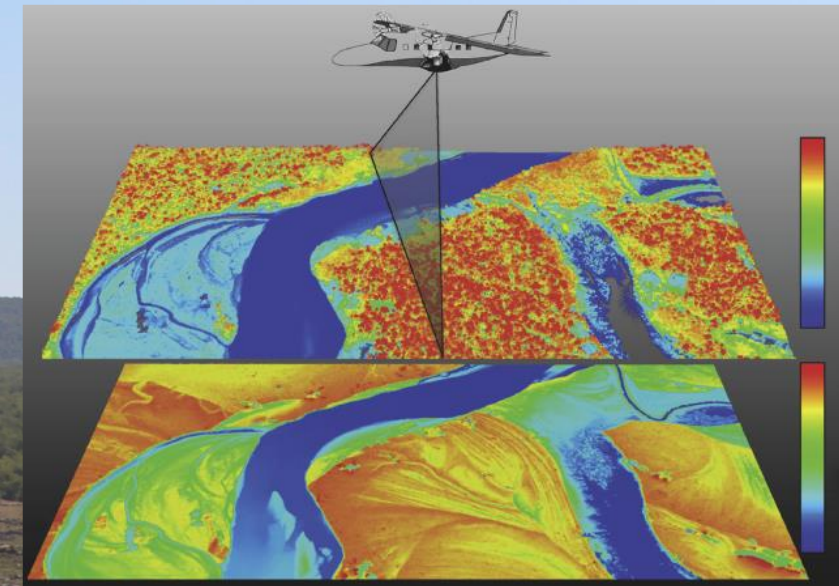
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- Approximately 10-12km of riparian grassland
- 1.5-2.0 km buffer away from each river



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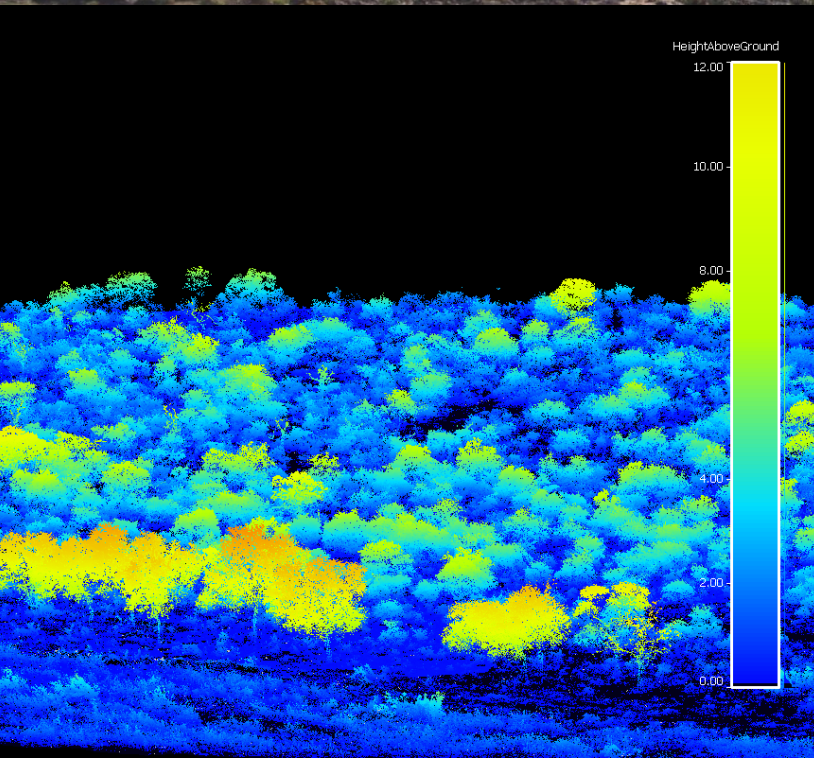
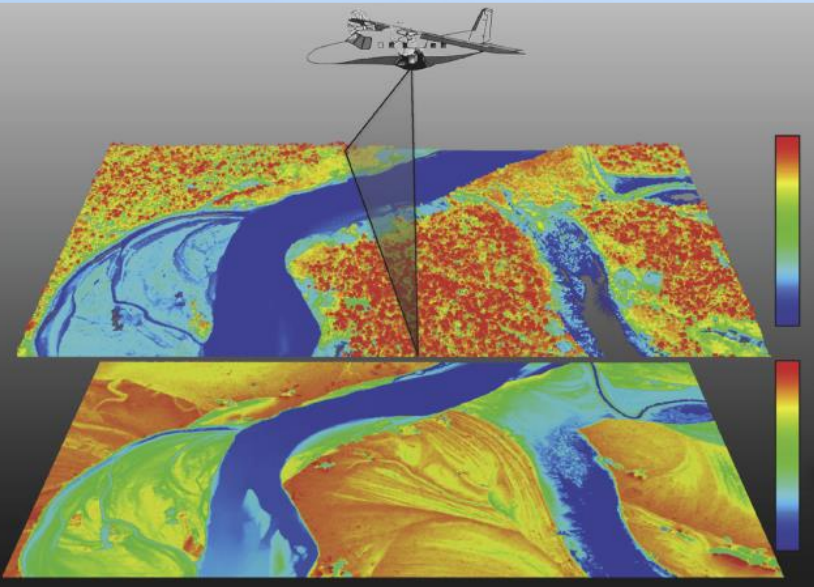
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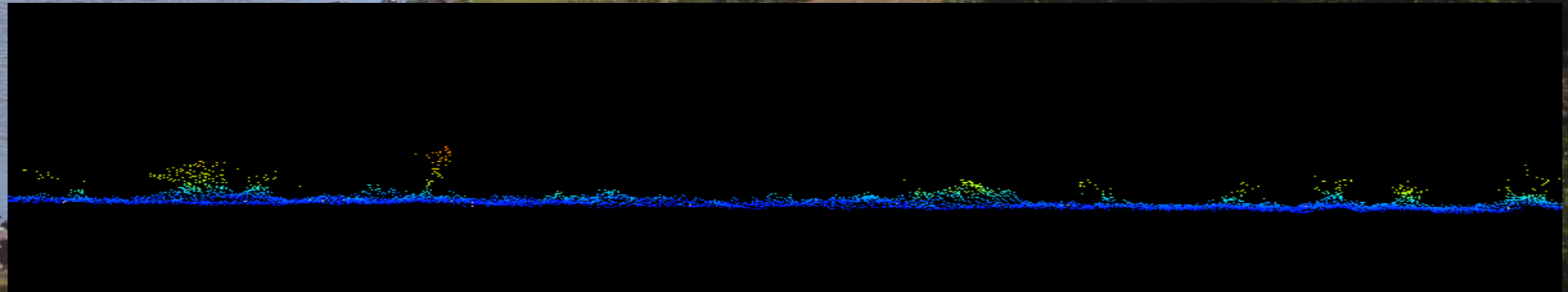
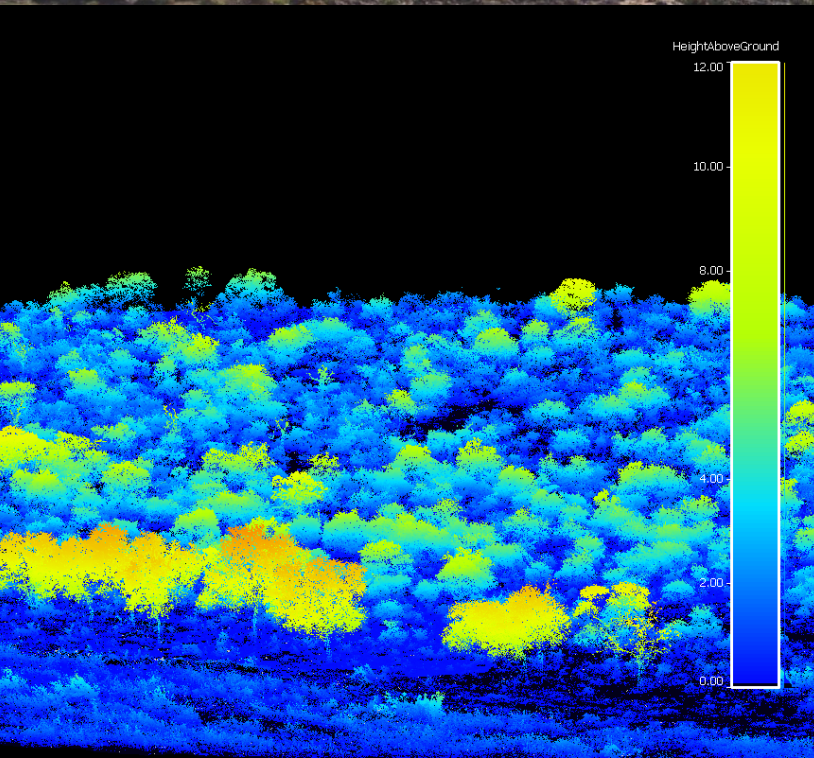
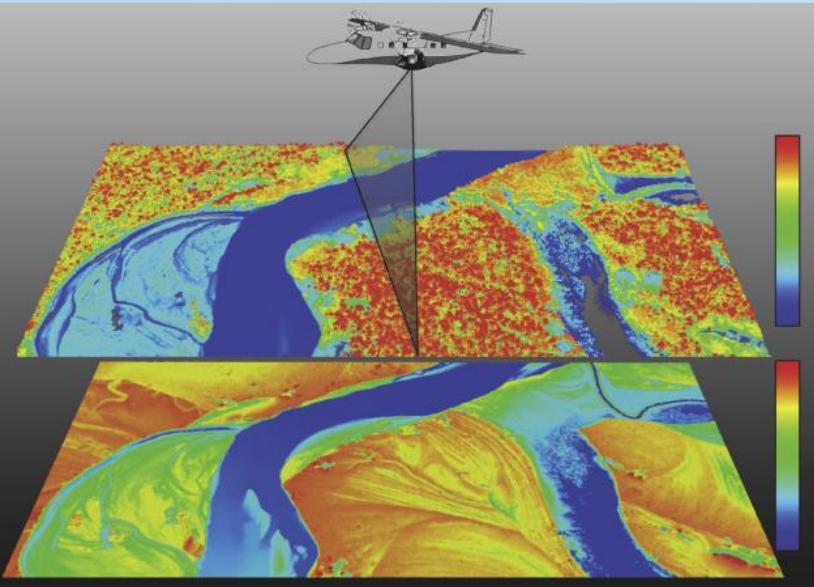
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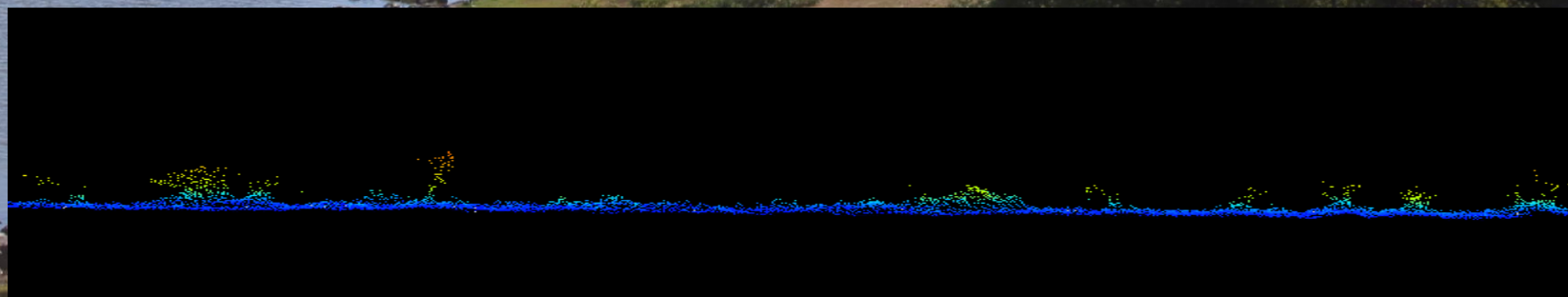
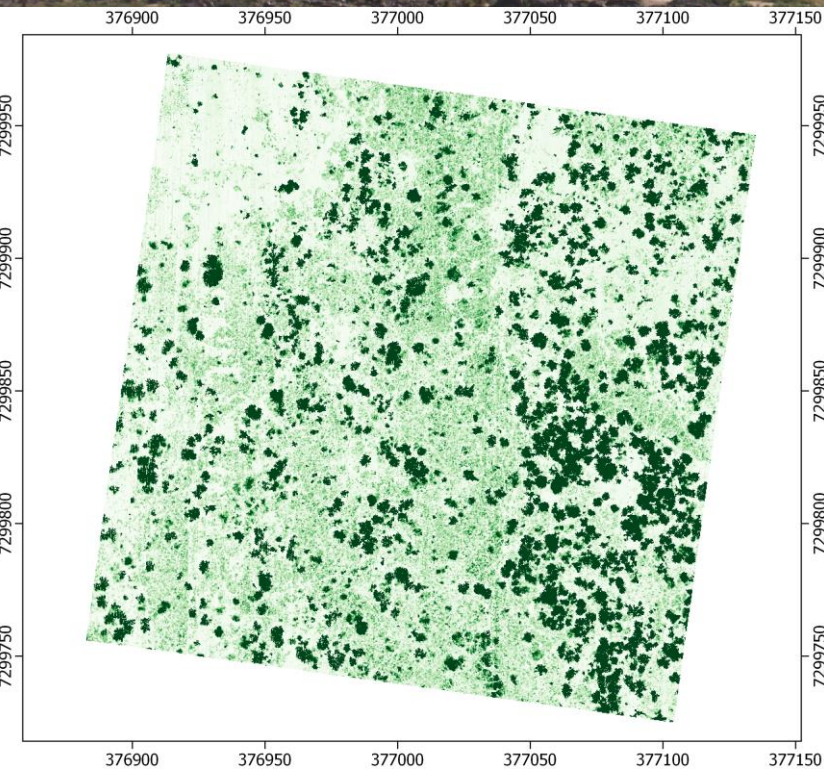
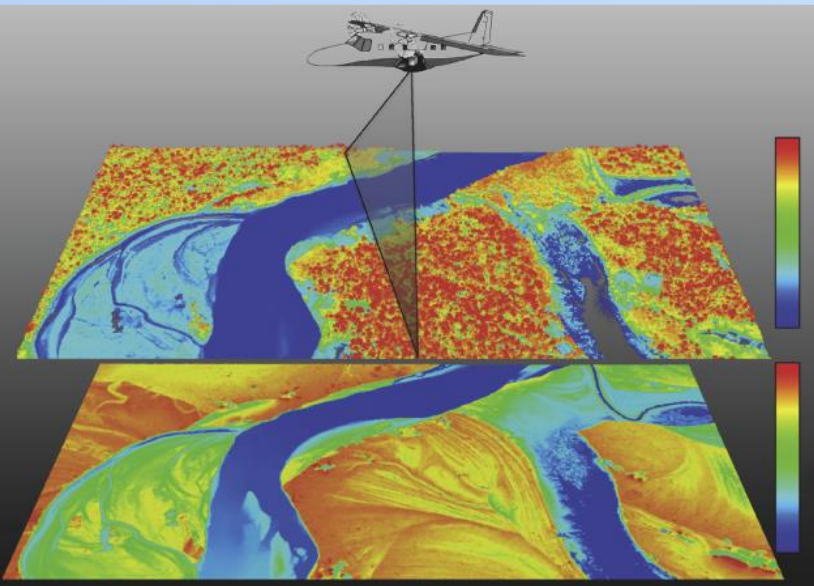
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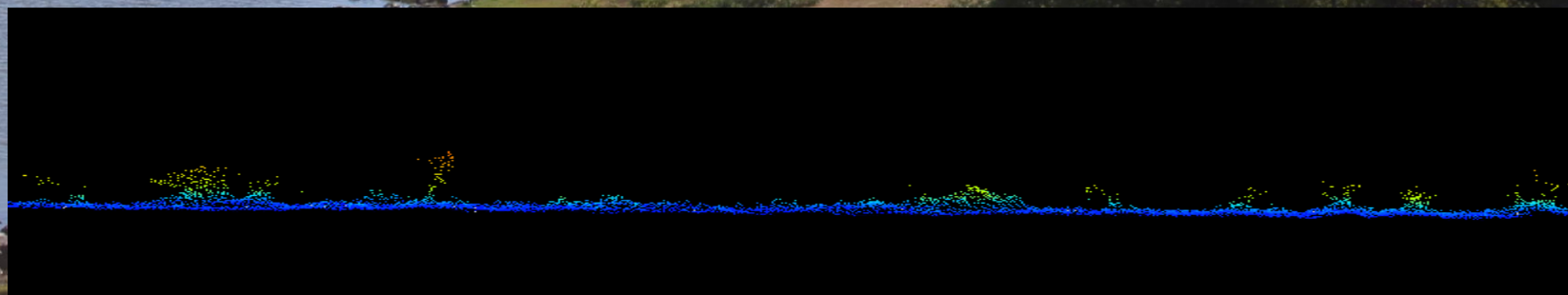
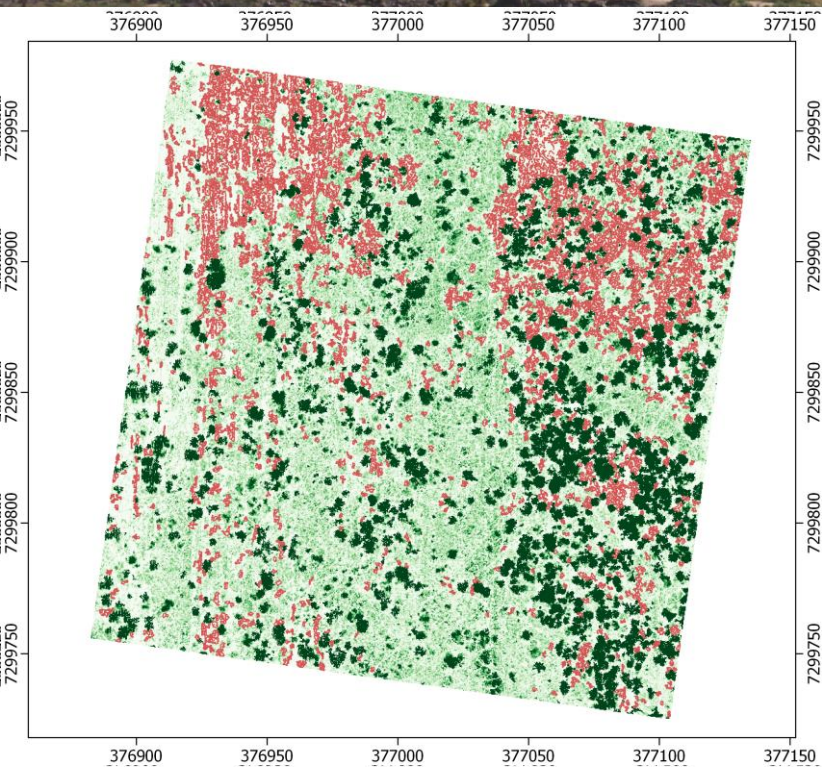
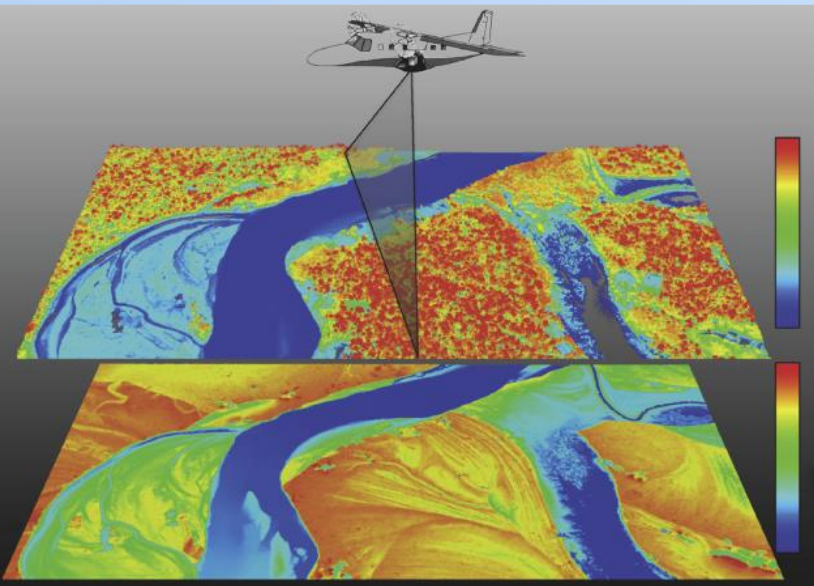
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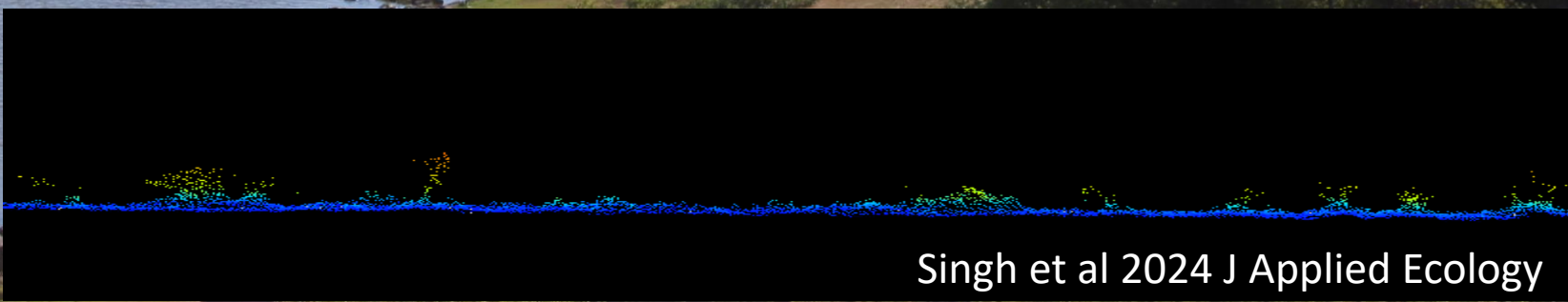
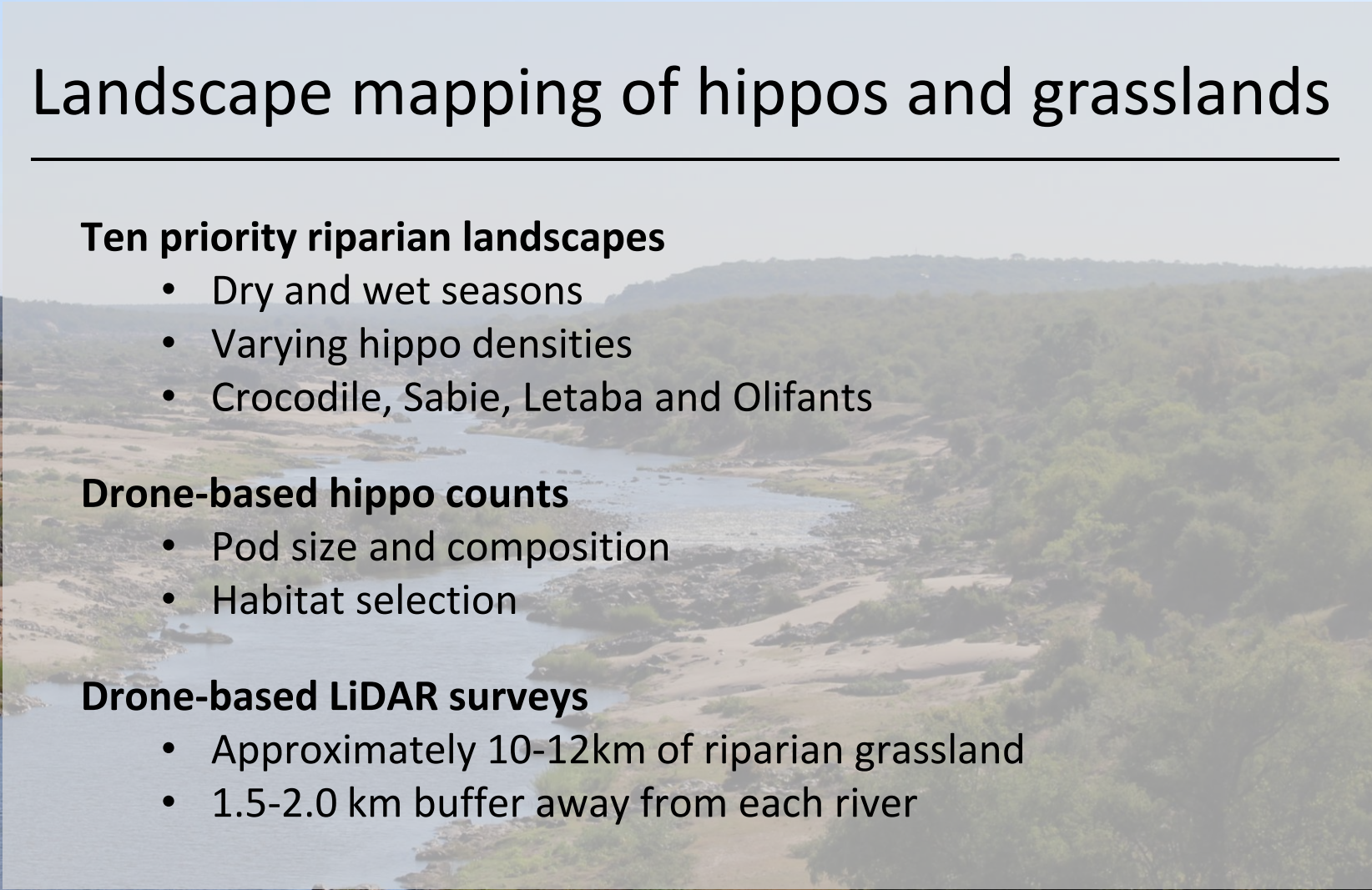
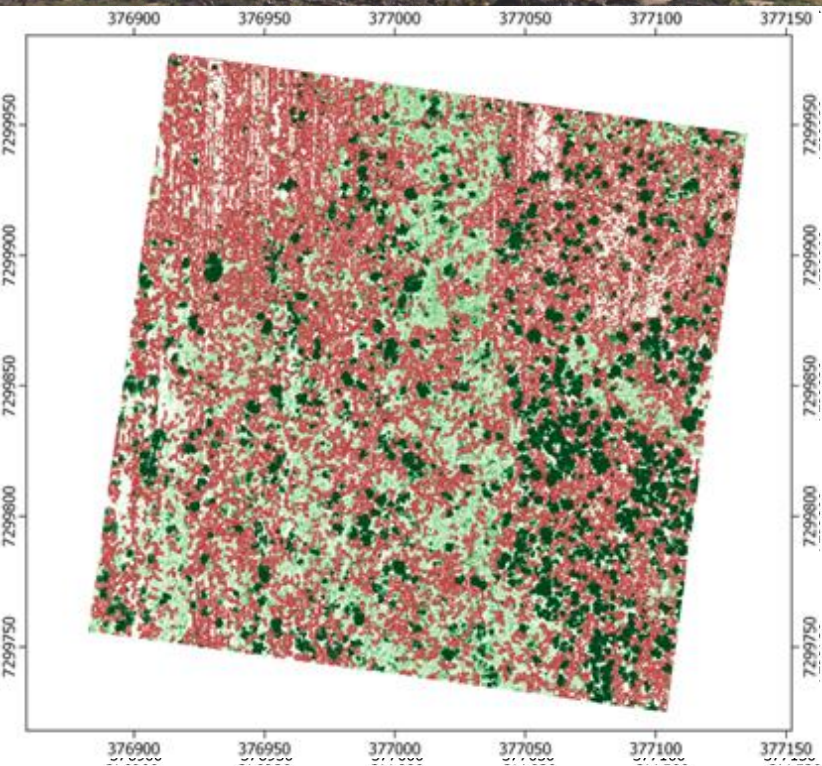
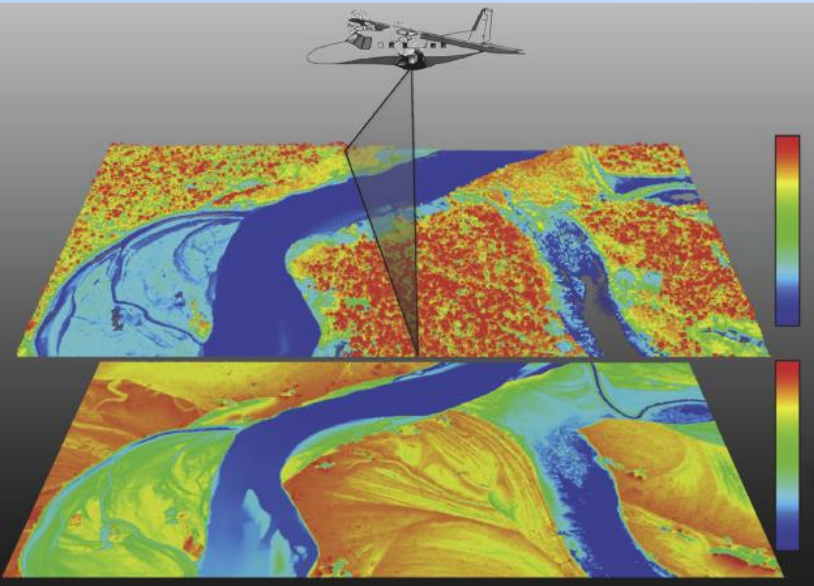
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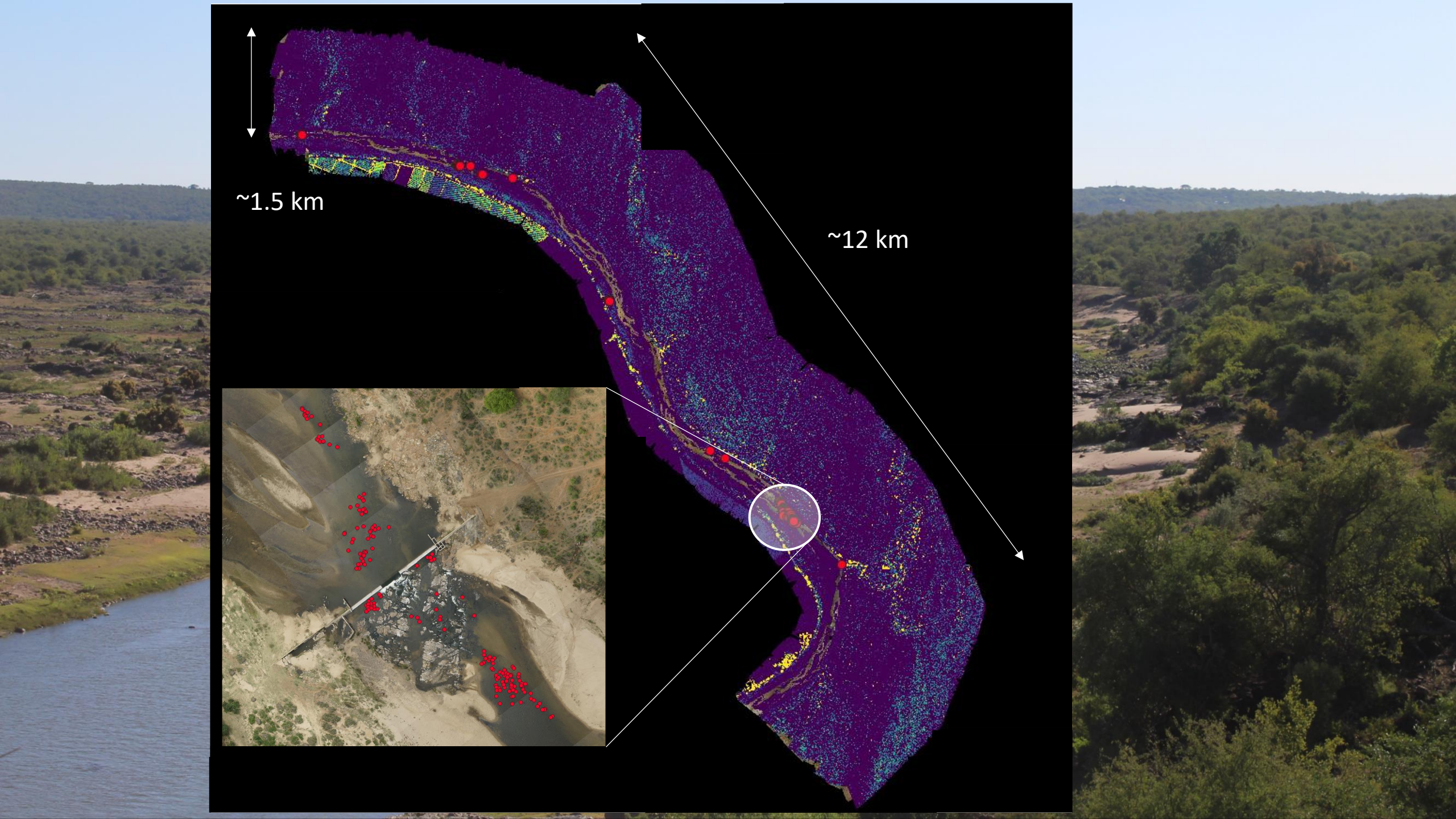
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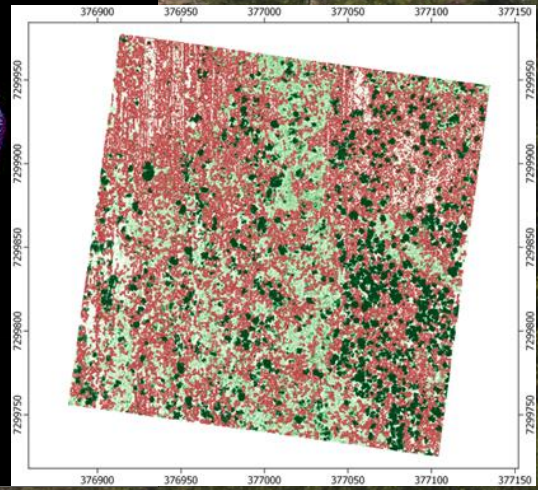
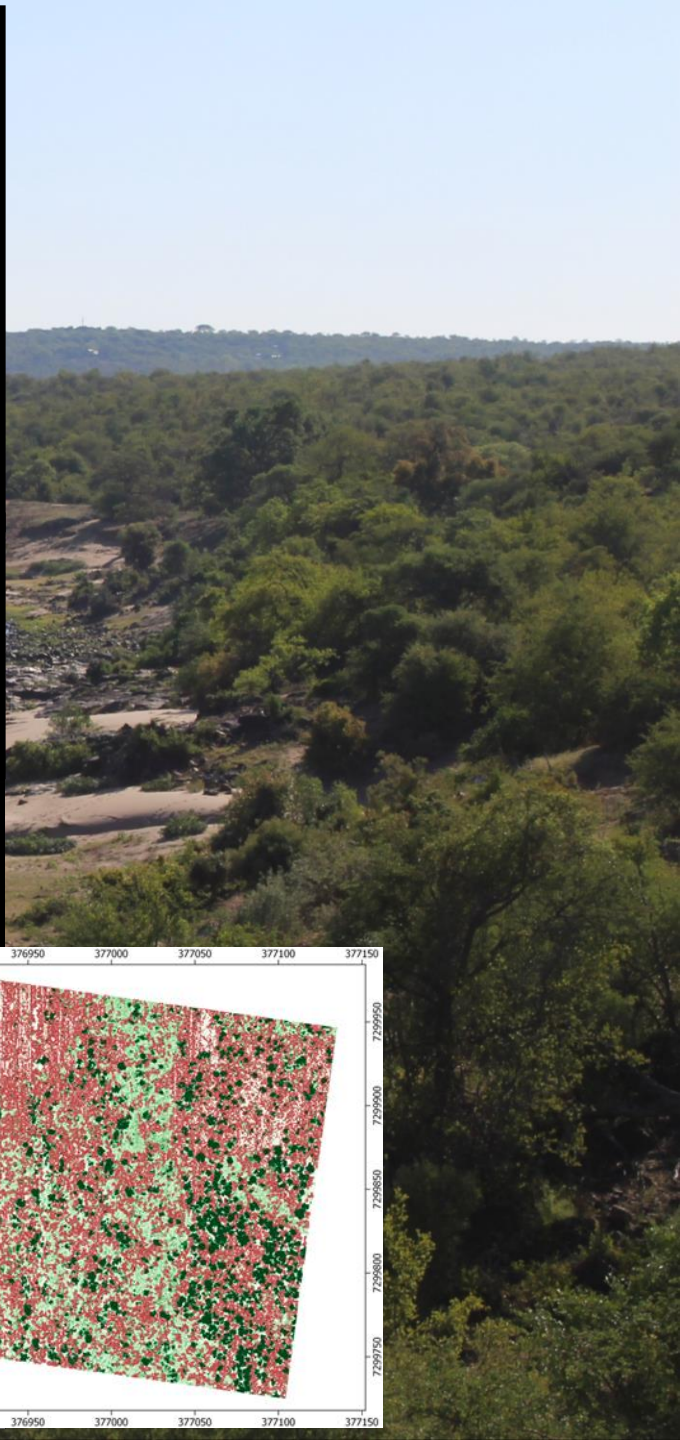
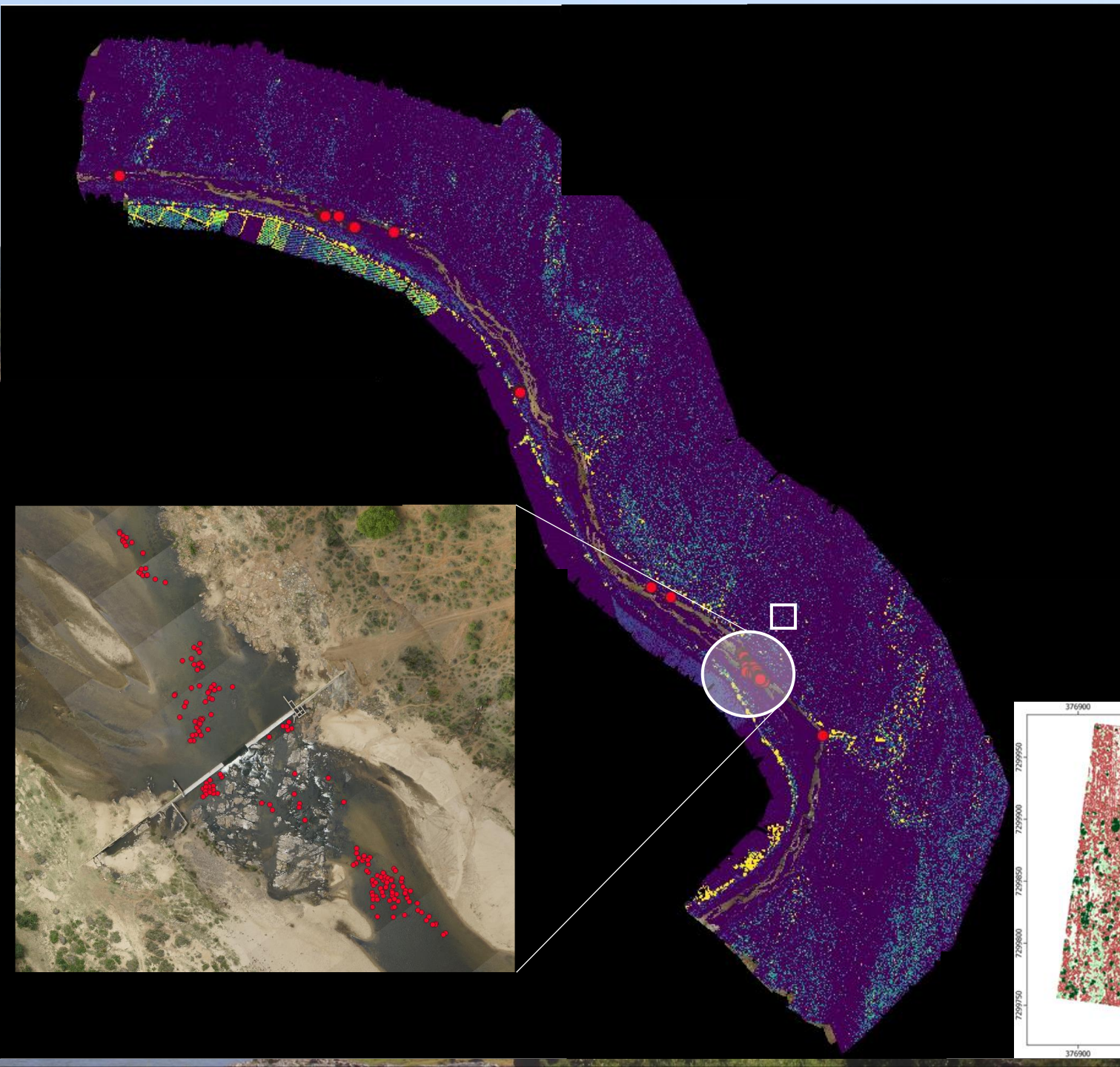


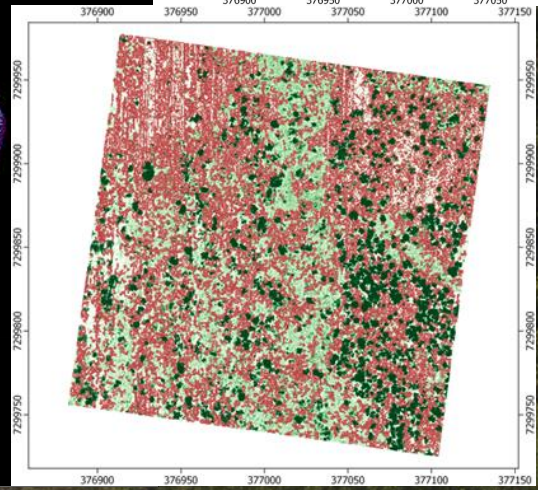
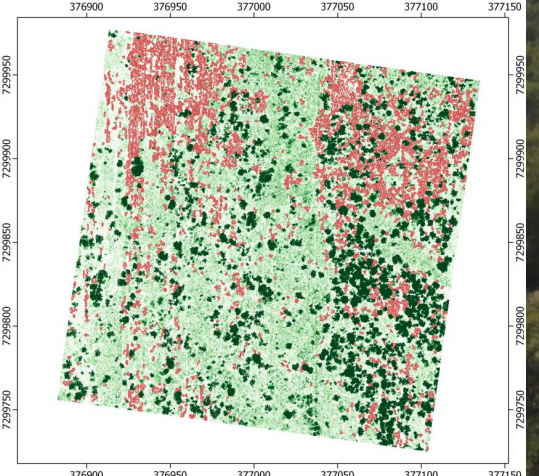
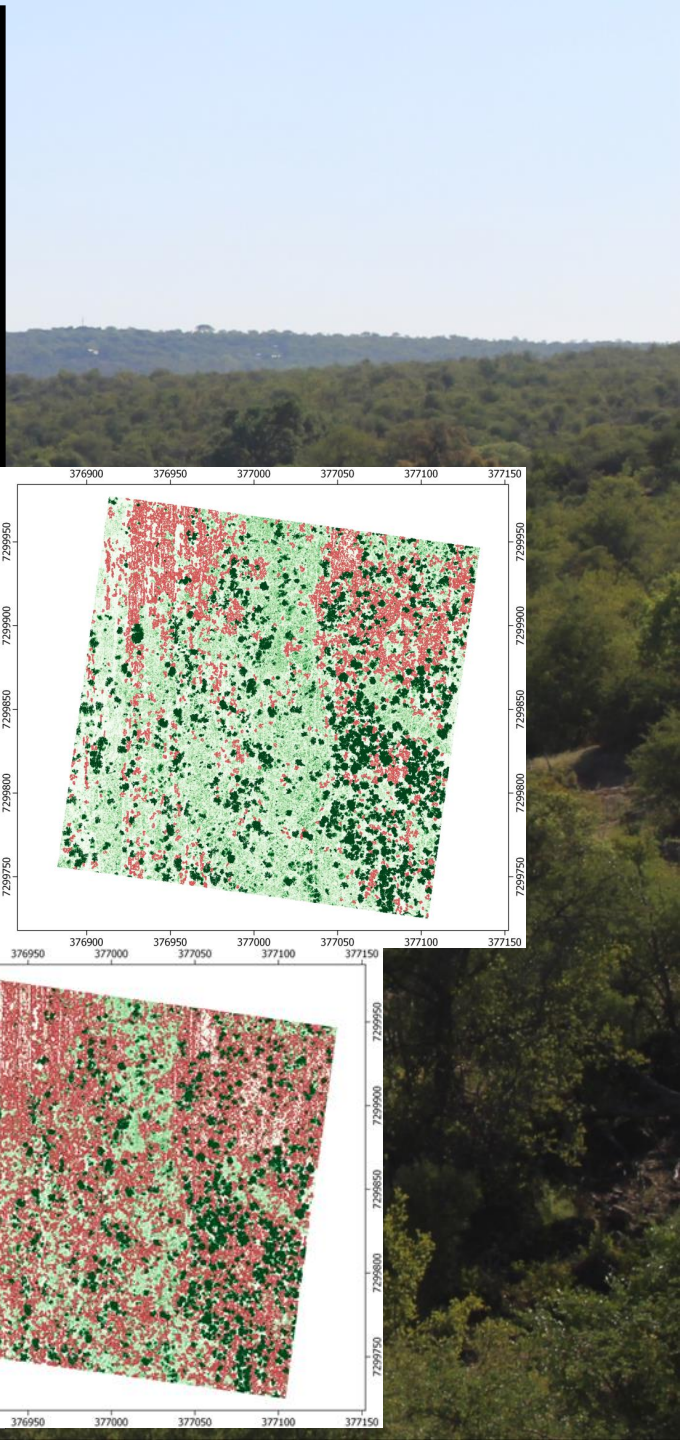
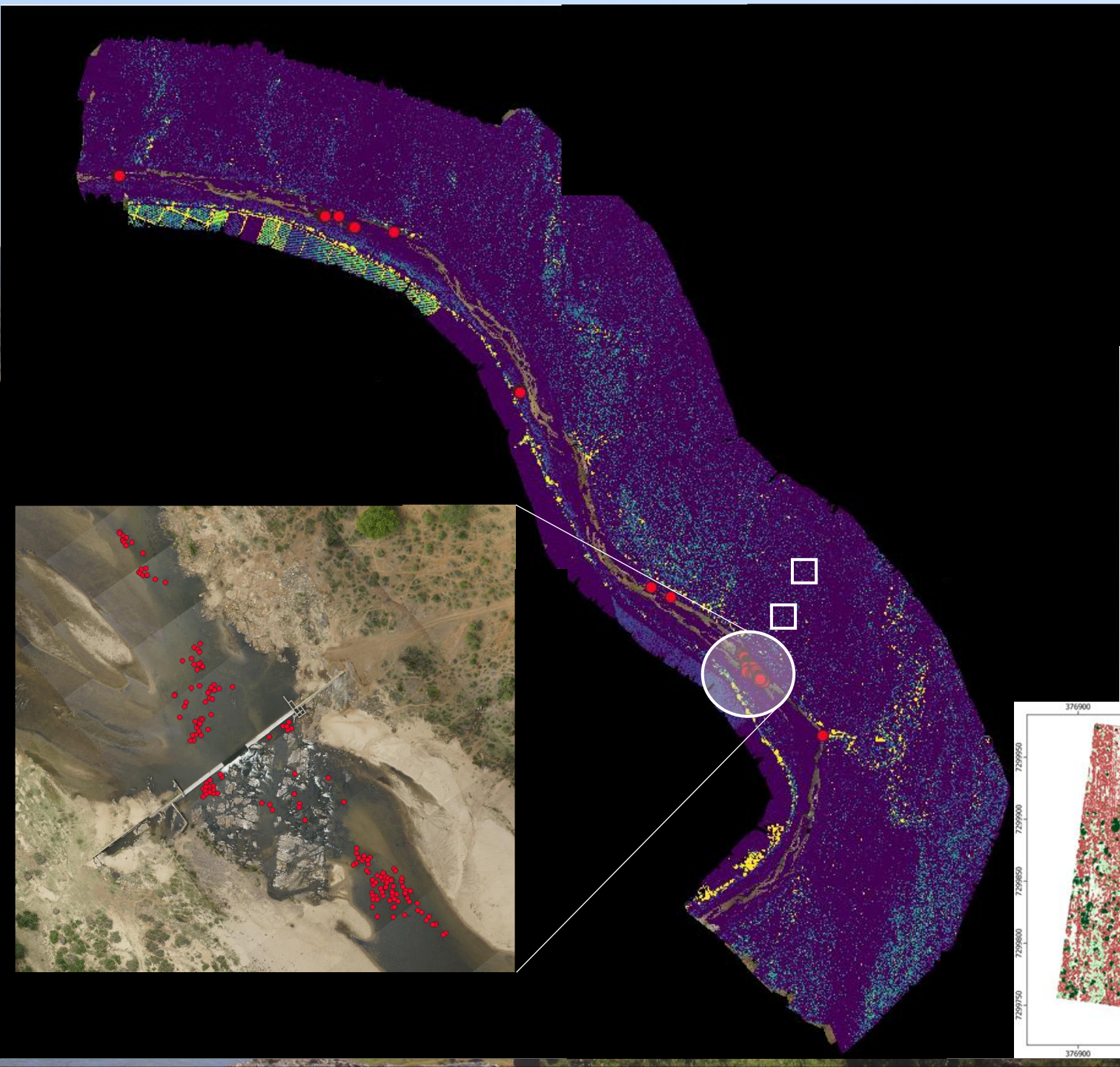


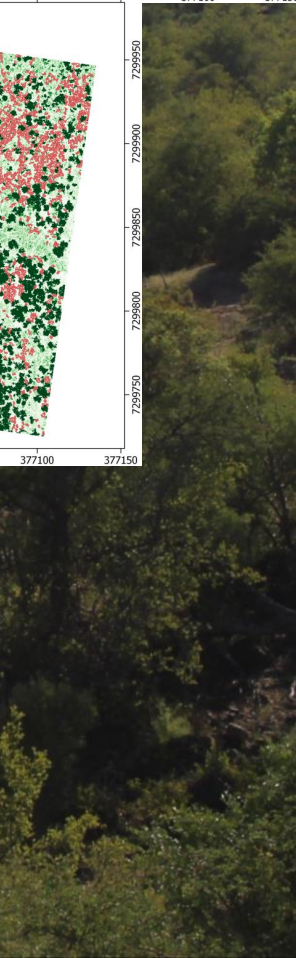
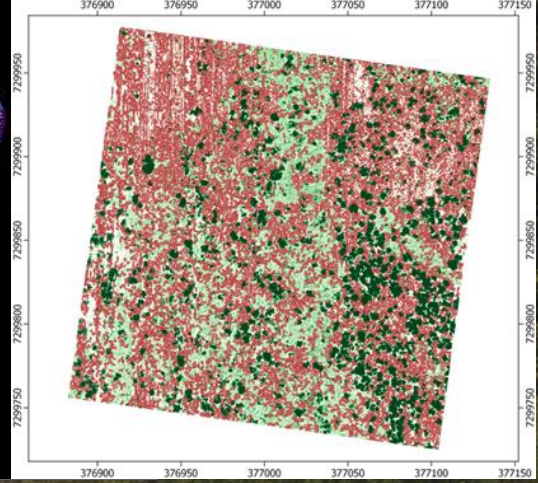
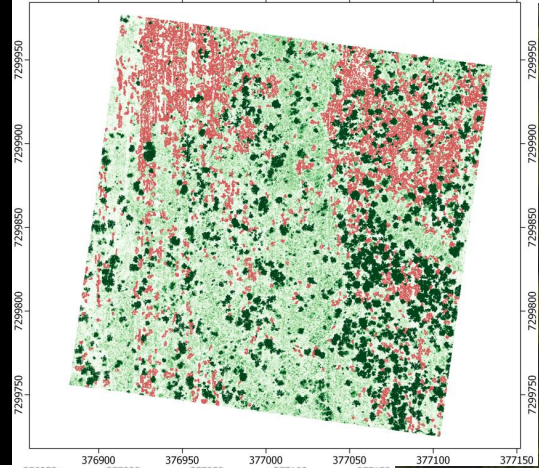
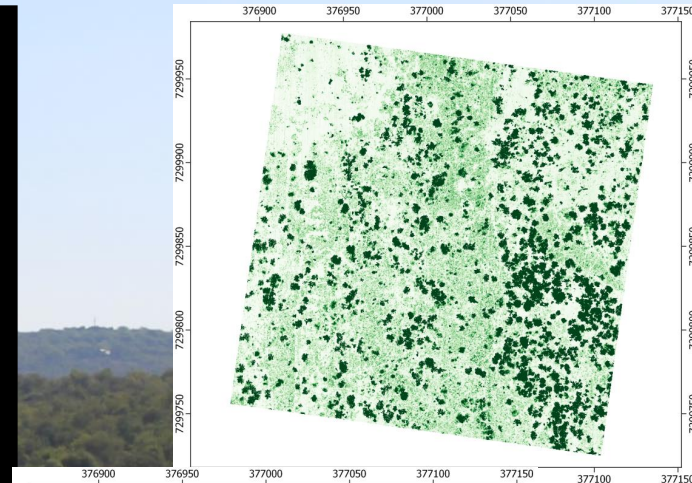
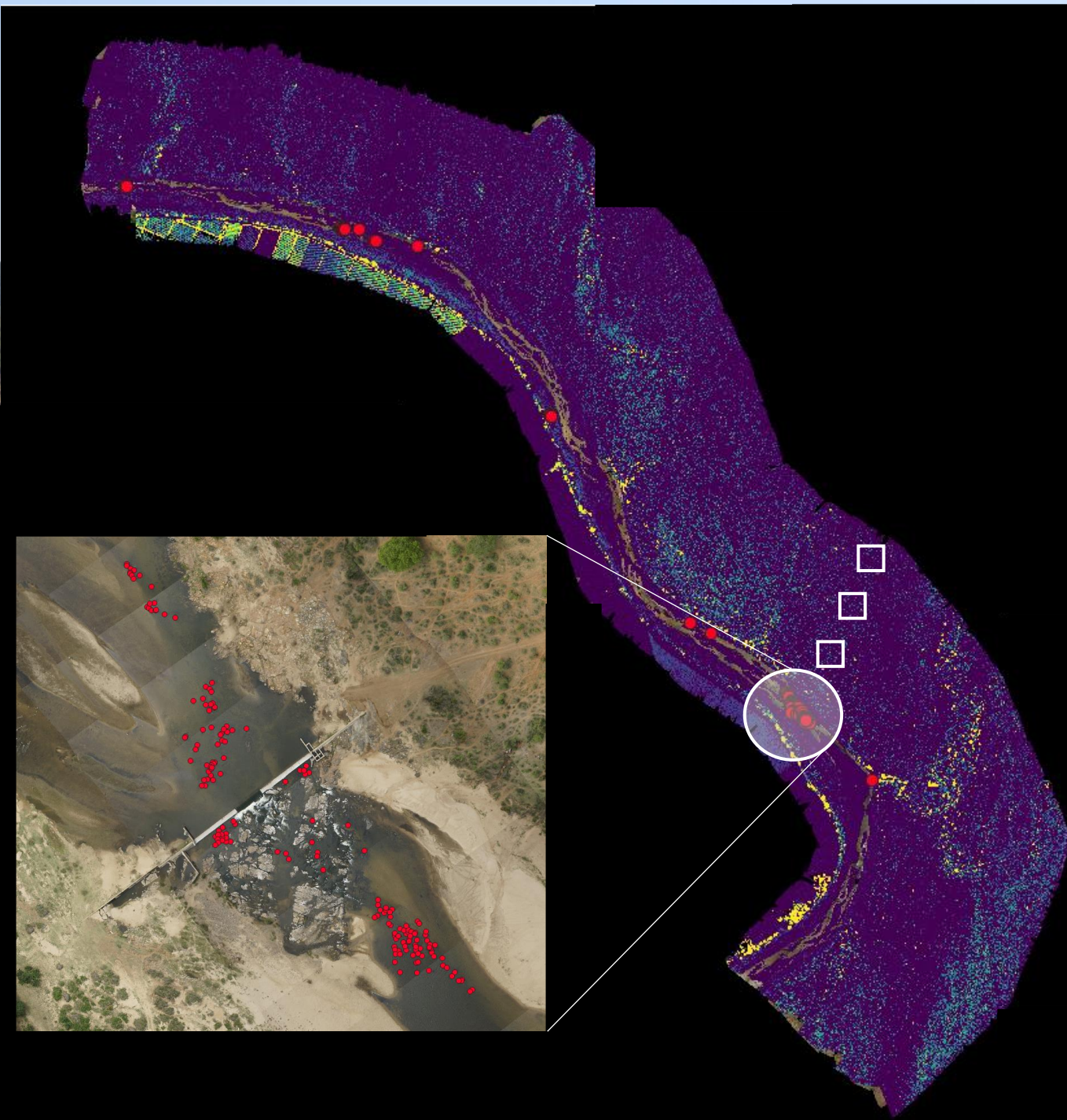
~1.5 km

~12 km









Closing thoughts

- Hippos play an important role in grazing lawn **creation** and **maintenance**.
- Smaller grazers and mixed feeders play an equally important role in maintaining these short-grass communities.
- Grazing lawns can be mapped at the landscape scale using high resolution LiDAR.
- Combining **experimental** and **landscape-scale** approaches using high-resolution LiDAR and RGB imagery may be useful in revealing the important ecological role of hippos in shaping savanna grasslands.

Special thanks to:

**Scientific services, game guards
and section rangers**

