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## **How Moon Illumination, Cloud Cover, and Temperature Influence Capture Rates for Small Mammals**

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# How Illumination, Cloud Cover, and Temperature Influence Capture Rates for Small Mammals



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## Introduction

- Changes in prey activity (assessed via capture rates) are a result of the predator-risk hypothesis.<sup>1,2</sup>
- Bright moonlight is believed to play a role in predator / prey relationships by increasing the ability for predators to detect prey, which increases the predation risk for nocturnal mammals.<sup>1</sup>
- Two main drivers of activity change have been identified by previous studies: moonlight & temperature.<sup>3</sup>

## Study Area



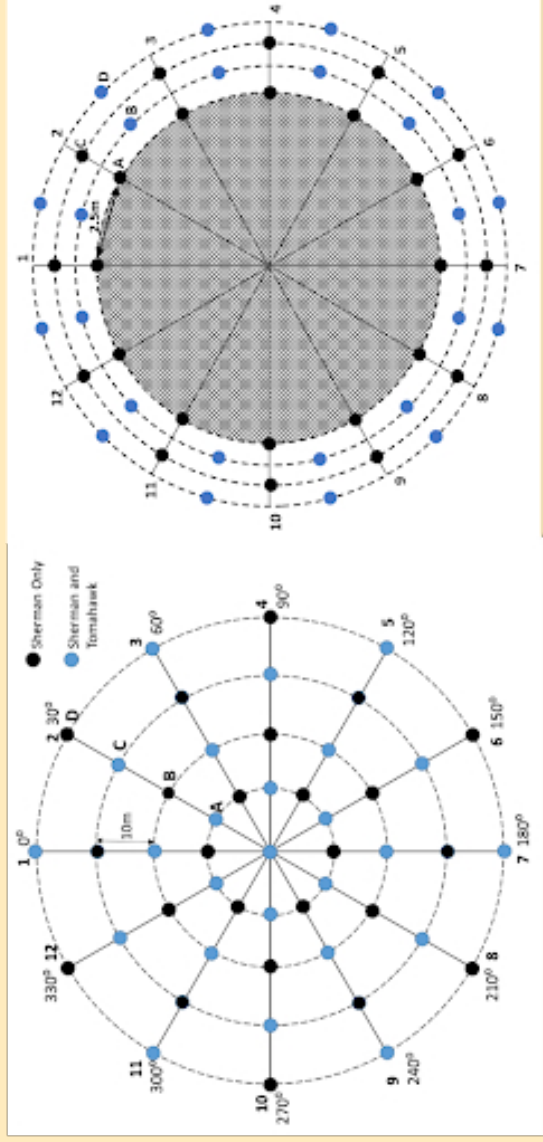
Study was conducted in regions: Blue Lake, Trinidad, and Klamath, CA on Green Diamond Resource Company land

Each region had 3 treatments:

- Regenerated forest stand that has been harvested within 15 years
- Slash pile
- Forest adjacent to the slash pile

## Methods

- Data collection: 30 June - 07 November 2021
- Trapping webs at each pair treatments for five trapping days (24-hour periods)
- Moon phase was grouped into three illumination levels: bright (full, waxing gibbous, waning gibbous) half (1st quarter, 3rd quarter +/- 3 days) dark (new, waxing crescent, waning crescent)
- Minimum and maximum temperatures were collected from NOAA
- Kruskal Wallis test and two correlation tests



## Results

- 841 individuals were captured (nocturnal = 694, diurnal = 147) over 39 trap nights
  - 588 Deer Mouse
  - 147 Allen's Chipmunks
  - 26 Dusky-Footed Woodrats
  - 2 Humboldt's Flying Squirrels
  - 46 Shrews
  - 28 Voles
  - 3 Weasels
  - 1 Mole

- More nocturnal animals were trapped in half illumination as compared to bright and dark;  $H(2) = 13.78, p < 0.01$  (Fig 1)

- Less diurnal animals were trapped in dark illumination as compared to bright and half;  $H(2) = 6.23, p < 0.01$  (Fig 1)
- Minimum and maximum temperatures influenced daily capture rates for diurnal animals ( $R_s = 0.45$  and  $0.33, p < 0.05$ ), but temperature did not for nocturnal animals ( $R_s = 0.08$  and  $-0.14, p > 0.05$ ) (Fig 2)

Figure 1. Nocturnal and diurnal daily capture rates per illumination period.

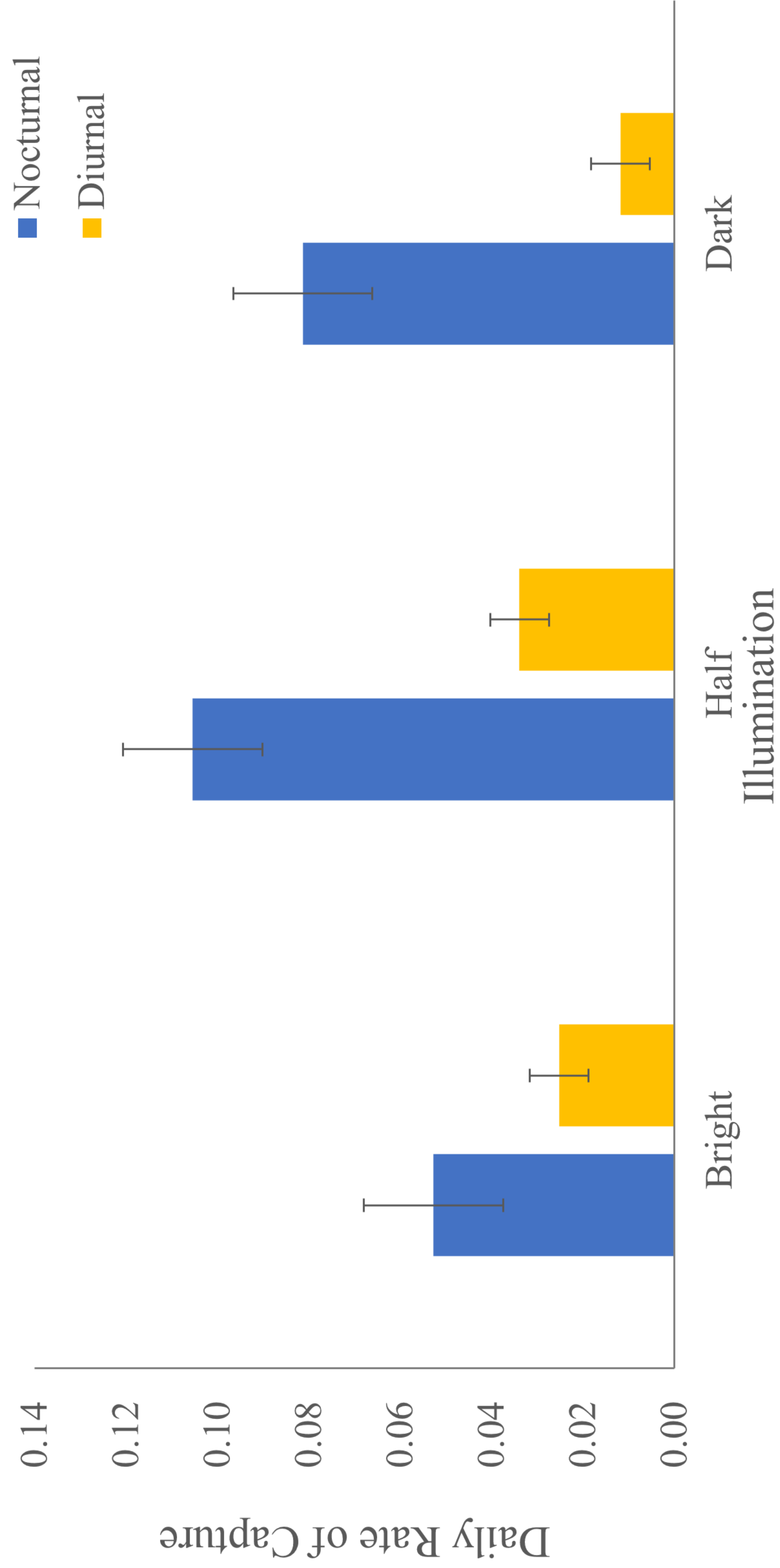
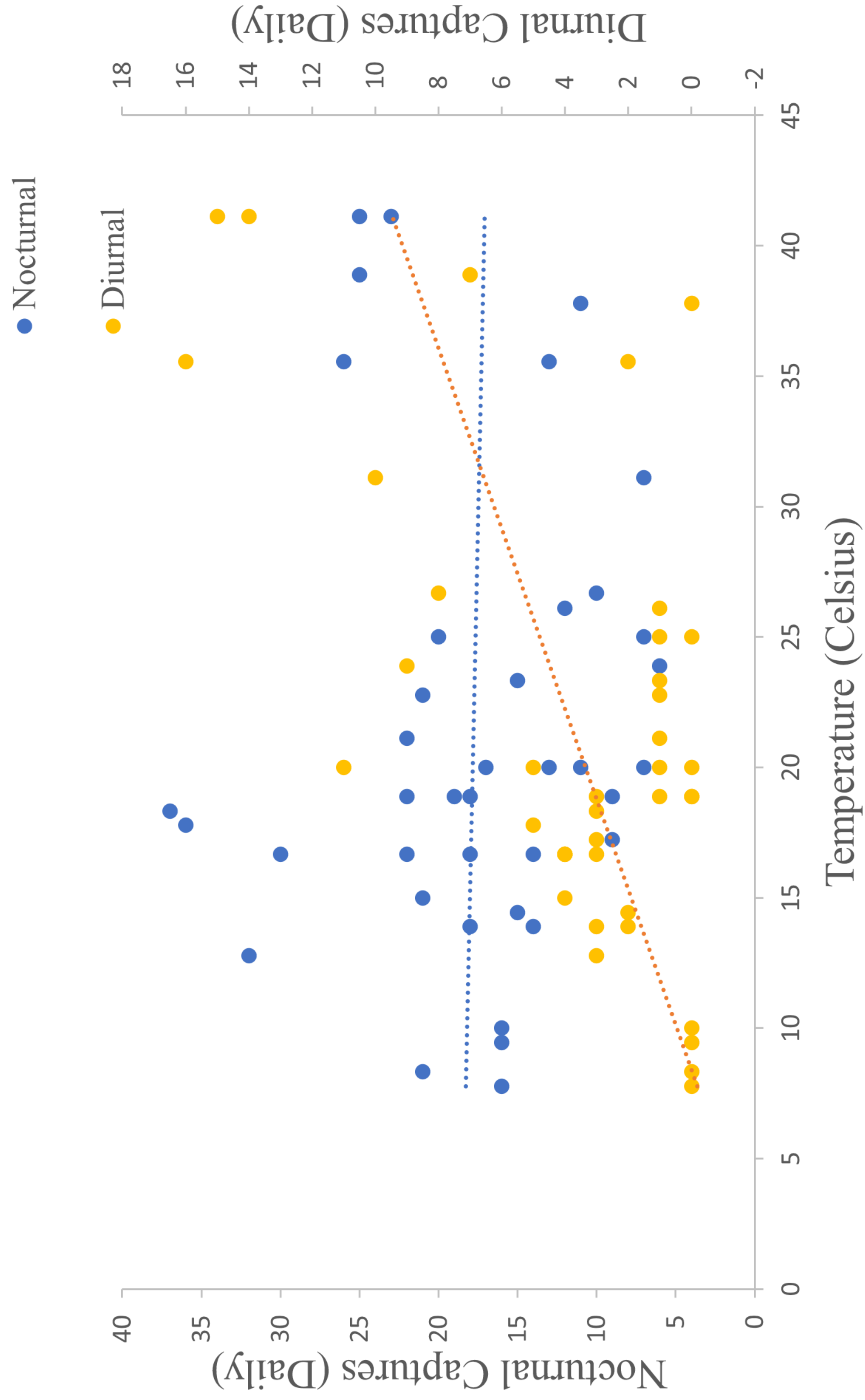


Figure 2. Capture rates for both nocturnal and diurnal species in relation to maximum temperature.



## Discussion

- Nocturnal animals appear to reduce their activity levels in response to moonlight.
- Patterns of captures of small mammals follow the predator-prey hypothesis and suggest explanations based on predation avoidance.
- Diurnal animals appear to increase their activity levels in response to increasing temperature.
- Diurnal animals may be responding to moonlight.
- Cloud cover did not influence activity levels but likely affected by temperature.

## Management Implications

- This research could be considered when deciding trapping protocol for effectively capturing the maximum number of small mammals.
- These results give us a greater understanding of small mammal activity and behavior, which will help develop better management plans for these species and other species who are directly affected by their populations.
- This study can contribute to data that can be used for future research on trapping success rates and predator-prey relationships in this given location.

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