

LARGE-SCALE ANALYSIS OF CORRELATES OF BAT SUSCEPTIBILITY TO WHITE-NOSE SYNDROME

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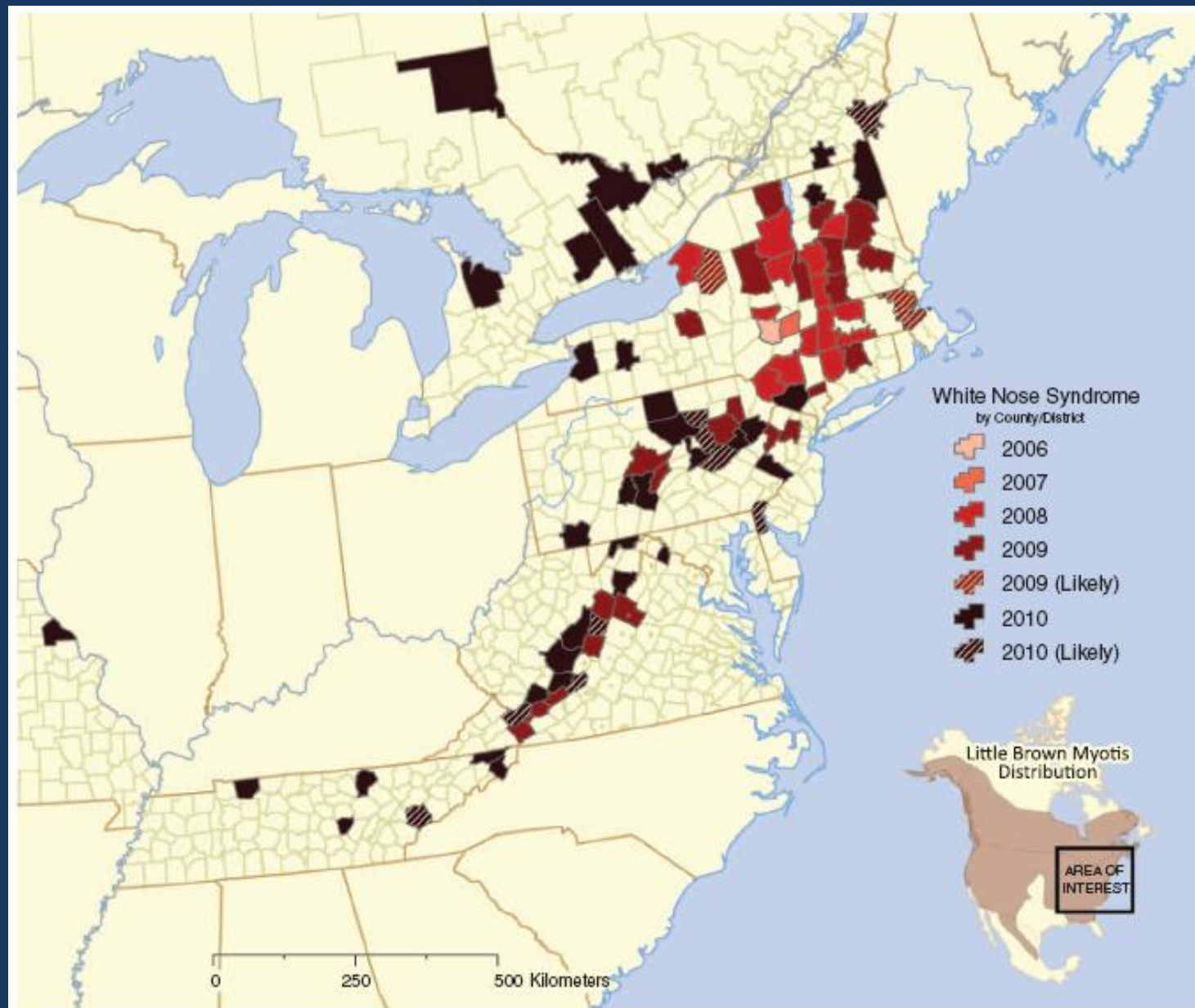


Fig. 2. Map of current distribution and spread of WNS across eastern North America.

Map is from Frick et al. 2010

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 - Could enable examination of questions that are hard to answer by a single field researcher

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 - Controlled for differences among hibernacula
 - Examined changes at hibernacula from historical (pre-WNS) colony sizes to post-WNS
 - Post-WNS counts were at least 2 years after infection with WNS
 - Used log response ratio as a measure of effect size

Bat Species Examined

- Big brown bat *Eptesicus fuscus*
- Small-footed bat *Myotis leibii*
- Tri-colored bat *Perimyotis subflavus*
- Indiana bat *Myotis sodalis*
- Northern long-eared bat *Myotis septentrionalis*
- Little brown bat *Myotis lucifugus*



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Bat species differences in susceptibility to WNS

Bat Spp Log Response

Ratio LS Means

1
0
-1
-2
-3

Big-brown

Small-footed

Tri-colored

Indiana

Northern_long-eared

Little_brown

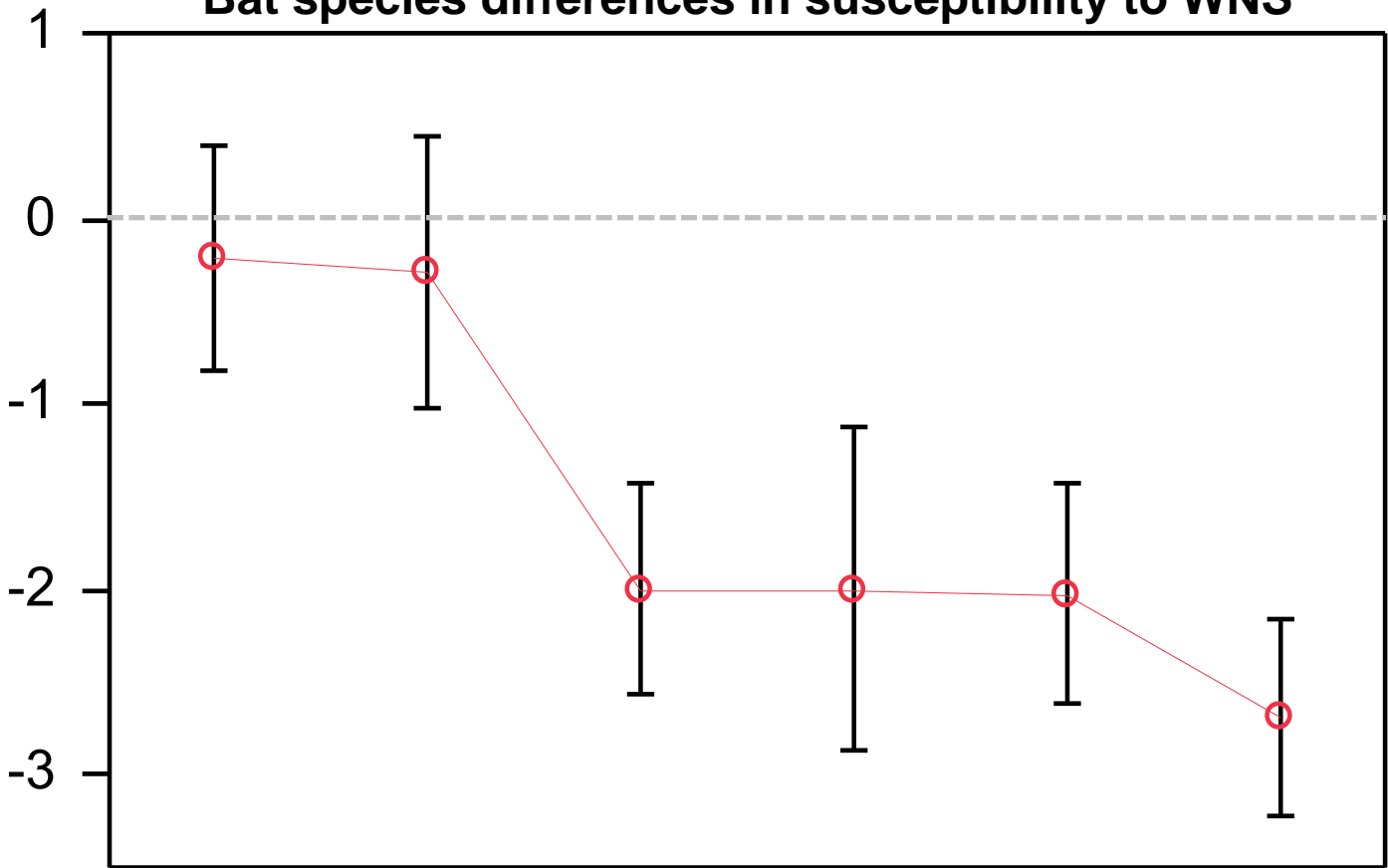
Bat species



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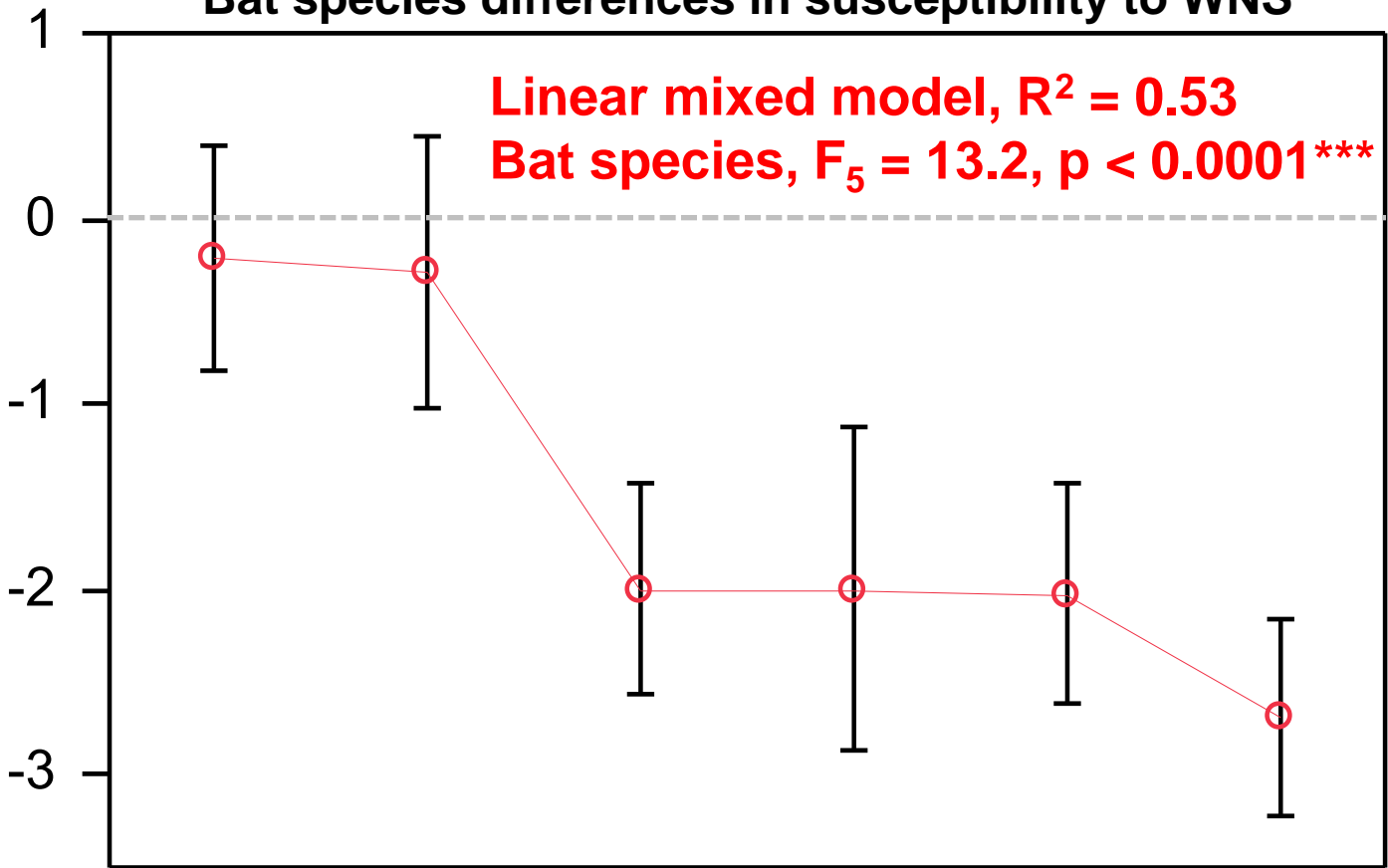


Bat species

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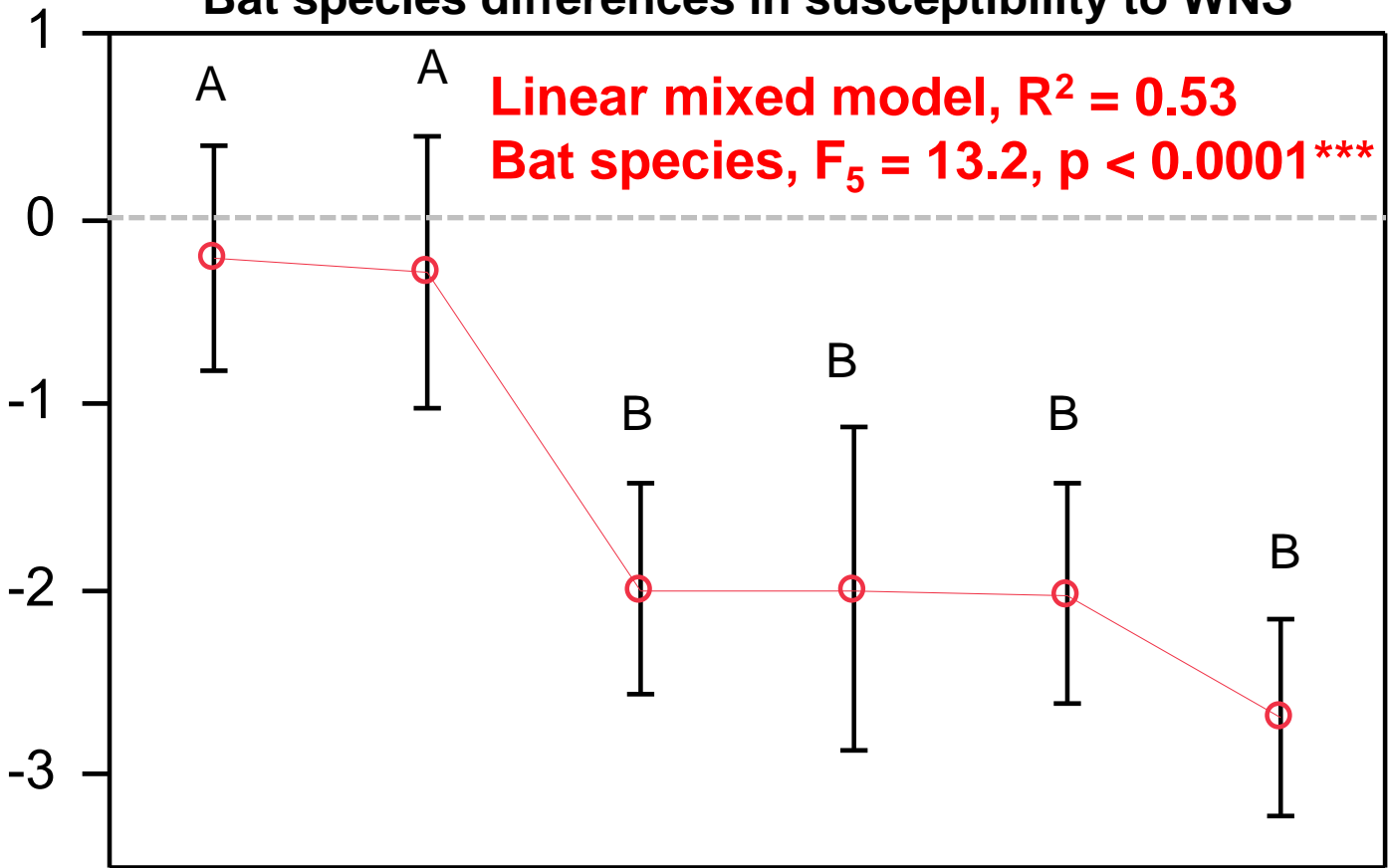
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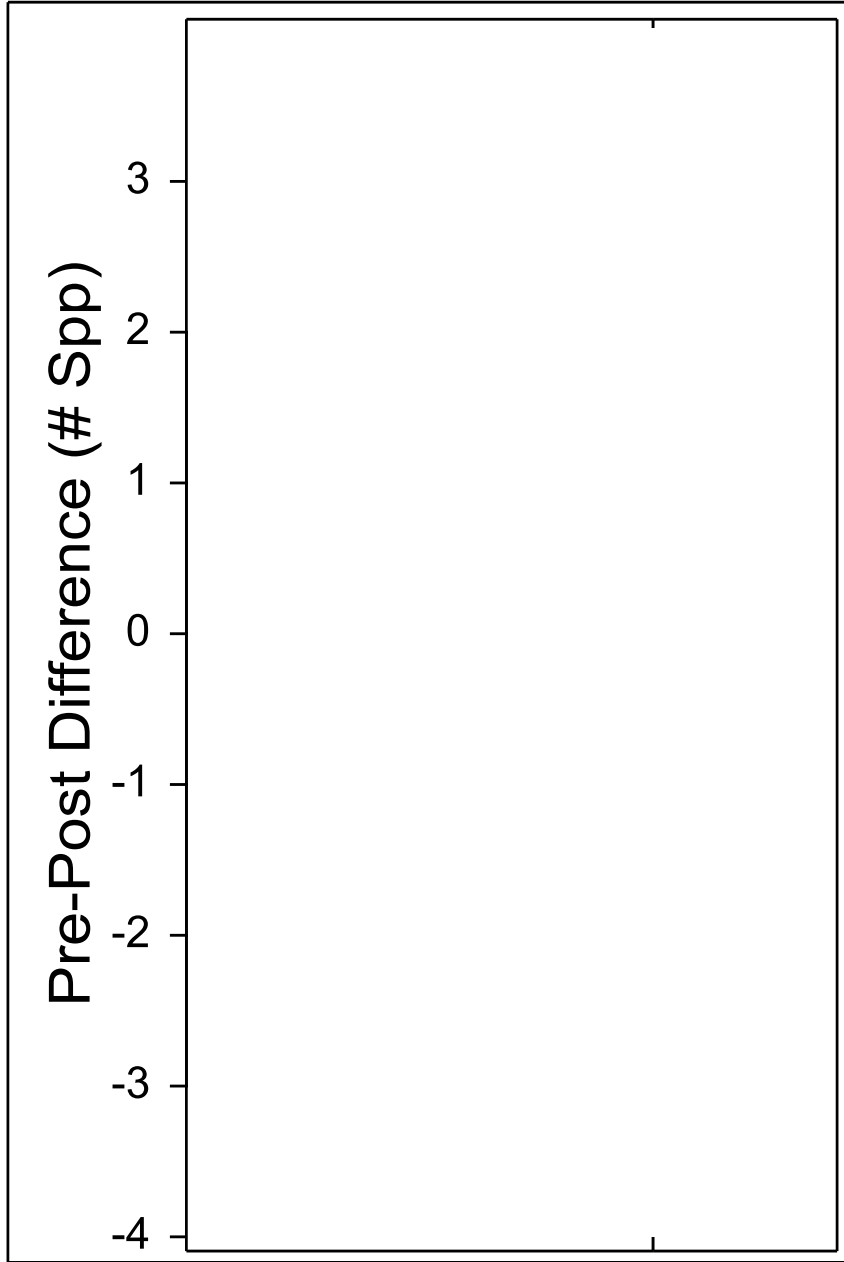
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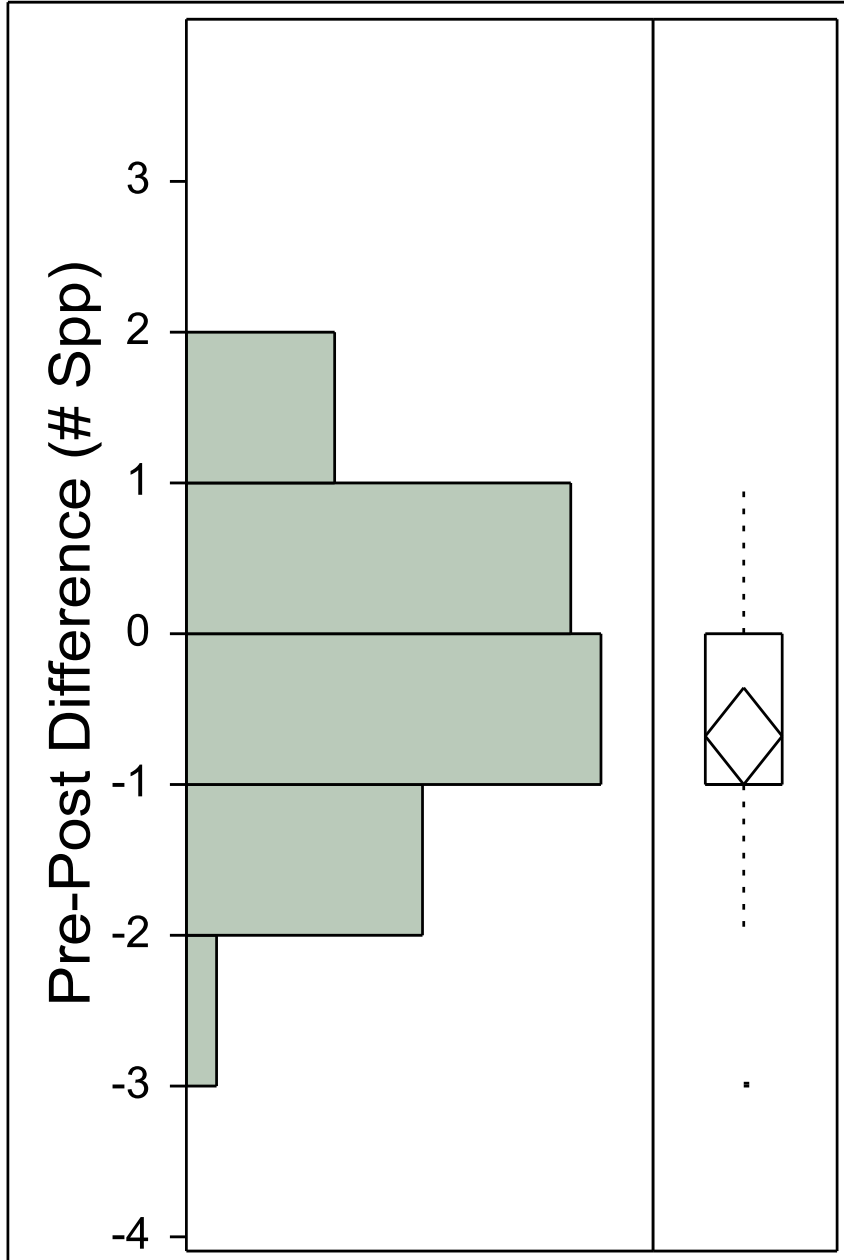
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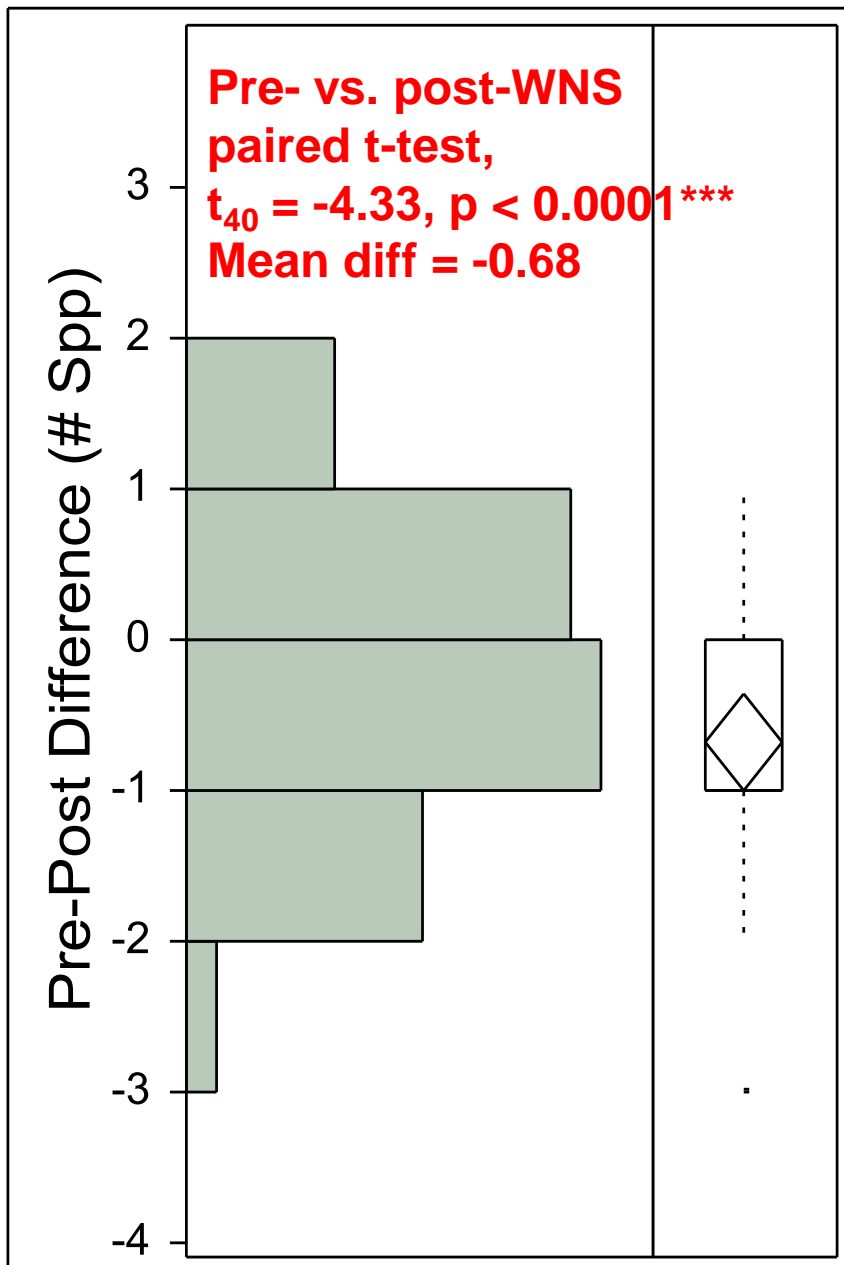
Change in Species Diversity



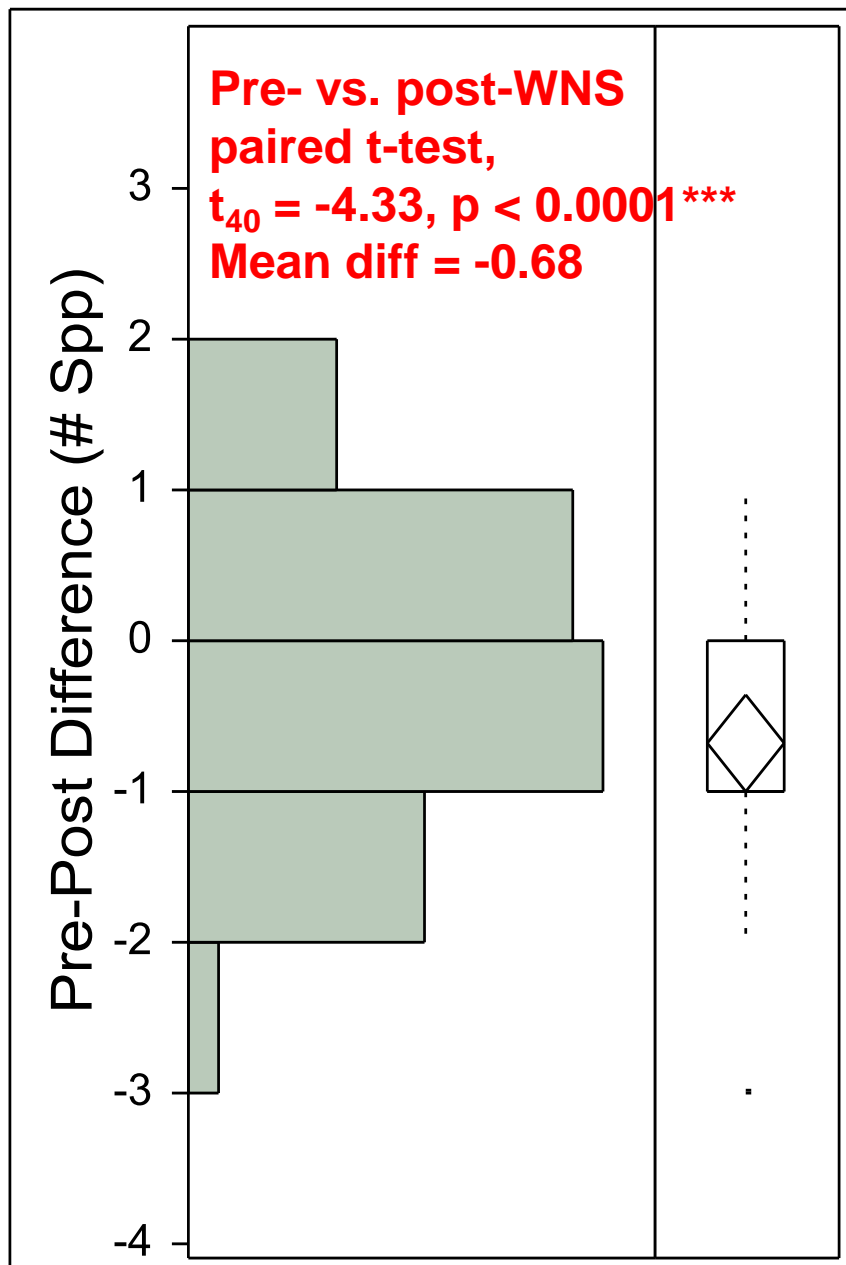
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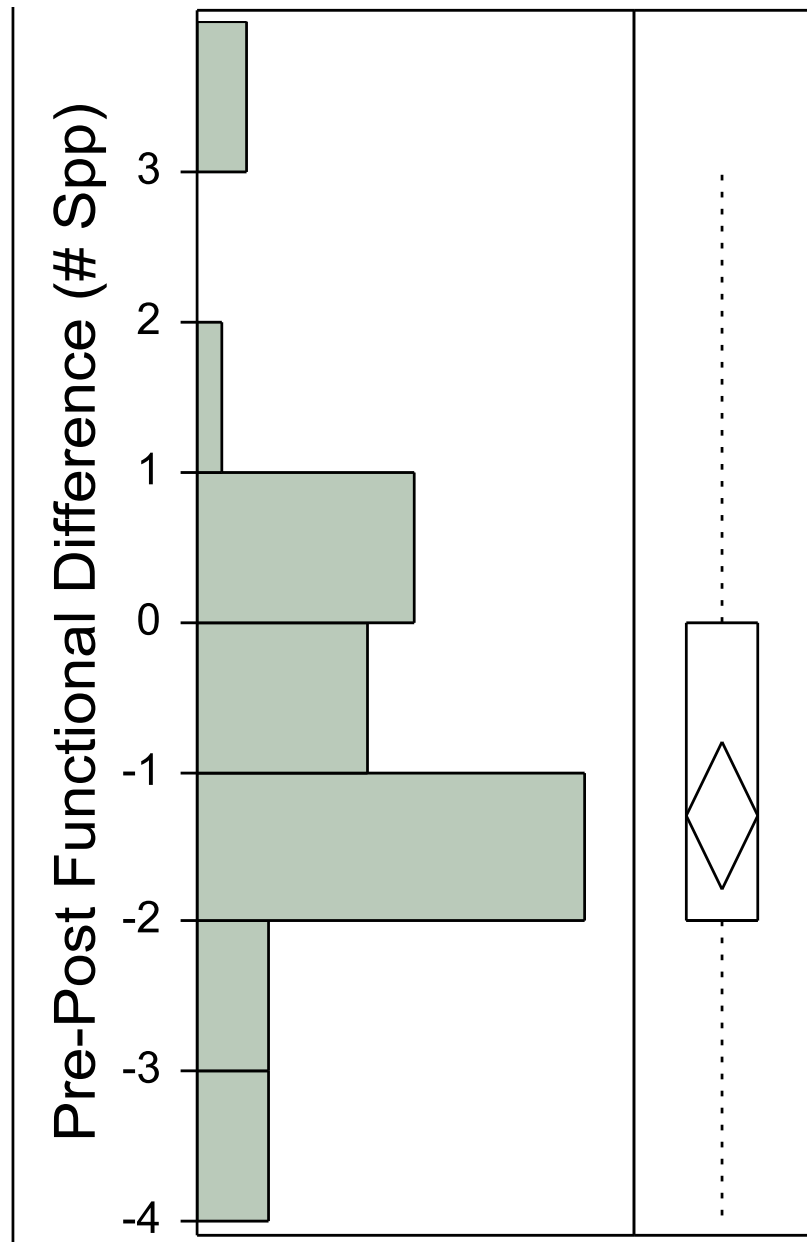
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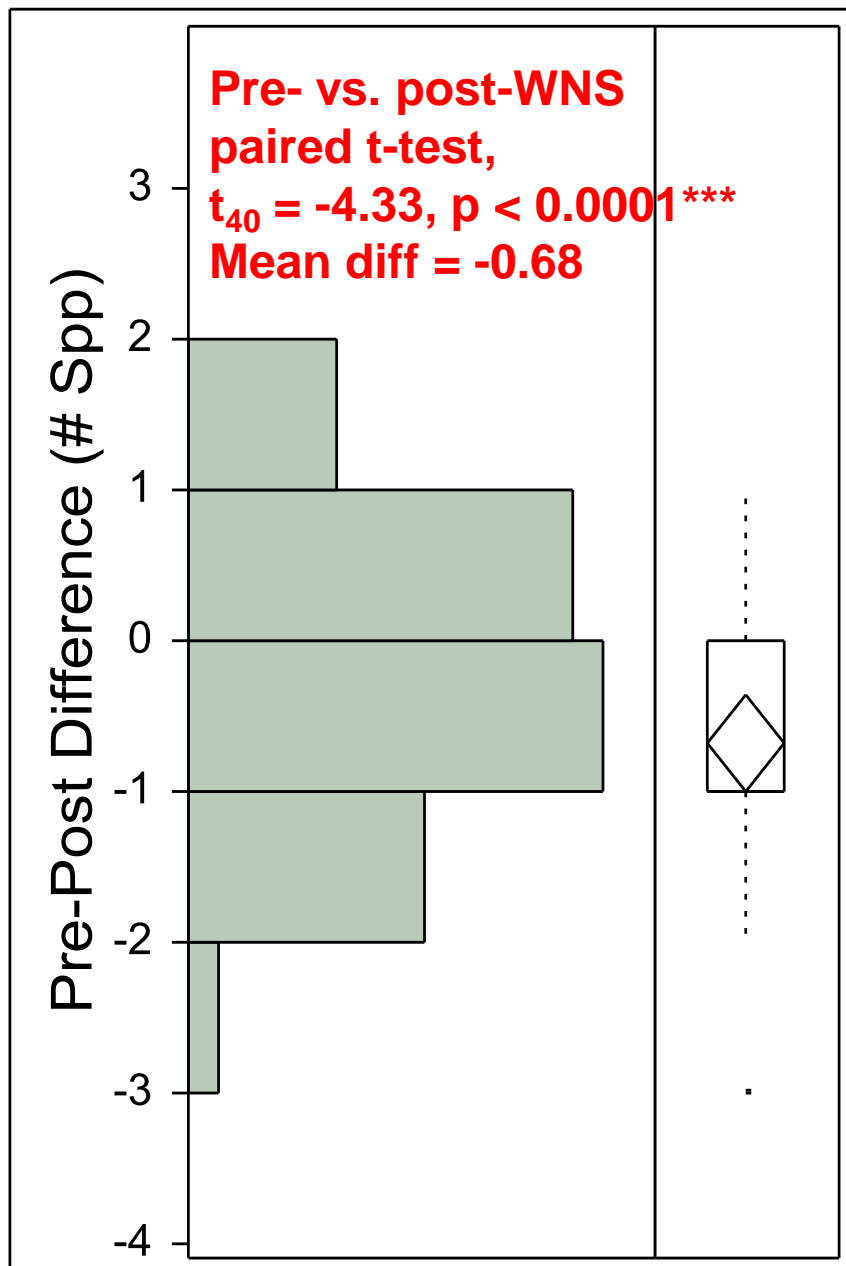
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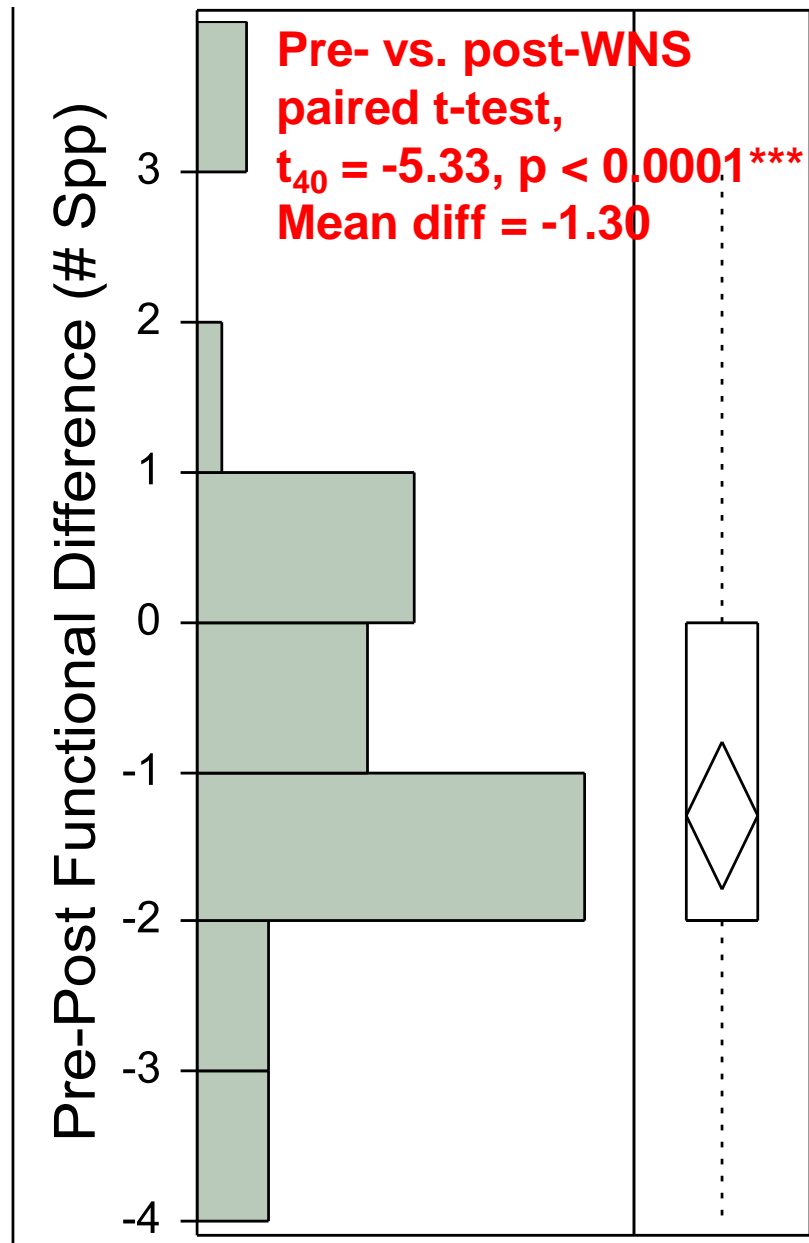
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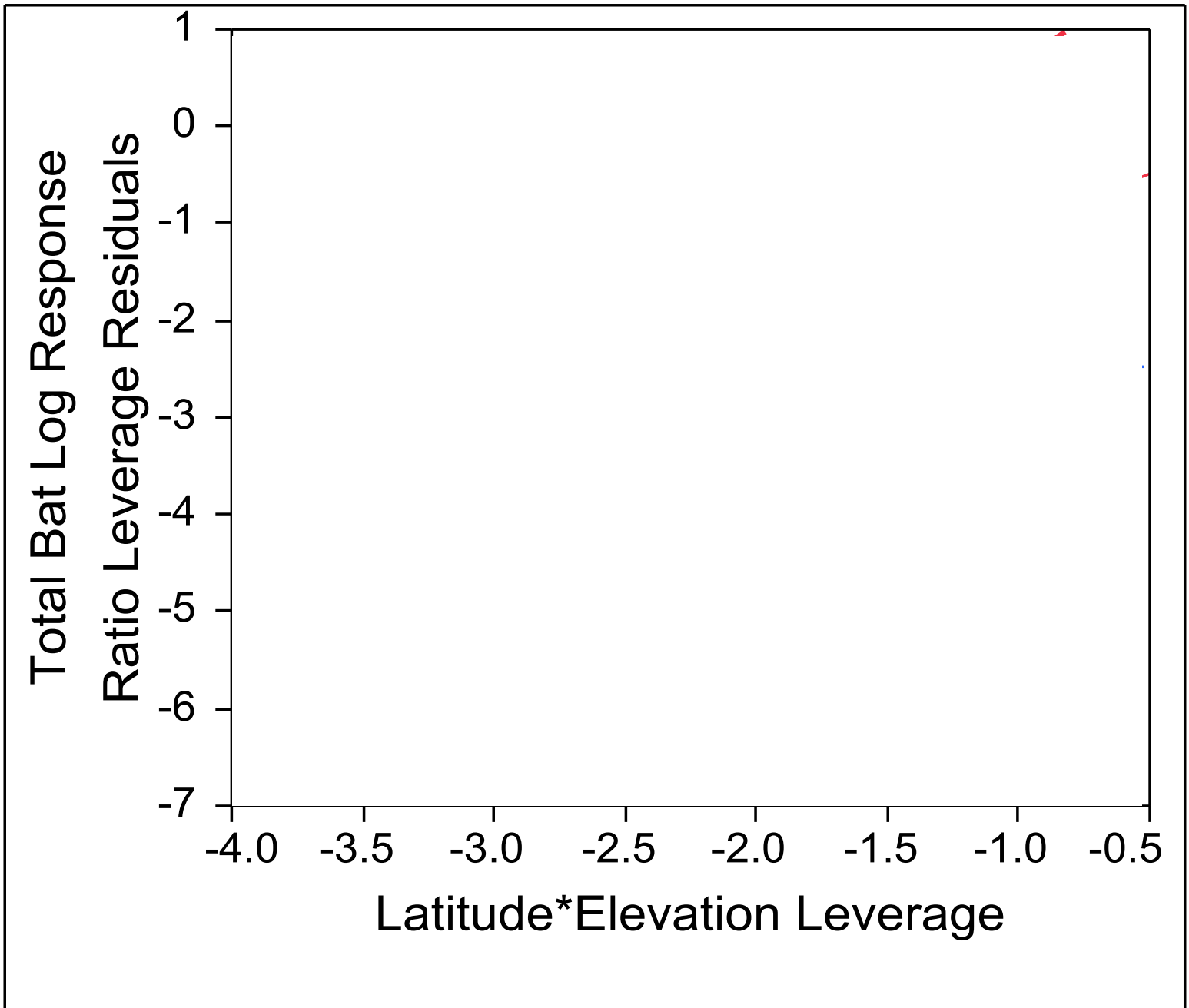
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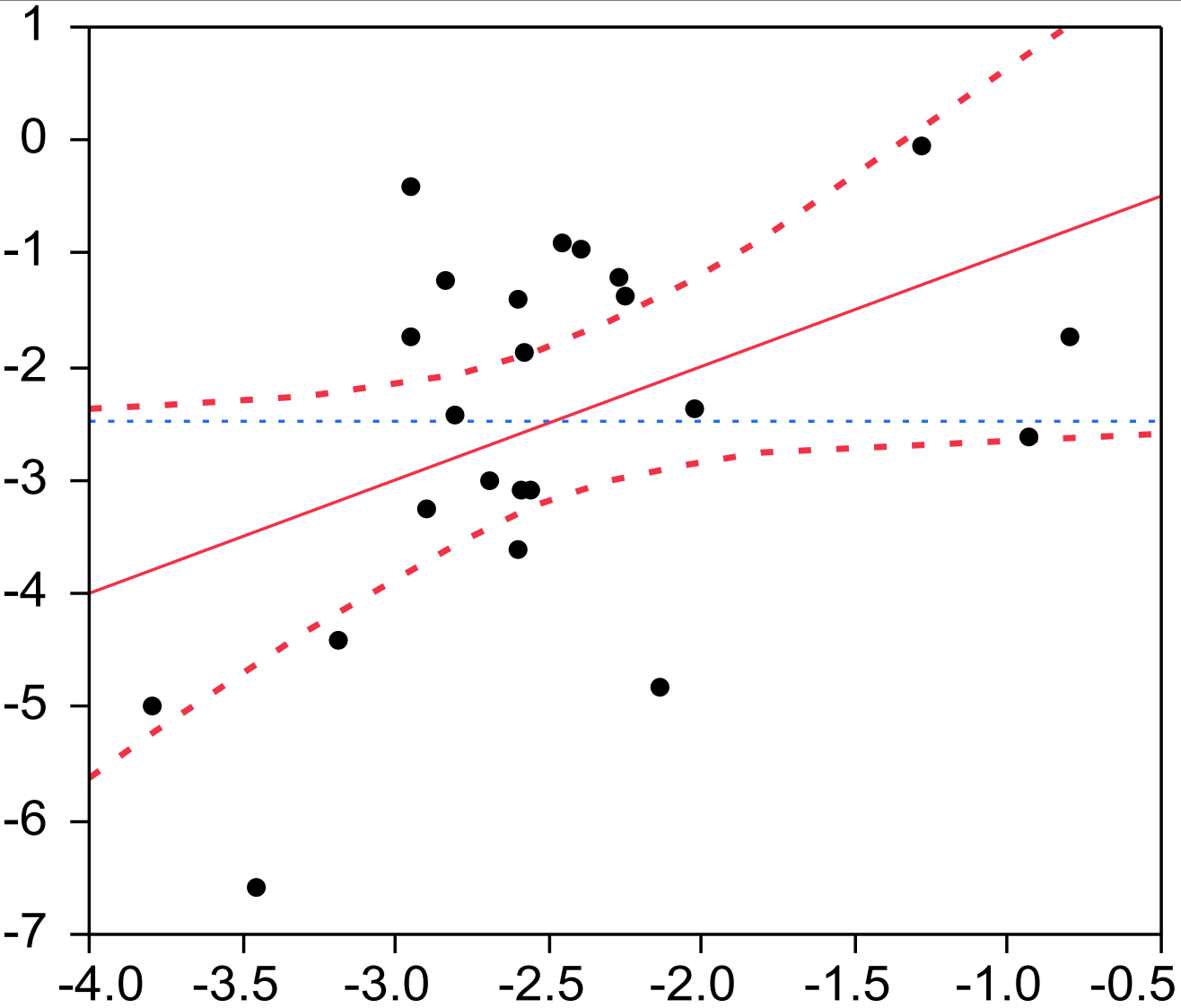
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- For this initial analysis I solely examined:
 - Latitude
 - Elevation
 - Latitude*Elevation interaction



Total Bat Log Response

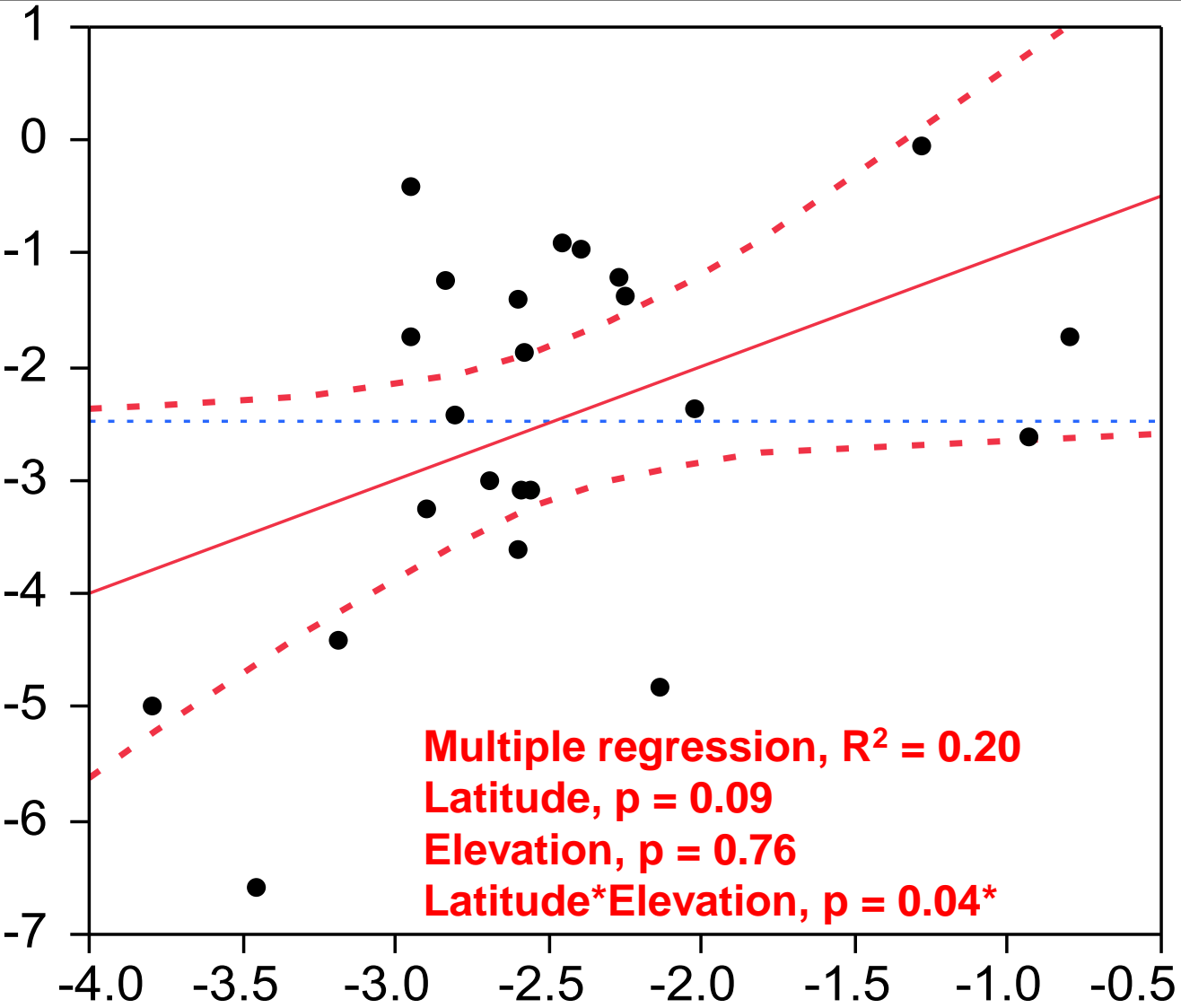
Ratio Leverage Residuals



Latitude*Elevation Leverage

Total Bat Log Response

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Multiple regression, $R^2 = 0.20$
Latitude, $p = 0.09$
Elevation, $p = 0.76$
Latitude*Elevation, $p = 0.04^*$

Latitude*Elevation Leverage

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 - Further study needed; likely due to an underlying factor, like hibernation length, cave temperature, or regional variation

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 - Can identify strongest correlations, and the relative strength of correlation of each factor with susceptibility of bat colonies to WNS

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- Data on hibernacula
 - Temperature, humidity, cave length/complexity, strata, hibernation dates, etc.



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Acknowledgments

Thank you for assistance from

- Cal Butchkoski
- Greg Turner
- Christopher Swezey

Contact information:

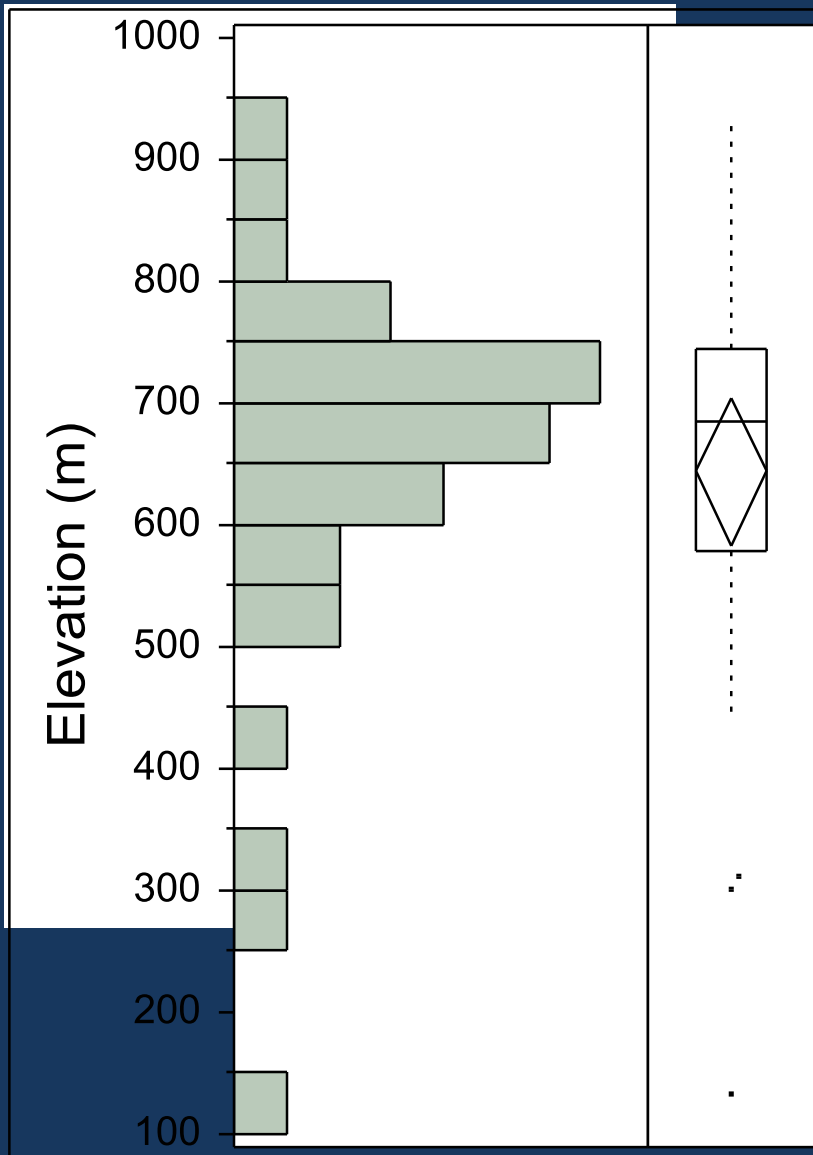
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Photo: USFWS / Martin Moriarity

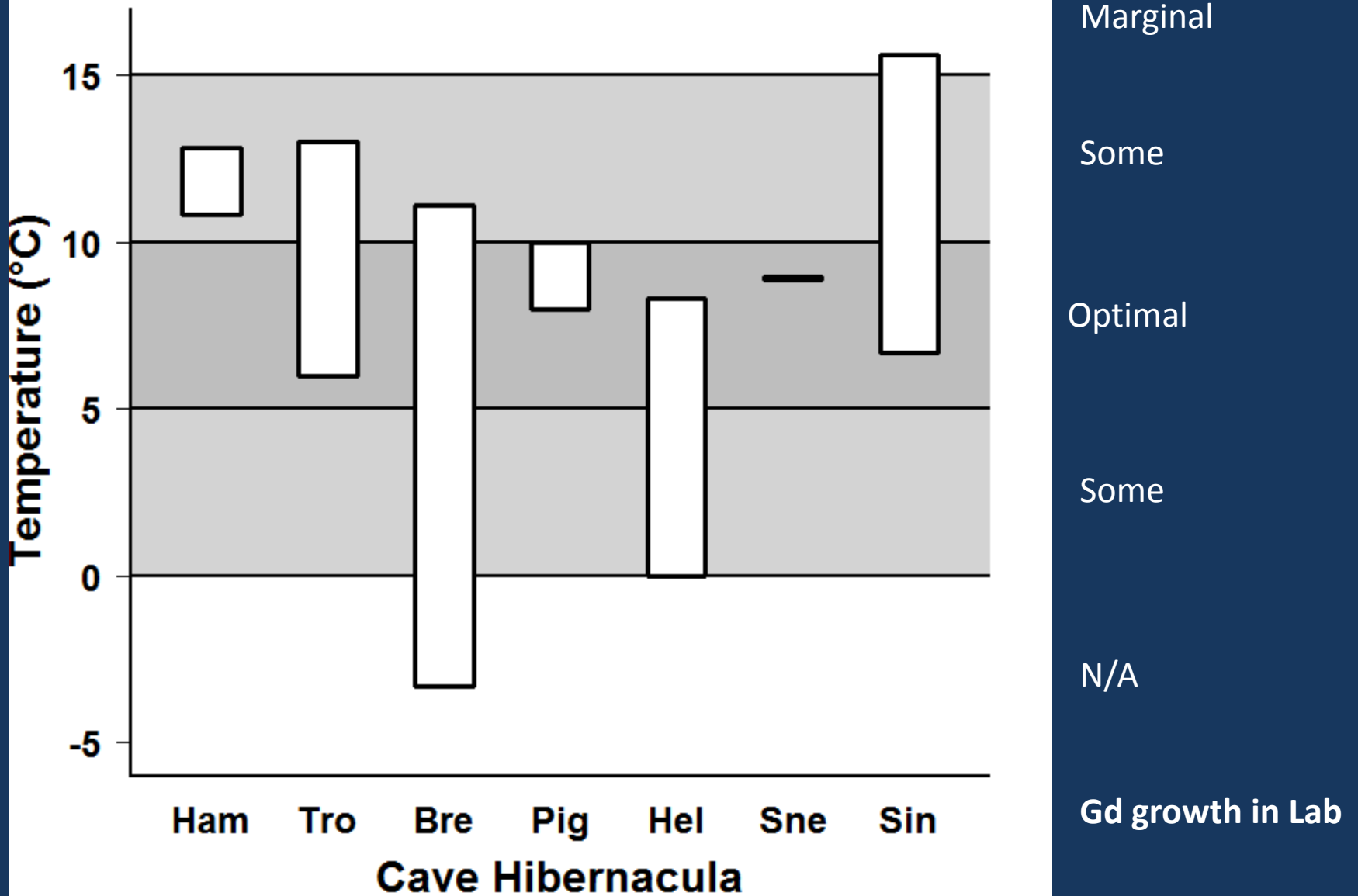
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Elevations of WNS-affected hibernacula in SE US

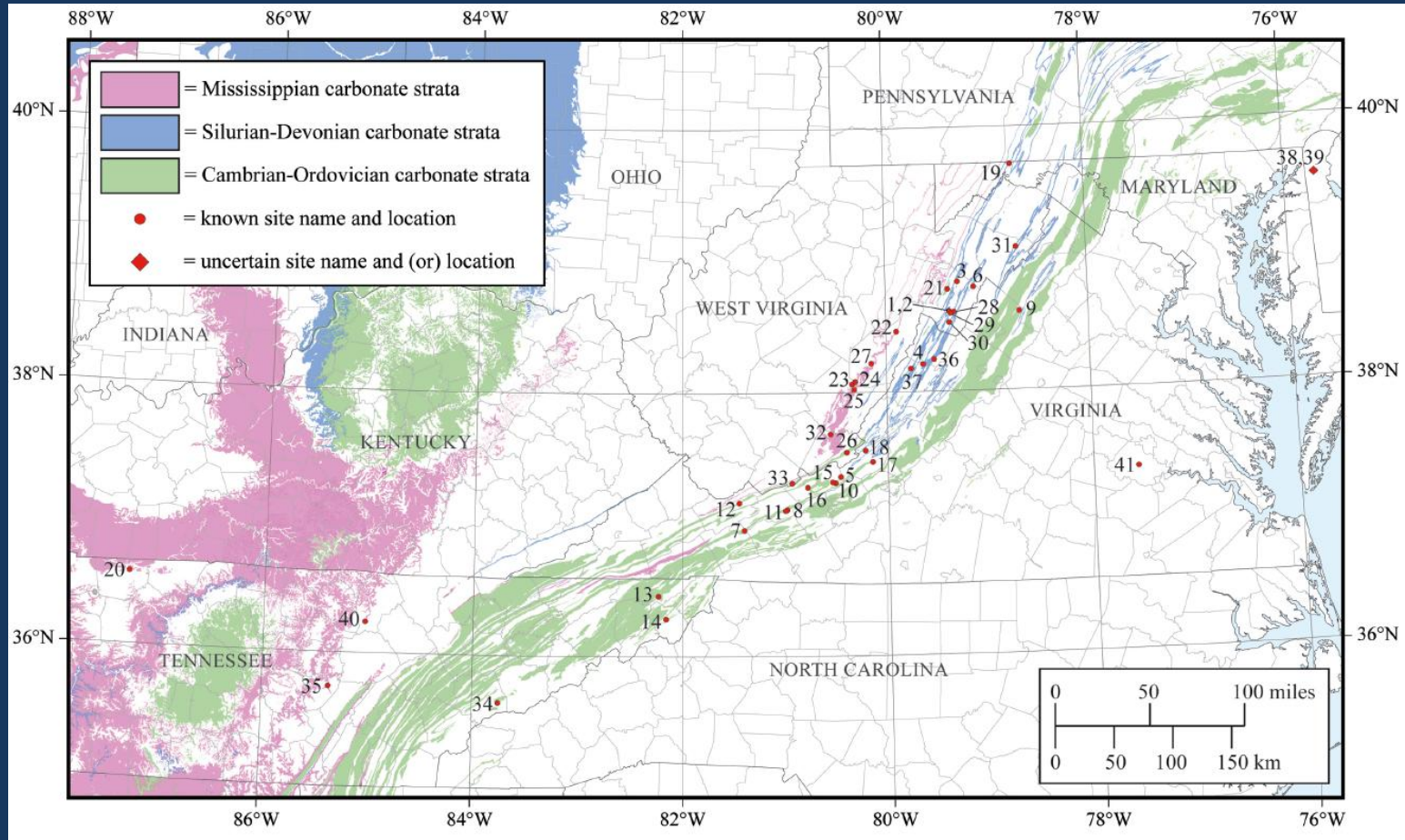


- Mean (95% CI):
643 m (582 – 704 m)
- Median (IQ Range)
686 m (579 – 744 m)
- Range: 131 - 933 m
- Sample size: $n = 31$

Temp of Caves with WNS & lab growth range of Gd



Geology of WNS-affected hibernacula in SE US



- WNS found in hibernacula along spine of Appalachian Mountains in 3 types of carbonate strata (17 C-O sites, 12 S-D sites, 9 M sites)
- Within Appalachians, most sites are in Cambrian-Ordovician, but this stratum is still underrepresented per unit area

Source of Data: Swezey & Garrity 2011

Conclusions for Part 1: WNS-affected hibernacula in SE US

- In SE US, hibernacula with WNS are
 - Most often found in the Cambrian-Ordovician stratum
 - However, C-O stratum is underrepresented on a per-unit area basis
 - Most often found between ~580 - ~740 m elevation
 - Found in temperature range from -3.3 - 15.6 °C
 - However, most overlap optimal growth range of 5-10 °C
- Limitations
 - No comparisons to WNS-unaffected sites, so not possible to say if trends indicate greater susceptibility or simply where hibernacula are located