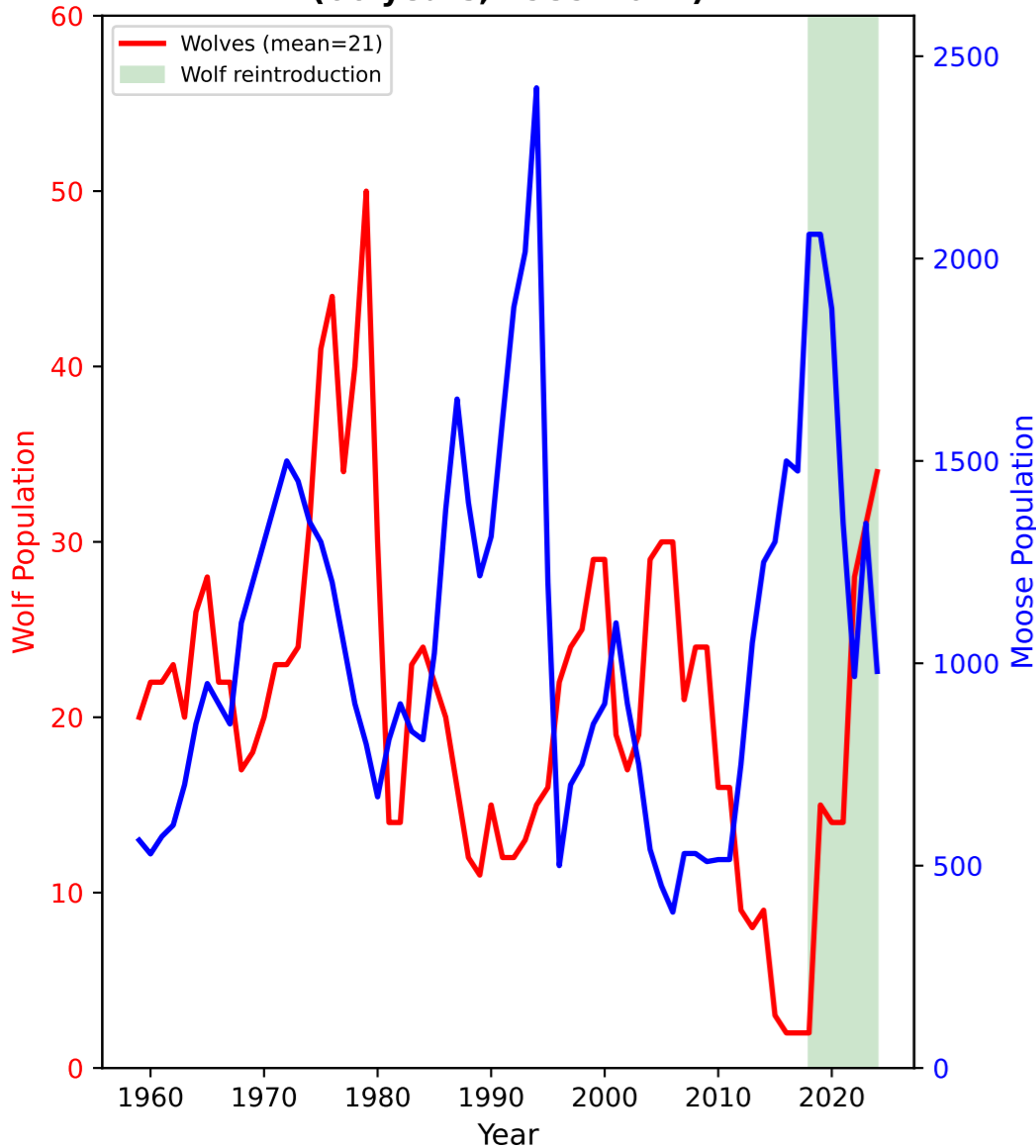
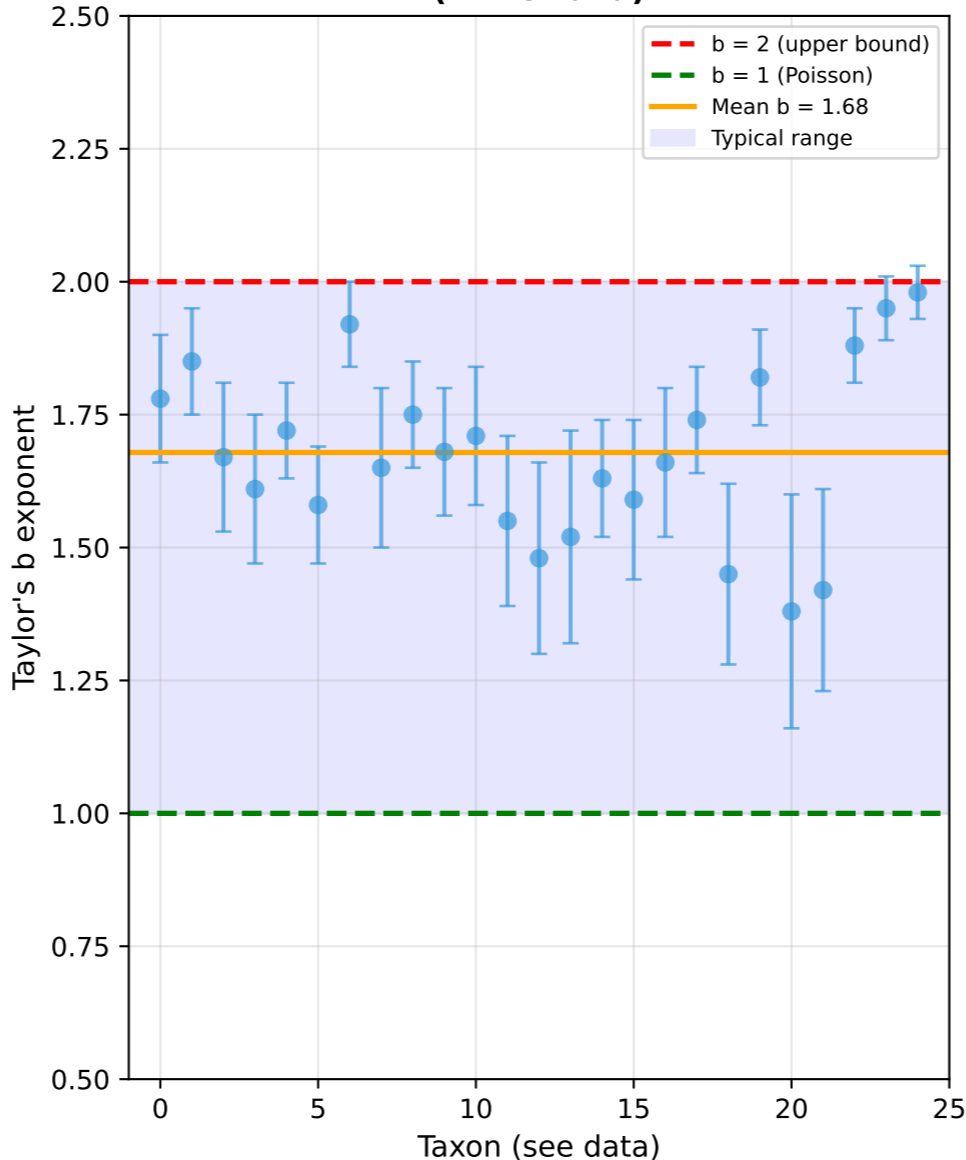


# RTM Ecology: Population Dynamics Validation

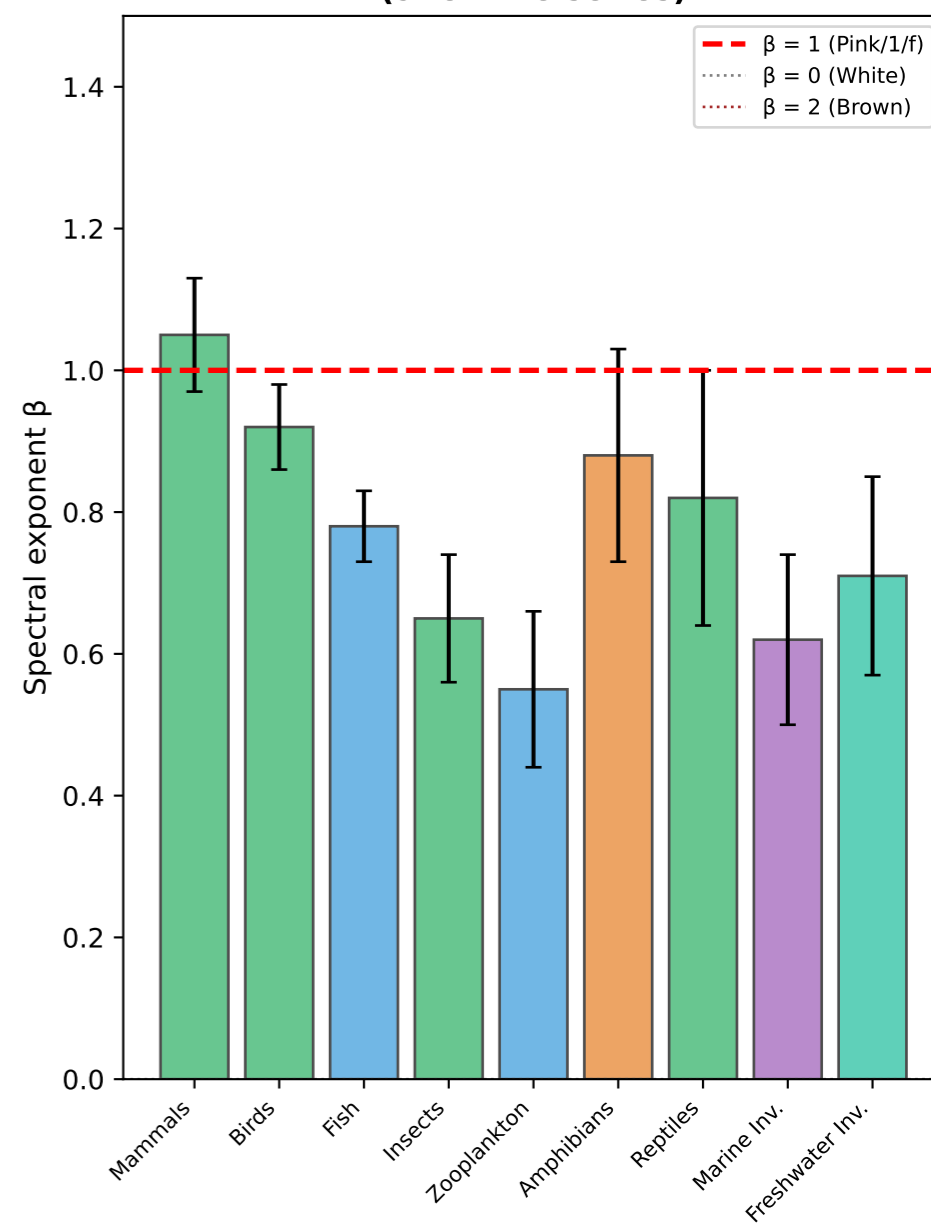
1. Isle Royale Predator-Prey Dynamics  
(66 years, 1959-2024)



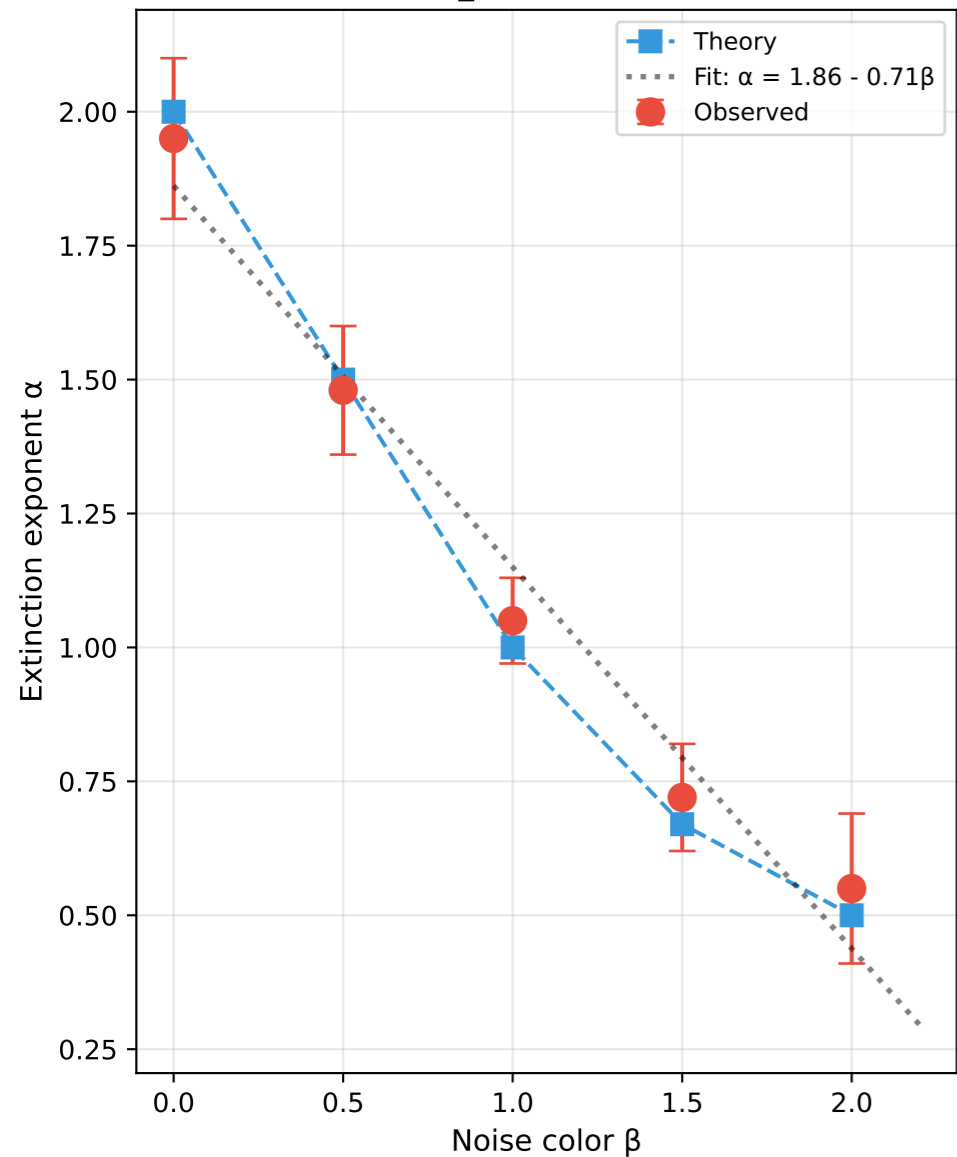
2. Taylor's Power Law:  $\text{Var} \sim \text{Mean}^b$   
(n=25 taxa)



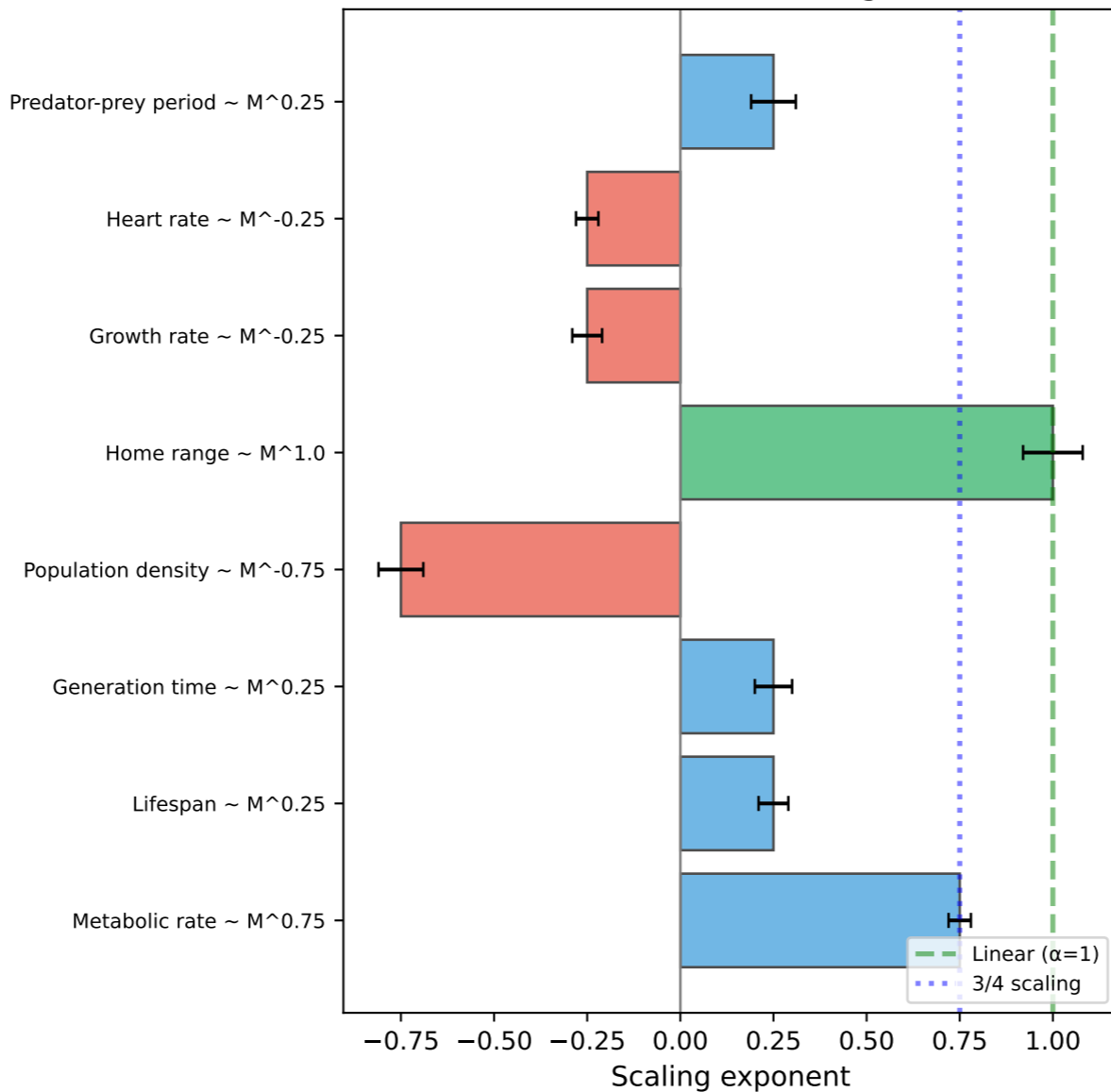
3. GPDD Spectral Redness  
(978 time series)



4. Extinction Time Scaling  
 $T_{\text{ext}} \sim N^\alpha$



5. Body Mass Allometry  
(Metabolic Scaling)



## RTM ECOLOGY - POPULATION DYNAMICS VALIDATION

### DATA SOURCES:

- GPDD: 4,500+ time series, 1,800+ species
- Isle Royale: 66 years (1959-2024)
- Taylor's Law: 25 taxa, 3,000+ populations
- Extinction studies: 78 analyses

### DOMAIN 1 - TAYLOR'S POWER LAW:

Mean  $b = 1.68 \pm 0.16$   
Range: 1.38 - 1.98  
Test vs  $b=2$ :  $p = 0.0000$   
RTM Class: AGGREGATED ( $1 < b < 2$ )

### DOMAIN 2 - SPECTRAL REDNESS:

Weighted mean  $\beta = 0.82$   
Terrestrial:  $\beta \approx 0.9-1.1$  (PINK-RED)  
Aquatic:  $\beta \approx 0.5-0.8$  (PINK)  
RTM Class: CRITICAL ( $1/f$  noise)

### DOMAIN 3 - PREDATOR-PREY (Isle Royale):

Wolf  $\beta = 2.08$   
Moose  $\beta = 2.30$   
Correlation:  $r = -0.39$

### DOMAIN 4 - EXTINCTION SCALING:

$\alpha$  decreases with  $\beta$  (redder  $\rightarrow$  faster extinction)  
Correlation:  $r = -0.98$

STATUS: ✓ CRITICAL DYNAMICS VALIDATED