



Plethodon chattahoochee



Plethodon shermani

A Blast to the Past: Multi-decadal Trends in Parasite Diversity in Plethodon Salamanders

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Introduction

- Climate change is altering ecosystems at immense scales, and one consequence of climate change is biodiversity loss
- Parasites are an important part of biodiversity that could decline with climate change
- To investigate whether parasites infecting *Plethodon* salamanders are changing over time, we examined preserved natural history collections of *Plethodon* salamander species (mostly *Plethodon shermani*) collected from Macon County, NC from 1943-2017
- The Southeastern US is a salamander biodiversity hotspot
- Plethodon* salamanders have changed abundance and elevation in response to climate warming
- Published surveys of parasites infecting *Plethodon* salamander species from 1937 was used as a baseline to compare museum and contemporary field sample parasite diversity changes over time



Methodology

Field Sampling:

- Contemporary salamanders caught using field methods
- Upon capture, we recorded species identity, sex, age, and snout vent length prior to release
- 20 individuals were euthanized for future dissection and parasite examination



Museum Sampling:

- 117 Museum samples selected from the Georgia Museum of Natural History
- Individuals of *P. shermani* were selected based on locality, year, and season of capture

Dissections:

- Entire gastrointestinal (GI) tracts were examined at 5x to search for macro-parasites
- Parasites were identified to type and, when possible, species
- Parasite richness, prevalence, and infection intensity were measured
- Preserved GI tracts and parasites found were stored for later identification
- We noted that parasite aggregation was common (80 percent of the parasites in 20 percent of the hosts)



Results

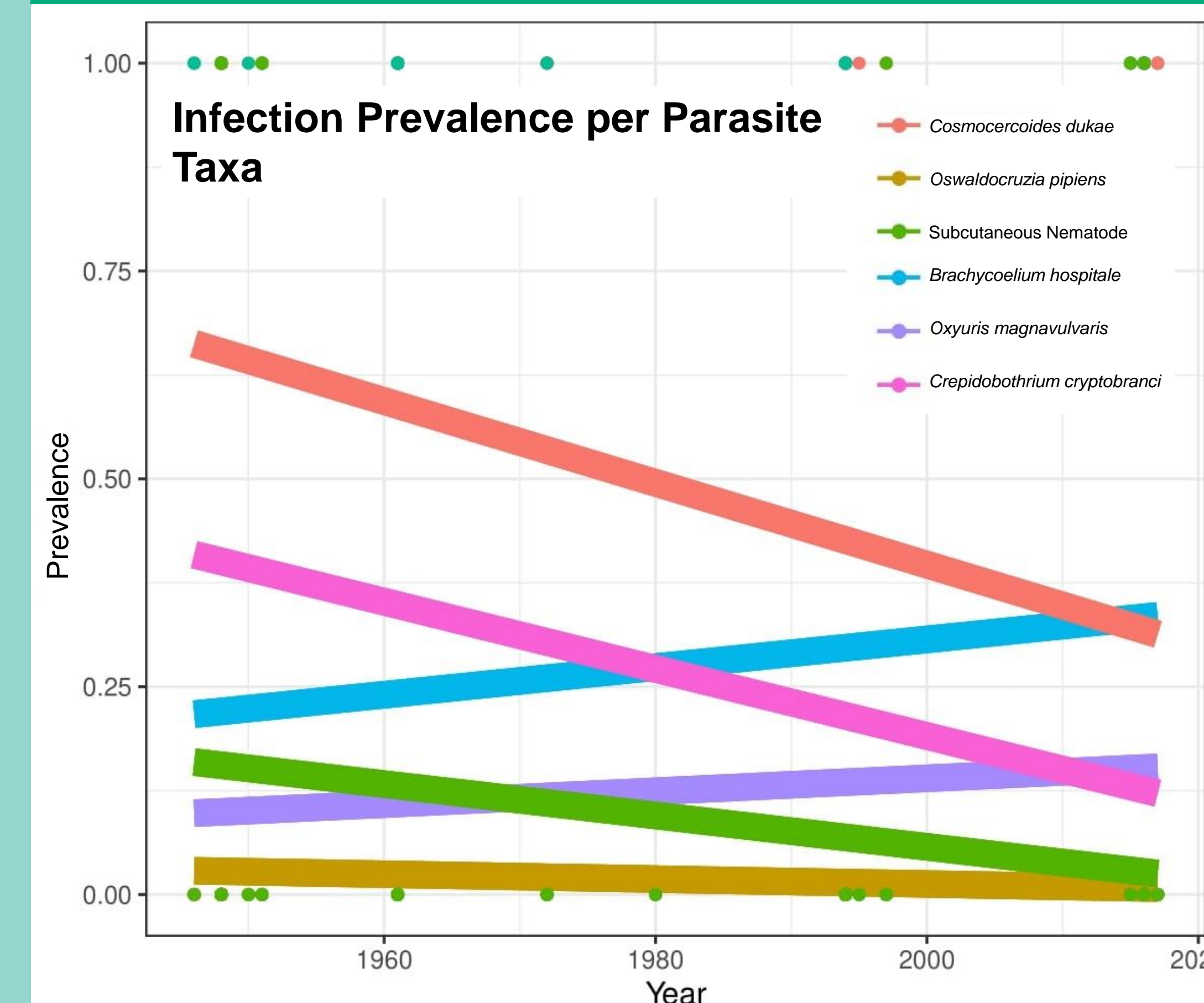


Figure 1: Prevalence in each parasite taxa over a continuous time scale. *Cosmocercoides dukae*, *Crepidobothrium cryptobranci*, and the Subcutaneous Nematode are significantly lower in richness.

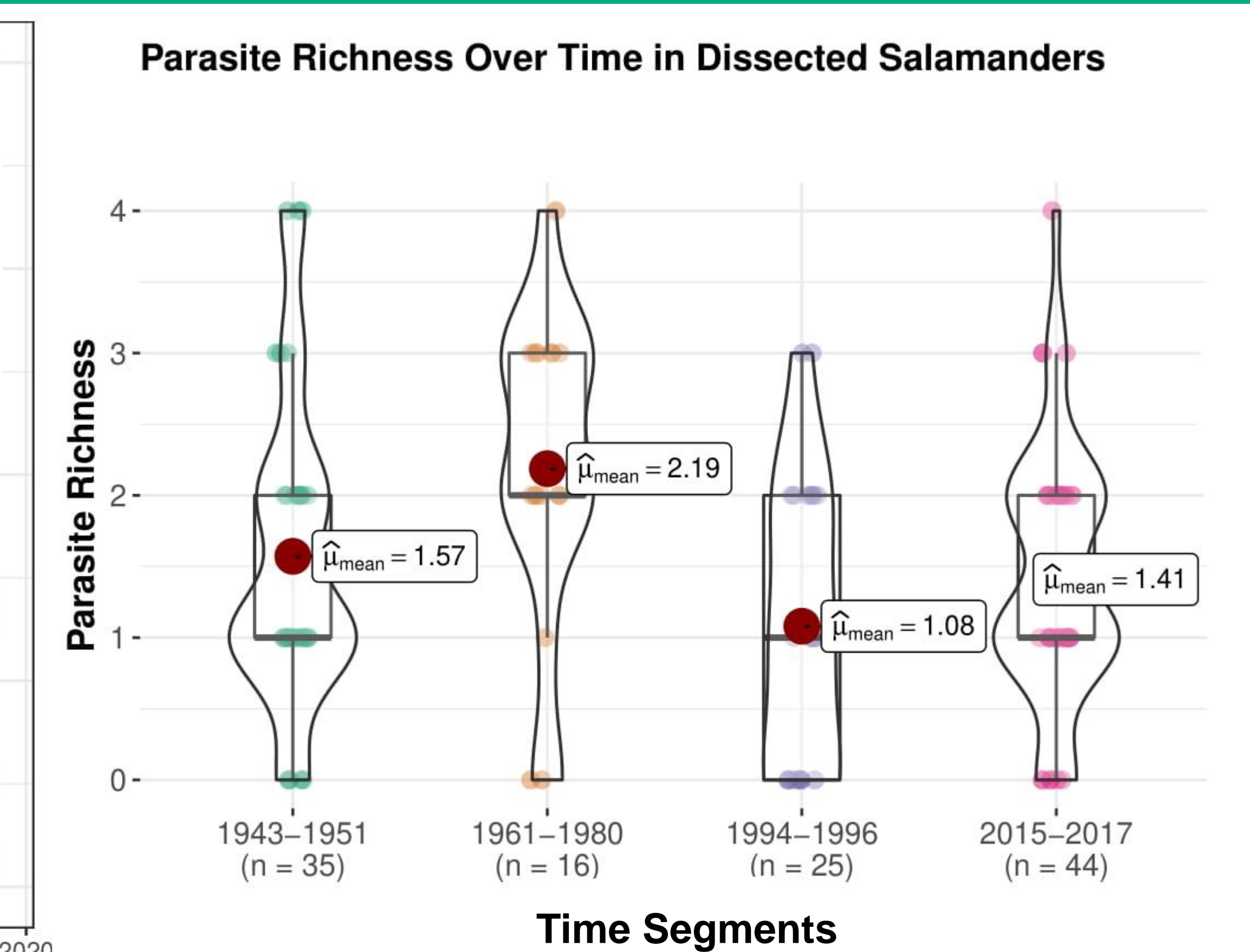


Figure 2: Parasite richness from all dissected specimens is shown and compared across the 4 different sections of time of collection. There was a significant difference between all four of these times in terms of parasite richness.

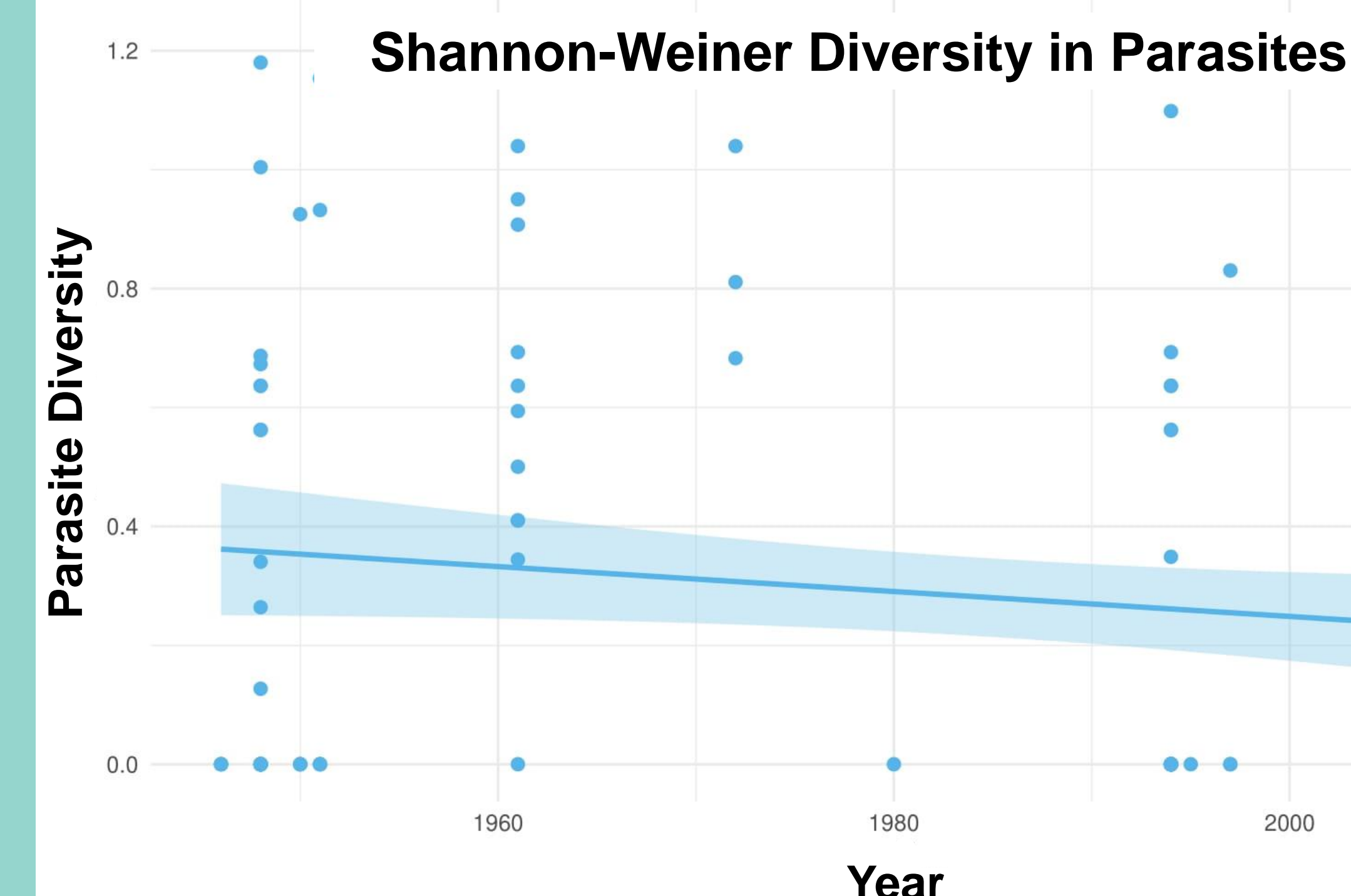


Figure 3: Parasite diversity calculated using the Shannon-Weiner index for each sampled salamander is shown. The trend of diversity is decreasing over time, and while not statistically significant, may be biologically significant.

- Parasite richness over time is generally decreasing
- Cosmocercoides dukae*, *Crepidobothrium cryptobranci*, and the Subcutaneous Nematode are significantly lower in richness
- Examples of macroparasites found
- Cosmocercoides* was most prevalent



Research Question & Predictions

- How has parasite diversity changed over time?
- Predictions:**
- Parasite diversity may decline in response to declining host population sizes and shrinking host geographic ranges, or hot-dry conditions unsuitable for transmission
- Parasite diversity may increase as host ranges shift and parasites encounter new host species, or if warming conditions favor parasite development and transmission

Conclusions & Future Work

- Parasite richness is stable in 2 parasite species, but decreasing in 3 others, which could indicate differential climate sensitivity across parasite species
- Diversity and parasite richness are trending downwards, which may indicate overall reduction in transmission
- Future Work:**
- Identify parasites at the molecular level
- Examine more salamanders from each decade to get a clearer resolution of changes over time

Acknowledgements

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