Ranavirus Prevalence in Connecticut Wood Frog Populations

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Research Question: Is ranavirus present in vernal pools throughout Connecticut?

Ranaviruses are attributed to 40-60 percent of amphibian mortality events in the United States. Despite the potential impact of mass mortality events on local population dynamics, spatial distribution and frequency of mass mortality events are not known. The first documented ranavirus-associated mass mortality event in Connecticut was in summer of 2010 at pool LEBR. Prevalence of the virus within pools is generally low (<30%), making the virus difficult to detect without extensive sampling (Hoverman et al, 2012). However, high prevalence rates in CT have allowed us to expand the spatial extent of our surveillance effort to the entire state.

Adult Wood Frog (*Lithobates sylvaticus*) and field crew.

Methods

Year 1 – We sampled wood frog tadpoles from vernal pools in the watershed with a confirmed ranavirus morality event and in a watershed where mass mortality events had been documented but the cause was unknown (blue dots in Figure 1).

Year 2 – We resample pools from Year 1 and added 27 pools. We randomly selected state owned properties given that properties were > 15 km apart and stratified by four Level II Ecoregions (58e, 59a, 59c west of CT river, 59c east of CT river. We then collected tadpoles from up to three pools per property (red dots in Figure 1).

Quantitative real-time polymerase chain reaction (qPCR) was used to amplify and quantify viral DNA within liver tissue. All lab work was completed by Amphibian Disease Diagnostic Laboratory at Washington State University.

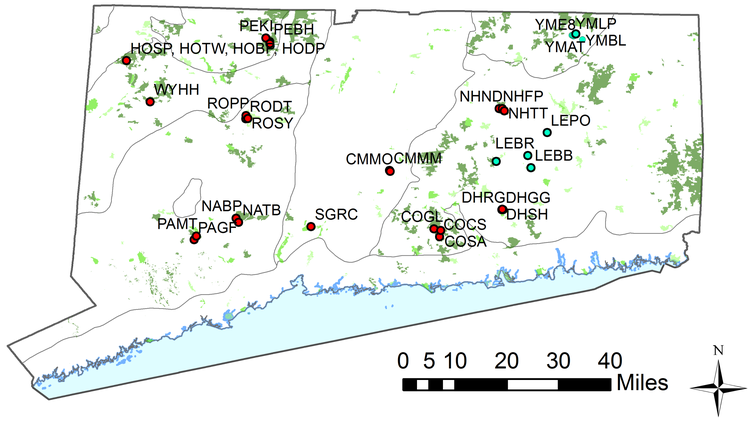


Figure 1. Vernal pools where wood frog tadpoles were collected. Eight pools were sampled in both years (blue dots) and 27 additional pools were sampled in year 2 (red dots). Green represents state owned properties, with dark green = state forest, medium green = state parks, light green = wildlife management areas.

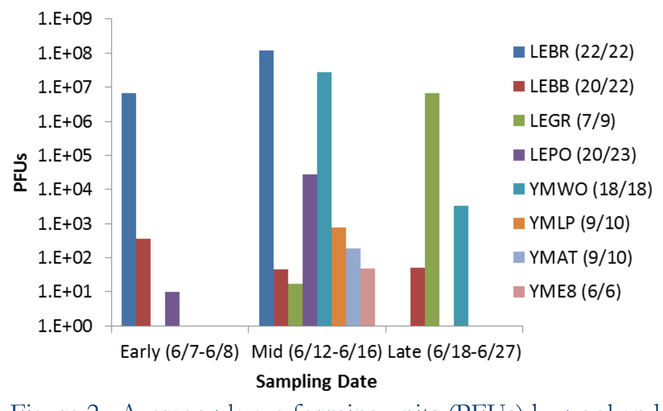


Figure 2. Average plaque forming units (PFUs) by pool and the proportion of tadpoles that tested positive for ranavirus.

Acknowledgements

We thank Jessie Brunner for helpful advice. Jason O'Connor and D. Cristina Macklem collected tadpoles. Funding provided by Connecticut Department of Energy and Environmental Protection.

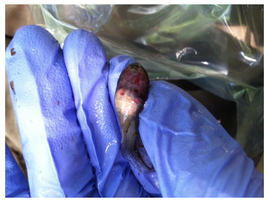
Main Result: Ranavirus detected in all eight pools sampled in year 1

Prevalence of ranavirus within a pool was very high (Figure 2). All tadpoles collected from three pools (LEBR, YMWO, YME8) tested positive for ranavirus.

Only one mass mortality event was observed during weekly visits to eight pools in Year 1, although all pools contained ranavirus.

PFU levels were particularly high in LEBR, the vernal pool where a mass mortality events were observed in 2010 and 2012.

Results from year 2 are pending.



Symptomatic tadpoles were rarely observed.

Discussion

Prevalence of ranavirus seems to be high in local wood frog populations in Connecticut's vernal pools. We were unable to test hypotheses regarding environmental and landscape predictors of ranavirus presence due to the presence of ranavirus in all vernal pools sampled. The assumption that the presence of ranavirus in a wetland will results in an amphibian mass mortality event cannot be made. Alternatively, observed mass mortality events alone are not an accurate predictor of ranavirus presence across a landscape. The PFU levels in LEGR and LEWO pools were similar to those observed in LEBR, and thus suggests that mass mortality events may have occurred in these pools after our last visit. Our results emphasizes the rapid nature of these mortality events, and supports a need for very frequent and consistent monitoring of vernal pools, especially as tadpoles near metamorphosis.