Estimating the Biomass of Amphibians Breeding in Bat Lake

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INTRODUCTION

Fauna serve an important function within ecosystems due to their ability to hold and transfer nutrients within and between habitats[1].

Amphibians that undergo biphasic lifestyles play an important role in aquatic - terrestrial nutrient transfer, especially in nutrient poor habitats such as bogs and swamps[2].

Biomass provides an estimate of the standing nutrient stock of a population within a habitat. This measure can be used to further inform researchers on the organisms role in nutrient cycling[3].

RESEARCH GOALS

1. Calculate the adult biomass of 4 amphibian species at Bat Lake, Algonquin Provincial Park.
2. Calculate the biomass of different life stages (egg, metamorph, and adult) for *Ambystoma maculatum*.

Blue-spotted Salamander
Ambystoma laterale

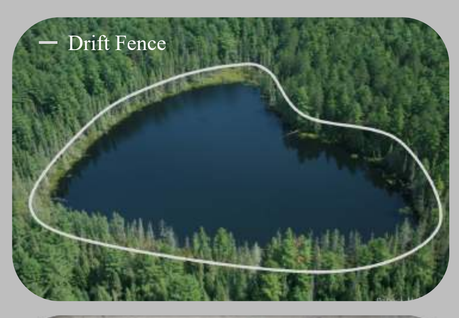
Spotted Salamander
Ambystoma maculatum

American Toad
Anaxyrus americanus

Wood Frog
Rana sylvatica

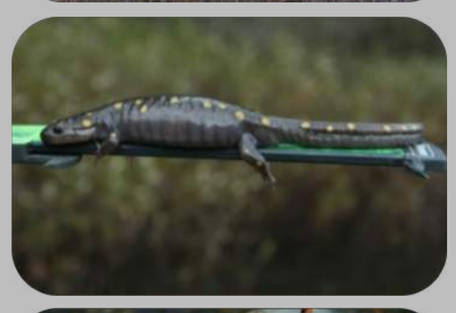
METHODS

Field Work



Study Site
Bat Lake, Algonquin Provincial Park

Trapping Method
Drift Fence
Funnel Box Traps



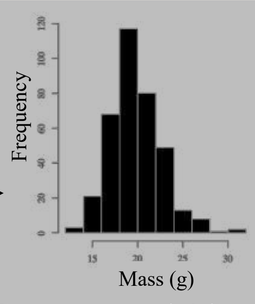
Measurements
Species
Sex
Mass

Egg Mass
Visual Surveys

Biomass Calculations

Total number of captures per sex/species

Sampled from



The mass distribution of the given population

*This simulation was preformed 1000x to provide upper and lower 95% confidence intervals.

RESULTS

Adult Amphibian Biomass Calculations

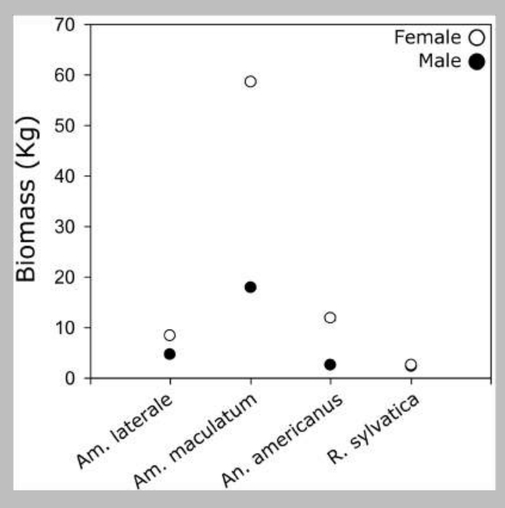


Figure 1: Biomass calculations shown for adult males and females for four species over the 2018 season. Total biomass for all species measured was 108.9 kg (LCI:107.2; UCI:110.6). 95% confidence intervals are also displayed however due to scale, are not visible.

Ambystoma maculatum Life Stage Biomass Calculations

Figure 2: Nutrient cycling of *Am. maculatum* at Bat Lake, over the 2018 season. Quantified biomass measurements shown for 3 life stages (adult, egg/embryo, metamorphs).

DISCUSSION

The adult amphibian breeding population at Bat Lake shown (Figure 1) represents a **total measure of 108.9 kg.** In comparison to current literature on the subject, this calculation illustrates that Bat Lake has a **remarkably high amphibian biomass**[2]. Bat Lake could potentially owe a great deal of productivity to these amphibians however, future studies are needed.

Ambystoma maculatum are shown to represent approximately **70% of the adult amphibian biomass** at the site (Figure 1), and occur at a density that is unseen within the literature. These amphibians supplied a **net influx of nutrients** into the environment (Figure 2). *Am. maculatum* can therefore provide an interesting case study for productivity within low nutrient systems.

Future Directions

1. Measure the productivity of *Am. maculatum* larvae within Bat Lake seasonally.
2. Quantify the specific make up of nutrients for each population, in order to further understand the role amphibians have in nutrient cycling at the site.

ACKNOWLEDGEMENTS

Many thanks to Dr. Njal Rollinson and Patrick Moldowan for their support and encouragement throughout this project. Always grateful to the fellow BLISS team members; E. Ann Francis, Daire Crawford, Mariel Terebiznik and Samuel Paiva who survived the night of the 5000 amphibians alongside me.

REFERENCES

1. Atkinson, C. L., Capps, K. A., Rugenski, A. T., Vanni, M. J. (2017). Consumer-driven nutrient dynamics in freshwater ecosystems: from individuals to ecosystems. Biological Reviews. 92(4): 2003-2023.
2. Milankovich, J.R., Peterman, W. E., (2016). Revisiting Burton and Likens (1975): Nutrient Standing Stock and Biomass of a Terrestrial Salamander in the Midwestern United States. Copeia. 104(1): 165-171.
3. Regester, K. J., Lips, K. R., Whiles, M. R. (2006). Energy flow and subsidies associated with the complex life cycle of ambystomatid salamanders in ponds and adjacent forest in southern Illinois. Oecologia. 147(2): 303-314.