Carter Adamson

FISH 558 – Project Description

3/18/2024

I propose the following research question(s):

How does spring salamander abundance, survival, and growth vary between streams in the Hubbard Brook Experimental Forest, and what covariates significantly affect these relationships?

Whether salamanders qualify as an appropriate animal may be up to the discretion of the graders, but I can find another dataset if necessary. The data come from the Hubbard Brook Experimental Forest, a long-term ecological research station in New Hampshire. The methodology involved walking surveys along 500-meter reaches of 5 distinct streams in Hubbard Brook. There were generally 9 surveys per reach – 3 secondary occasions each nested within 3 primary occasions. Salamanders were caught in-hand, marked with PIT tags, and assessed for various covariates like sex, life stage, mass, length, width, and the amount of tail missing. Survey-level covariates like date and weather were also recorded. The data were found on the publicly available Environmental Data Initiative repository.

To conduct this analysis, I plan to use Program MARK or RMark to construct encounter histories for each tag. This will allow me to determine survival rates and potentially an abundance estimate. I will also use size data from recaptured individuals to determine growth. I can incorporate individual-level covariates in both cases. I am less interested in adding the site-level covariates, since they mostly concern the survey itself (e.g. names of surveyors and duration of survey) rather than including informative environmental information (e.g. water quality).

To conduct this analysis, I plan to consult Cooch & White (2019) and Kery & Schaub (2012), and I am also open to using tagging model methods that will be covered later in this class if they are applicable.

I expect that growth will be similar between all streams, as environmental conditions within Hubbard Brook will be relatively similar. However, I hypothesize that abundance and survival will be lower in downstream reaches, since predatory brook trout live low in the system but not upstream. To investigate that relationship, “Reach” must be included as a covariate. I also expect that the “% of tail missing” covariate will have a negative effect on survival.