

## **Project summary**

### **Research overview**

Ecological theory (metapopulation theory, neutral theory, etc.) has been developed using relative scales (e.g. local vs. regional, demographic rates). While theory is developed in relative scale for greater generality across taxa, conservation planning and research studies need to operate on absolute scales (square kilometers, seasons, years). My overarching research goal is to use a highly computational, data-intensive approach to identify which **1)** Explore the relationship between absolute and relative scale across taxa and provide a framework for future ecological studies by **2)** derive a model for unifying absolute and relative scale across taxa and **3)** determining the scales at which space-for-time substitutions are appropriate. Timothée Poisot (University of Montreal) is an ideal mentor for his expertise in scientific programming and working with large spatial and temporal datasets.

### **Intellectual Merit**

Different ecological mechanisms operate at different scales, and thus the scale at which a study is conducted is central to understanding those mechanisms [1]. The realm of ecological theory has tended to operate in terms of relative scale, while applied ecology requires absolute scale. While ecology has addressed the problems of spatial scale for some time now, it has been only recently that the data have become available to rigorously address the problem of temporal scale. Because temporal scale ecology is still in its infancy, the problem of synthesizing the relationship between space and scale has not yet been thoroughly addressed. However, gaining a better understanding of the relationship between relative and absolute spatial and temporal scales is central to developing a general model to unifying absolute and relative scales across taxa and understanding over which scales space-for-time substitutions are effective.

### **Broader impacts**

I will use currently existing tools and technology to improve access for chronically ill/ disabled people through **1)** creating a framework for remote collaboration as well as **2)** partner with the Data & Software Carpentry organizations to develop remote options for teaching and learning to use those tools. Open science is also a powerful tool for increasing the accessibility of science for many different underrepresented groups, not only chronically ill/disabled researchers, and all of my research products, including data, code, publications and presentations, as well as project development and this proposal will be fully open. I will also serve as a mentor for K-12 students with a disability/chronic illness interested in pursuing a career in science through

the AccessSTEM DO-IT program.

1. Levin, S. A. **“The Problem of Pattern and Scale in Ecology: the Robert H. MacArthur Award Lecture”** *Ecology* 73, no. 6 (1992): 1943–1967.