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February 17, 2021

(scroll down for agenda and speaker abstracts)

Plenary Youtube Livestream: https://youtu.be/-UdkKirpG_A

9:00 AM - 9:30 AM	*Login & mingle (Join a conversation room in The Lounge)*	
9:30 AM -10:00 AM	Welcome • Workshop logistics and overview • Synthesis in Ecology and Environmental Science: A Look Back	Ben Halpern, PhD UC Santa Barbara, NCEAS
10:00 AM -10:20 AM	Considering complexity in global change biology: Using theory to parse syntheses of multiple stressors	Kristy Kroeker,PhD UC Santa Cruz
10:20 AM - 10:40 AM	Synthesizing evidence of anthropogenic climate change, tree mortality, wildfire, and biome shifts for conservation and carbon solutions	Patrick Gonzalez, PhD UC Berkeley, US National Park Service
10:40 AM -11:00 AM	Question and Answer session for speakers	
11:00 AM - 11:15 AM	*Coffee/Stretch Break*	
11:15 AM - 12:30 PM	(Meet in Main Room First) Breakout discussion groups: Big questions in ecology & environmental science	
12:30 PM - 1:30 PM	*Lunch Break*	
1:30 PM - 1:50 PM	Cross disciplinary syntheses, the nature of generality, and meta-analysis for parameter estimation in the context of Big Data and Open Science	Jessica Gurevitch, PhD Stony Brook University
1:50 PM - 2:10 PM	Prediction, predictability, and emerging imperatives	Michael Dietze, PhD

		Boston University
2:10 PM -2:30 PM	Question and Answer session for speakers	

-Continued next page-

2:30 PM - 3:00 PM	Day 1 Wrap Up	Ben Halpern, PhD UC Santa Barbara, NCEAS
3:00 PM - 4:00 PM	*Networking Hour (join us in The Lounge for formal and informal networking opportunities)*	

Keynote Speakers

Kristy Kroeker, PhD - UC Santa Cruz

Considering complexity in global change biology: Using theory to parse syntheses of multiple stressors

Forecasting and adapting to the emergent effect of environmental change requires a bettering understanding of the combined effects of multiple stressors. Interactions among multiple environmental stressors, where the ecological effect of one is dependent on the magnitude of another, are very common across ecosystems. These interactions can lead to non-additive outcomes, where the combined effects are more or less than expected. Our ability to predict interaction outcomes is very limited, in part because physiological and ecological responses to abiotic factors are non-linear. Here, I use our theoretical understanding of thermal performance curves to illustrate how theory and syntheses can advance our understanding of the cumulative impacts of multiple stressors and the emergent effects of global change.

Patrick Gonzalez, PhD - UC Berkeley, US National Park Service

Synthesizing evidence of anthropogenic climate change, tree mortality, wildfire, and biome shifts for conservation and carbon solutions

Anthropogenic climate change is altering ecosystems and human well-being globally. Detection and attribution analyses of field observations and causal factors have found that anthropogenic climate change has doubled tree mortality in western North America, driven the loss of up to one-third of tree species in the African Sahel, doubled the area burned by wildfire over natural levels in western North America, and caused upslope and latitudinal shifts of biomes in boreal, temperate, and tropical ecosystems. These impacts drive carbon emissions from ecosystems to the atmosphere, exacerbating climate change in self-reinforcing feedbacks. Syntheses of evidence across individual sites reveal widespread impacts of anthropogenic climate change on vegetation and high sensitivity in polar, montane, and arid ecosystems. Syntheses reveal that tropical deforestation in Africa, Asia, and South America, agricultural expansion, and other extensive forms of human land cover change can cause more severe impacts on ecosystem integrity than climate change. Syntheses of historical evidence provide a basis for analyzing future risks and identifying ecosystems at high risk and potential refugia. Results can guide natural resource management and biodiversity conservation under climate change, with measures that include proactive use of fire to reduce catastrophic wildfire and conservation of refugia for endangered species. As the Intergovernmental Panel on Climate Change has demonstrated, a global synthesis across different impacts can quantify reasons for concern at different temperature increases. Future syntheses would provide scientific information essential for global policy on the fundamental solution to climate change–cutting greenhouse gas emissions from cars, power plants, and other human sources.

Jessica Gurevitch, PhD - Stonybrook University

Cross disciplinary syntheses, the nature of generality, and meta-analysis for parameter estimation in the context of Big Data and Open Science

I will discuss several interrelated issues currently facing research synthesis in ecology as well as in other fields. As the volume of scientific literature has grown in recent decades, different approaches have been made to make sense of it in different disciplines. One of the great challenges in working across disciplines is that not only are terms unfamiliar and background knowledge different, but the nature of the questions we ask and how we frame them differs. Meta-analyses in medicine and animal studies, for example, strive to minimize heterogeneity; in ecological meta-analyses studies are assumed to be heterogeneous and the focus is on explaining as much of the heterogeneity as possible. How then can we synthesize results across disciplines? What if our questions are inherently interdisciplinary, as they would be in issues of environmental causes of illness and effects on lifespan? How important is it to reach general estimates and hypotheses about causal relationships, rather than precise estimates of specific effects? I will argue that a broader scope of tolerance among disciplines for different kinds of questions is essential for cross-disciplinary synthesis, where both specific effects of more narrowly defined scope are accepted, as well as meta-analyses that incorporate high heterogeneity to answer more general questions. Another area that is ripe for development in research synthesis is the estimation of parameters for use in models in ecology, climate science and other fields. Making use of formal meta-analysis procedures can offer more precise, replicable and transparent parameter estimation than current ad-hoc approaches. In the era of Big Data, domination by computer science rather than statistics has overlooked these kinds of issues in parameter estimation and data synthesis that have been established for decades in statistical meta-analysis. How will open science influence the availability and collection of data for future meta-analyses? I suggest that it is not the panacea that many hope for, because messy data and messier meta-data will reduce the usefulness of published primary data for meta-analyses. However, open science practices may open other doors, particularly in the practice and application of research synthesis itself.

Michael Dietze, PhD - Boston University

Prediction, predictability, and emerging imperatives

This talk focuses on the role of prediction in driving synthesis and advancing ecological understanding. While synthesis and prediction are often presented as separate activities when viewed statically, they become tightly linked when viewed as an iterative cycle, where ecologists generate predictions that are quantitative, specific, and thus falsifiable, and synthesis becoming a continuous process of updating our understanding as new information becomes available. In this perspective models play a critical role as "scaffolds" for synthesizing information across scales and variables. Furthermore, in our current era of rapid environmental change an iterative cycle of prediction and synthesis provides a critical win-win of simultaneously improving environmental decision making and sustainability while accelerating basic research. Beyond prediction itself, I present predictability and transferability as grand challenge themes driving "across silo" theory and synthesis. Finally, I report on the ongoing efforts by the Ecological Forecasting Initiative to build an international, interdisciplinary community of practice around prediction in ecology.