Connie Woodhouse
Associate Professor
School of Geography and Development
412 Harvill Building, Box #2
University of Arizona
Tucson, Arizona 85721-0076

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Dear Professor Woodhouse:

Of all of the students that I have had over the past twenty-five years, Jeremy Lichstein is the most complete blend of empiricist and theoretician. Jeremy came to Princeton with a Master's in forest ecology and unusually deep field experience. He is interested in forest dynamics at all scales, including basic and applied questions about diversity, biogeochemistry and global change. He is ambitious enough to pursue some of the longest-standing and most fundamental questions in ecology, determined enough to assemble a unique collection of knowledge and tools, and talented enough to make headway where others have been stopped.   One measure of his ability and potential is that the U.S. Forest Service is building a research group around him at Princeton. I want to emphasize that this was the Forest Service's idea. They saw his potential, proposed the idea, wrote the proposals, and funded the effort. He is obviously ready to lead his own group, because he is already leading his own group.

Jeremy began his scientific career as a field biologist and he is by far the best field biologist who has ever been part of my lab. Most of his empirical work is aimed at estimating or testing mathematical models. Every summer, while he was a graduate student, I gave him a budget of fifty to one hundred thousand dollars and he managed everything.   Most of the empirical part of Jeremy's thesis was devoted to understanding and estimating competition for light. He censused his own plots like the US forest inventory plots, in forests across the US, and measured light availability in them. He then developed a sophisticated statistical method to use this information together with the US forest inventory data to estimate light-dependent growth and mortality for any tree species in the US. He also tested his method against direct measurements of the functions for a range of species. The work is important because it provides critical building blocks for models of forest dynamics that apply to the large scales and high natural diversities that characterize real ecosystems.

Jeremy connects models to data with statistical estimators. He is an expert in statistics, able to derive his own Bayesian or non-Bayesian estimators and tests. Jeremy is the best statistician in my laboratory since Ben Bolker (now at the University of Florida and author of a widely used statistical text).

Jeremy is also a mathematical modeler, who develops simple analytically tractable and mechanistic models of forest dynamics, with parameters can be measured from field data, and that quantitatively predict distribution and abundance (see the early example in the PNAS article from 2008 listed in his CV). The modeling work has a number of applied and basic objectives. On the applied side, Jeremy is interested in improving our capacity (and the Forest Service's) to manage diverse forests in a changing climate.

My research group currently builds the land–surface component of NOAA's earth system model, which predicts global climate change. The model controls the exchange of mater, energy and momentum with the atmosphere, and predicts the distribution of biomes, effects of land use and the global carbon, nitrogen and water cycles. Global modeling is a vital but rare skill, particularly among people trained as biologists. Jeremy decided six months ago to take over the development of the next generation of our global model. He has already built a statistical interface between the current version and forest inventory and eddy covariance tower data, and is using this to estimate poorly constrained parameters. One interesting early finding is that the forest inventory data reveal sensitivities to climate not present in existing models, and that will have large effect on predictions about global warming. This work should result in a high-profile paper this year. Jeremy plans to build the next-generation global model around the simpler forest models that he has been working on to date. His promise as a global modeler is extraordinary. The only other comparable person that I have helped train is Paul Moorcroft who just earned tenure at Harvard.

In addition to his skills as a modeler, Jeremy is a card-carrying mathematical theoretician. He has a number of purely theoretical papers on his CV on topics ranging from the maintenance of diversity to ecological drift. But what really sets his work apart is his ability to work across the spectrum of models, from the complicated models that govern climate, to the simple models of ideas that dominate the literature of mathematical ecology. He is thus able to understand where others merely simulate.

Finally, Jeremy is one of the best teachers I have ever known. He was my TA on a field course in Panama, and I have watched him with the undergraduate field assistants for four summers. Undergraduates love him because he is rigorous, demanding and clear, and yet unusually patient and kind.

I urge you to interview Jeremy Lichstein. He is among the top couple of prospects I have seen in my career.

Sincerely,

Stephen W. Pacala
Frederick D. Petrie Professor
Director, Princeton Environmental Institute
Department of Ecology and Evolutionary Biology