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I am a senior research scientist in the Energy-Water-Resource Engineering Group and have a joint faculty appointment in the Department of Ecology and Evolutionary Biology at the University of Tennessee. I also mentor post-doctoral fellows for the National Institute for Mathematical and Biological Sciences.

One of my primary research goals is to quantify ecological benefits of renewable energy alternatives (primarily hydropower and bioenergy) so that they can be brought into the decision-making arena. My research has identified synergies for producing renewable energy and supporting fish and wildlife using models designed to project ecological responses to future conditions. My research has often had a spatial theme, for example to incorporate spatial heterogeneity (e.g., refuge), spatial processes (e.g., metapopulation dynamics), and spatial management decisions.

Understanding how changes in future climate will influence win-win synergistic strategies is another aspect of my research. When I first arrived at ORNL, I conducted uncertainty analysis of an ocean-climate model, and later developed methods for validating terrestrial climate models based on their ability to mimic observed responses to climate drivers. Later, I used individual-based models to evaluate climate effect on salmonids, including complex interactions in ecological responses to seasonal shifts in flow as well as rising temperature. Currently, I am involved in examining how stresses placed on federal hydropower to meet today's flow and water quality regulations in tailwaters will change in future.

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Select publications:

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