**Preliminary Exam Questions: Dr. Dinsmore**

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March 27, 2020

1. **One general perception in our profession is the notion that research without management implications (e.g., theoretical ecology) is of diminished value. I would like you to contrast theoretical and applied ecology, citing specific examples of each from your own areas of research. Should our profession continue to emphasize applied ecological questions, or is some other approach more worthwhile? Your response should demonstrate the breadth of your knowledge in these areas. [~5 Pages]**

In ecological scientific research, natural resource management, sustainability, and climate change, applied ecological research is quite useful for making use of observational data and predicting outcomes of management action, but broader theoretical ecology plays a significant role in generating applied management hypotheses. Together, applied ecology and theoretical ecology can provide ubiquitous and robust explanations of natural phenomena. Fields such as fish and wildlife management, forestry, and agronomy use applied ecology to quantify effects of management actions and define how the structure and function of certain ecosystems operate. Theoretical ecology includes behavioral ecology, evolutionary biology, and many other interdisciplinary fields that rely on the conceptual realm of data analysis where existing theories are tested, and novel theories are explored. There are costs and benefits associated with both approaches to ecology, and both contribute to the foundations of human knowledge in different ways.

Theoretical ecology is a function of the inherent quest for knowledge about ecological phenomena, and many fields of research contribute to a vast base of knowledge and information. Hypotheses in theoretical ecology rely on parsimony and simplification, often with broad, relaxed assumptions to encompass more taxa, more environments, or more time. Modeling simulations are cheap experiments, and computer power is continually growing. We’re entering the age of “Big Data” and I believe that Bayesian statistics will develop innovative ways to predict unobservable environmental variables. The widespread applicability of population ecology study design among animals and plants (e.g., occupancy modeling) is a great example of how theoretical ecology can be beneficial toward building the portfolio of knowledge about a certain taxa or ecosystem. Integrated population models (IPMs) are becoming an essential component of ecology, and I plan to use IPMs to explore the connections between common carp and bigmouth buffalo responses to harvest (i.e., mechanisms that may compensate for harvest mortality, and what covariates affect those mechanisms).

Theoretical ecology