Presidents' Lecture: Tuesday, 14 June 2022, 1–2 PM ET

Title: Decision-Making Processes and Statisticians: An Example from Natural Resource Management

Speaker: James D. Nichols

Decision-making is important to virtually every aspect of our lives, yet seldom receives the attention that it deserves. The discipline of statistics plays multiple roles in informed decision processes:

(1)   providing estimates of current system state,

(2)   developing models for predicting future state associated with each potential action, and

(3)   combining these estimates and models with a decision algorithm to make the optimal decision.

For many decisions, estimates of system state and predictive models are characterized by substantial uncertainty that must be dealt with by decision algorithms. One source of uncertainty, imperfect knowledge of the effects of different actions, is a target of some decision processes (e.g., adaptive management) that seek to reduce this uncertainty (i.e., learn) as the process proceeds through time.

The presidents' address will provide an overview of the adaptive management decision process used for 27 years in the establishment of annual duck hunting regulations by the U.S. Fish and Wildlife Service which provides a nice example of how such processes work. The adaptive management decision process reduced the contentious arguments that once accompanied annual decision-making at the U.S Fish and Wildlife Service and has led to a reduction in uncertainty about the effects of hunting on duck populations. Perhaps most important, decisions that result from such processes are objective, transparent, scientific, and readily defensible. Decision-making in many diverse areas (e.g., public health, education, economy, military) likely could be improved by use of formal decision processes, and statisticians are critically important in implementing such processes.

Bio: James D. Nichols is a retired research scientist who worked for the U.S. Fish and Wildlife Service and the U.S. Geological Survey (Biology) for his entire career. His research broadly emphasized the analysis and management of animal populations. Specific research foci were estimation of population parameters for animal populations, development of models for animal population dynamics, and use of formal decision processes for managing animal populations. He was given the Aldo Leopold Memorial Award in 2016 for a career in statistical estimation innovations and for his collaborations to bring better decision making to wildlife management.

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