

E.1.1: Plenary Ken Williams

Prospects for the Integration of Waterfowl Science and Management

B. Ken Williams^{1*}

¹ The Wildlife Society, Bethesda, MD, 20814, USA, kwilliams@wildlife.org

For at least 50 years waterfowl management has been one of the best expressions anywhere in the world of science-based wildlife management and conservation. Efforts to bridge the divide between science and management has led through the years to a good deal of creative thinking, resulting in new ways to bring science to management and new ways to engage management in scientific investigation. However, the pressures from a growing population with increasing demands on natural resources have created tensions in the linkages between waterfowl science and management. Habitat fragmentation, financial and budgetary limitations, changing social and demographic patterns and values, disconnects of people from the land, and a host of other issues necessitates our rethinking the roles and practices of waterfowl conservation in today's world. Though there is widespread agreement that science discovery will continue to have an important role as the future unfolds for waterfowl conservation, that role will develop in a context of changing relationships between the public and our waterfowl resources. Among other things, science discovery and its application to waterfowl management will play out in a rapidly changing socio-ecological framework, at local through international scales and at different levels of biological organization. It will be more important than ever to enhance partnerships among governmental and non-governmental organizations in the natural resources community, while including non-traditional interests in a broad coalition that will be needed to sustain our waterfowl heritage. It is only through such partnerships that large-scale investigations on critical waterfowl issues are likely to continue, that science-based conservation of waterfowl and their habitats can be sustained, and that public support for these activities can be maintained in the face of a growing number of competing needs for public resources.

E.1.2: Plenary Jim Nichols

Adaptive Waterfowl Harvest Management: Where Are We and How Did We Get Here?

James D. Nichols^{1*}, Fred A Johnson², G. Scott Boomer³, Byron K. Williams⁴

¹ Patuxent Wildlife Research Center, U.S. Geological Survey, Laurel, MD, 20708, USA,
jnichols@usgs.gov

² USGS Southeast Ecological Science Center, U.S. Geological Survey, Gainesville, FL, 32653, USA

³ Division of Migratory Bird Management, U.S. Fish and Wildlife Service, Laurel, MD, 20708, USA

⁴ The Wildlife Society, Bethesda, MD, 20814, USA

The adaptive harvest management (AHM) program for North American waterfowl represents an achievement of singular importance in modern wildlife management. The significance of this program is perhaps best appreciated by contrasting it with the approach to setting harvest regulations that it replaced. The traditional approach to harvest management is described, with emphasis on its shortcomings. The evolution of AHM is described, beginning with development of ideas within a small working group, moving to the formal adoption by the U.S. Fish and Wildlife Service, and to the subsequent full development and implementation of the approach. Lessons learned during the past 20 years of implementation of mallard AHM are discussed, as are current criticisms. Although current waterfowl AHM programs are not without problems, we know of no alternative approaches to management that deal as effectively with change and uncertainty.

F.1: Strengthening the Links between Waterfowl Research and Management (Organizer: Tony Roberts)

F.1.1: Runge

Decision Analysis as a Framework to Link Waterfowl Research and Management

Michael C. Runge^{1*}, G. Scott Boomer², Fred A. Johnson³, Byron K. Williams⁴

¹ Patuxent Wildlife Research Center, U.S. Geological Survey, Laurel, MD, 20708, USA, mrunge@usgs.gov

² Division of Migratory Bird Management, U.S. Fish and Wildlife Service, Laurel, MD, 20708, USA

³ USGS Southeast Ecological Science Center, U.S. Geological Survey, Gainesville, FL, 32653, USA

⁴ The Wildlife Society, Bethesda, MD, 20814, USA

Any aspect of waterfowl management is a decision, whether it is an annual decision regarding harvest regulations, a long-term decision about habitat protection and enhancement, or a collaborative decision about initiatives for hunter recruitment and retention. The formal application of decision analysis provides a way to structure those decisions, integrate existing scientific knowledge, embed stakeholder values, choose an optimal strategy, and identify valuable research questions. At the heart of a decision analysis are quantitative models that predict the performance of the management alternatives against the desired objectives. The development of these models requires an understanding of the decision context, as well as an understanding of the existing body of knowledge about the system in question. These predictive models serve as an expression of the assumptions and hypotheses about waterfowl population, habitat, and hunter dynamics, and as such, provide the raw material for monitoring and research. In a system of formal adaptive management, alternative hypotheses about those dynamics provide a method for internal learning, through the feedback generated by regular monitoring. The assumptions in the predictive models also provide the impetus for external learning, research outside of the management system to improve the predictions. Decision analytical methods can be used to identify topics for monitoring or research that have a high value of information, meaning they matter to the choice of management action. By way of example, we present the current set of models used to set northern pintail (*Anas acuta*) harvest regulations, and discuss how those models are used for internal learning, and how external research could be designed to enhance them. We also briefly discuss how predictive models of waterfowl habitat and hunter satisfaction could be used to link research and management.

F.1.2: Johnson

Waterfowl Conservation and the Value of Information

Fred A. Johnson^{1*}, Byron K. Williams²

¹ USGS Southeast Ecological Science Center, U.S. Geological Survey, Gainesville, FL, 32653, USA, fjohnson@usgs.gov

² The Wildlife Society, Bethesda, MD, 20814, USA

Though the potential for information to measurably improve management has been highlighted for several decades, in recent years the “value of information” has surfaced with increasing frequency in natural resources. However, the use of this phrase belies the fact that many in natural resources have only a limited understanding about what it actually means, how to measure it, and what to do with it. We introduce and describe several forms of the value of information in a context of waterfowl management. The value of information is discussed in terms of a potential gain in value with the addition of new information, as well as a loss in value associated with the absence of information. Value metrics are developed for uncertainty about resource status as well as resource processes and responses to management. We provide a common notation for the metrics of value, and discuss linkages of the value of information to strategic approaches like adaptive resource management and partially observable decision processes. We demonstrate the value of information with examples from waterfowl management and discuss how it can help direct adaptive management programs, as well as research designed to support management.

F.1.3: Howerter

Using Science to Inform Waterfowl Habitat Acquisition and Management Decisions

David Howerter^{1*}, Benjamin Rashford², Kathleen Fleming³, and Patrick K. Devers⁴

¹ Ducks Unlimited Canada, Institute for Wetland and Waterfowl Research, Stonewall, MB R0E1X0, Canada, d_howerter@ducks.ca

² University of Wyoming, Department of Agricultural and Applied Economics, Laramie, WY 82071 USA

³ U.S. Fish and Wildlife Service, Branch of Population and Habitat Assessment, Patuxent Wildlife Research Center, Laurel MD 20708, USA

⁴ U.S. Fish and Wildlife Service, Division of Migratory Bird Management, Patuxent Wildlife Research Center, Laurel MD 20708 USA

Loss of habitat is a common cause of wildlife population declines. Accordingly, conservation outcomes commonly are achieved through the protection of intact or restoration of degraded habitats. Scarce resources, however, dictate that investments in habitat protection and restoration accomplish conservation objectives cost-efficiently. Thus, decision support tools that codify and integrate available data and assumptions of system dynamics can help inform these investment choices. On the breeding grounds, waterfowl scientists have invested heavily in understanding the relationships between demographic vital rates and landscape characteristics and the results form the foundation of decision support tools employed by several joint ventures. Similarly, scientists in wintering and migration areas have focused on understanding food energy demand and supply curves and use the results to determine how much, what type, and where habitat is needed most. Uncertainties in these relationships can result in suboptimal allocation of limited resources. Consequences of acquisition choices on waterfowl populations provides critical decision context, but other factors influence the return on investment for habitat management. For instance, when securing existing habitats (versus restoring degraded habitats), benefits accrue at the rate that habitat would be lost in the absence of management. Therefore, we used spatially explicit models of expected land-use change using a variety of geophysical and socioeconomic factors to inform where securing existing habitats may be most economically efficient. Similarly, heterogeneity in land acquisition costs and the method used to acquire land (e.g., fee simple vs conservation easement) affect programmatic efficiencies. Increasingly, land acquisitions are chosen to meet the requirements of waterfowl populations, and to engage conservation supporters. Thus, scientific investigations to quantify the ecological services habitat parcels confer to society or how habitat location affects hunter recruitment or retention are increasingly important. We reference several developing and implemented decision support tools to illustrate these principles.

F.1.4: Vrtiska

State and Flyway Perspectives on the Linkage Between Research and Waterfowl Management and Conservation

Mark P. Vrtiska^{1*}, Frank Baldwin², Greg Balkcom³, Jeff Knetter⁴

¹ Nebraska Game and Parks Commission, Lincoln, Nebraska, USA, mark.vrtiska@nebraska.gov

² Manitoba Conservation and Water Stewardship, Winnipeg, Manitoba, Canada

³ Georgia Department of Natural Resources, Fort Valley, Georgia, USA

⁴ Idaho Department of Fish and Game, Boise, Idaho, USA

State/provincial wildlife agencies are involved in management and conservation of waterfowl and their habitats at multiple scales. Specific questions on management actions or monitoring programs may occur at state/provincial scales, but also may occur at regional, flyway or national scales. Resolving issues and efficient management and conservation of waterfowl and their habitats relies on knowledge and understanding of biological and ecological processes. Because limited resources are available, those responsible for management and conservation efforts must communicate and connect with those involved in research to improve efficiency and effectiveness in programs. Poor communication or understanding between waterfowl managers and researchers ultimately hampers management and conservation efforts. State/provincial wildlife agencies may support research or monitoring projects directly or through their respective flyways or joint ventures. Logistical constraints, funding requirements, and processes of state/provincial agencies and flyways differ, as well as the experiences of those agencies with researchers. Decades of good habitat conditions, strong duck populations, and growth of nearly every goose population may have decreased public advocacy and the apparent need for management-oriented research. The dramatic decline in waterfowl hunter numbers also may have contributed to diminished programs in Canada, but may have more positive effects for direct research in the U.S. Finally, the decline in waterfowl-specific programs at U.S. and Canadian universities and changes in programmatic or funding directives within some agencies also has and will continue to impede efforts for better linkages. Strengthening the relationship between waterfowl research and waterfowl management ultimately comes down to better communication and interaction between managers and researchers.

F.1.5: Eadie

Muddy Boots and Ivory Towers: Challenges and Opportunities of Applied Waterfowl Research in Academic Institutions

John M. Eadie^{1*}, David N. Koons², Todd W. Arnold³, Bart M. Ballard⁴, Robert G. Clark⁵, Scott R. McWilliams⁶, Anthony Roberts⁷, Chris Williams⁸

¹ Department of Wildlife, Fish & Conservation Biology, University of California, Davis, CA 95616 USA, jmeadie@ucdavis.edu

² Department of Ecology Center, Wildland Resources and the Ecology Center, Utah State University, Logan UT 84322 USA

³ Department of Fisheries, Wildlife and Conservation Biology, University of Minnesota, St. Paul, MN 55108 USA

⁴ Department of Animal and Wildlife Sciences, Texas A & M University-Kingsville, Kingsville, TX 78363 USA

⁵ Environment Canada and Department of Biology, University of Saskatchewan, Saskatoon, SK S7N0X4, Canada

⁶ Department of Department of Natural Resources Science, University of Rhode Island, Kingston, RI 02881 USA

⁷ Atlantic Flyway, US Fish and Wildlife Service, Laurel, MD 20708 USA

⁸ Department of Entomology and Wildlife Ecology, University of Delaware, Newark, DE 19716 USA

The ability to conduct waterfowl research of direct management application has become increasingly difficult in academic institutions. Reasons for this include: (1) reduced funding is available for applied research, and most federal funding programs do not support purely management based research; (2) high overhead rates at academic institutions are prohibitive for state and NGO partners; (3) increased competition has developed for limited management dollars and support; (4) applied research is perceived by some academicians as being of lower scientific value relative to “basic” theoretical research; (5) merits and promotions of university academics are tied to the perceived prestige of publications and grant funding, and applied products are sometimes viewed as being less prestigious; (6) fewer academic programs and faculty teach and mentor research in basic and applied waterfowl research; (7) as a result, fewer undergraduates and graduate students are trained in the skills needed by the management community; all of which results in (8) fewer academics establishing partnerships with state and federal partners to pursue waterfowl research of management concern. Greater collaboration could be achieved in several ways. Academic researchers should be encouraged to be part of the technical and strategic teams of every joint venture and flyway council to ensure that the key management research needs are communicated. Conversely, state and NGO partners should be invited to participate on academic planning efforts to review, revise and update curriculum in wildlife sciences. Metrics of performance at academic institutions should be re-evaluated and the value of applied research should be better recognized. Cooperative agreements should be established with fixed, low, overhead rates to provide secure, reliable funding for applied research. Finally, collective efforts should be made with the private and public sector to ensure that there is a least one endowed waterfowl research and management program and professorship in every flyway.