



EDITOR'S MESSAGE

Special Section: Celebrating Waterfowl Conservation

As wildlife biologists, we look for moments in which to reflect on our past and benchmark our advancements, success, and progress to adaptively assess whether we are moving the conservation of wildlife species forward to a meaningful level of sustainability. After a headlong rush into development of the United States, the 1800s brought great personal advancement to its citizens while at the same time drastically transforming the nation's ecosystems and destroying much of its wildlife capital. The passage of the Lacey Act in 1900 began a new policy initiative to turn around our wanted greed for meat, feather, and fur; however, it was the momentous act of signing the Migratory Bird Treaty with Great Britain (on behalf of Canada) in 1916 (and ratified as an Act in the U.S. in 1918) that set the wheels in motion to inexorably alter conservation in North America and develop the entire field of wildlife conservation. Although no single event can make a scientific or academic discipline, watershed moments do exist that change the course of all future advancements. The Migratory Bird Treaty was such an event that we should hold in high regard.

The treaty closed the taking of all migratory birds, nests, and eggs, unless annually permitted outside the breeding season. Those alone are monumental decisions for the sake of population sustainability. However, it also stated there needed to be a regulated hunting season on a resource that was traveling the length of the continent. This was a behemoth task and it would require wildlife biologists to develop and stretch their skills in ways they had not been trained to think. To ask for a management regime that was demanding a landscape-level ecological approach toward population management, habitat management, and regulation enforcement was ahead of its time and our lack of wildlife ecology and management knowledge left a chasm to reach our goal. Thus we, as wildlife ecologists and more specifically as waterfowl ecologists, set upon the daunting task of figuring out how to solve cumulative advances. Think of solving each problem as pushing over a domino. By toppling a series of these dominos, we could hopefully accomplish our goal of long-term population sustainability. And in its wake, we also would leave a pathway upon which the principles of all wildlife management could follow.

First, we needed to push over a domino of landscape-level organization. Fred Lincoln needed to establish a concept of Flyways in 1935. This could lead to a Waterfowl Flyway Management System in 1947 and Flyway Councils advising USFWS and CWS on continental-scale harvest regulations in 1952. This precedent of cooperation and broad-scale

thinking and organization also led to the establishment of the North American Waterfowl Management Plan in 1986 to promote regional partnerships among all federal governments, state governments, and non-governmental organizations (NGOs); promote research initiatives to help clarify population and habitat relationships and limitations; and create formal joint ventures. The idea of landscape-level organization further created numerous university, federal, and NGO research centers across the United States and Canada to challenge paradigms, develop research methodologies, and solve critical limitations to long-term sustainability.

The second domino that needed to be toppled was achieving landscape-level habitat conservation. Through the creation of the National Wildlife Refuge System and funding mechanisms like the Federal Duck Stamp, we were able to set aside 560 refuges over 60 million ha of land. Private efforts initiated by NGOs have added to our continent-wide success. For example, Ducks Unlimited has conserved 5.5 million ha across North America, which is approximately the size of West Virginia.

The third domino we toppled was the need to have more accurate population estimation. At the time of the Migratory Bird Treaty Act, population ecology theory and estimation was in its infancy. It would require a new dedicated army of biologists to think about how to collect population data and improve estimation methodologies. For population estimates of waterfowl, in 1935 the United States Biological Survey conducted the first mid-winter inventory of waterfowl using aircraft. This would expand to become the Waterfowl Breeding Population and Habitat Survey in 1955, thus providing a comprehensive aerial breeding ground survey for waterfowl across the northern United States, prairie and western Boreal Canada, and Alaska. More recent efforts have begun to use bioenergetics supply and demand to determine habitat and landscape carrying capacities and the use of integrated population models to improve accuracy of population estimates and potential. Together these advances have provided a primary source of information upon which population estimation, status information, and hunting regulations could be established.

The last domino we toppled was building a more accurate estimation of harvest. Fred Lincoln initiated waterfowl banding to promote harvest returns. To date over 19 million waterfowl have been banded and approximately 90,000 recoveries are reported each year. Perhaps more importantly, harvest theories had to be developed including quantifying

the concepts of additive and compensatory mortality and the initiation of adaptive harvest management principles for Midcontinent mallards (*Anas platyrhynchos*) and now extending to multiple species across North America.

It is amazing to think that 100 years ago, early politicians and biologists pushed a rock off the cliff to better manage migratory birds. And yet it would take a century of building a wildlife profession to better develop, organize, and understand landscape-level organizations, habitat conservation, population estimation, and harvest estimation.

In February 2016, the Seventh North American Duck Symposium was held in Annapolis, MD, USA bringing over 400 waterfowl and wetland ecology professionals and students from around the world. It was a special event to bring the conference to the Atlantic Flyway for the first time, and an opportunity to celebrate the 100th anniversary of the Migratory Bird Treaty. This was not only a chance to look back at our accomplishments but also to discuss how we will continue to topple the dominos for future success and sustainability. Toward that end we initiated 4 plenary sessions. Each of those then led to a paper in the following special session entitled “Celebrating Waterfowl Conservation” wherein we offer reflections of the past and guidance for the future.

The first paper by Anderson et al. (2018) entitled, “The Migratory Bird Treaty and a Century of Waterfowl Conservation” expands on my thoughts above to lay the ground work for the many accomplishments ecologists made for the conservation of waterfowl and to illustrate the many advances they brought to the field of wildlife ecology. The second paper by Roberts et al. (2018) entitled “Strengthening Links Between Waterfowl Research and Management” discusses the successes and challenges of linking research and management in waterfowl conservation and the increasing need to expand structured decision making that incorporates stakeholder values into formal objectives, identifies research relevant to objectives, integrates scientific knowledge, and chooses an optimal strategy with respect to objectives. The third paper by Arnold et al. (2018) entitled “Integrated Population Models Facilitate Ecological Understanding and Improved Management Decisions” discusses new advancements in population estimation using integrated population models for combining multiple data sets such as population counts, band recoveries, and harvest surveys into a single unified analysis to better estimate population size, trajectory, and vital rates, and formally describes the ecological processes behind them. The last paper by Humburg et al. (2018) entitled “Implementing the 2012 North American Waterfowl Management Plan Revision: Populations, Habitat, and People” discusses the value of the historic continental-scale plan that incorporates the many topics discussed above but

more importantly discusses what scientific and policy additions need to be considered for future revisions to best achieve continued waterfowl population success.

The waterfowl community was faced with inextricable worry about the future of ducks and geese a century ago. And yet with the Migratory Bird Treaty’s charge, it forced a monumental shift in scientific understanding, methodological implementation, and policy regulation. Because of this, it was not surprising that in the 2014 State of the Birds Report (North American Bird Conservation Initiative 2014), wetland-related birds were the only group that were showing an average positive population trend. But of course, the world continues to face growing challenges with human population growth and its effects on resource use, habitat loss, and climate change. Most wildlife species will continue to see increasing pressure and the job of wildlife ecologists will only become harder. Humburg et al. (2018) correctly stated that the waterfowl management community will be faced with revisiting objectives and management actions related to landscape priorities, habitat conservation, harvest regulations, and public engagement. For the future generation of students this may seem scary and daunting. However, it is a challenge we must rise to and we should gain strength from our accomplishments over the last 100 years! It will not be easy. But with optimism, hard work, engagement and integration of ideas and technologies, and an embracement of human dimensions and adaptive policies, we too can rise to the next great challenges and maintain wildlife sustainability for future generations.

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