AVIAN CONSERVATION & ECOLOGY

VOLUME 19, ISSUE 2, ARTICLE 21

Van Wilgenburg, S. L., K. J. Kardynal, and B. X. Mora Alverez. 2024. In Memoriam for Dr. Keith A. Hobson. Avian Conservation and Ecology 19 (2):21. https://doi.org/10.5751/ACE-02782-190221

Invited Essay or Review

In Memoriam for Dr. Keith A. Hobson

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Former Editor-in-Chief of *Avian Conservation and Ecology*, Dr. Keith Alan Hobson (FRSC), regretfully passed away on 2 October 2024, at the age of 70 following a brief battle with cancer. Over his scientific career, Keith established himself as a world-renowned scientist across several fields. Having authored or co-authored more than 650 peer-reviewed manuscripts, edited 2 books, and written 16 book chapters, Keith's enormous productivity, creativity, extraordinary network of collaborators, and his tireless efforts in mentoring a new generation of scientists helped bring international attention to Canadian science and make *Avian Conservation and Ecology* internationally influential in ornithology.

Keith's career in ornithology was inspired by a childhood love of nature and a fascination for birds, in particular. Born in Harrow, England, on 10 July 1954, Keith and his family immigrated to Vancouver, BC, Canada in 1966. His early intellectual interests in science inspired him to pursue a Bachelor of Science in Physics from Simon Fraser University (SFU) in British Columbia, Canada. After completing his BSc in 1977, he spent the following seven years working in the SFU Archaeology Department's radiocarbon dating lab. This initial "distraction" could not keep Keith from applying his keen mind to ornithology for long, but did serve to pique his interest in possible applications of stable isotope methods to ecological questions.

When Keith finally pursued his love of ornithology, he hoped to study seabirds on the Pacific Coast with Dr. Spencer Sealy (University of Manitoba) as his supervisor. Prior to beginning graduate studies, Keith indulged his fascination with cormorants by examining colony site and roost site selection by Pelagic Cormorants (*Urile pelagicus*) in Barkley Sound, British Columbia (Carter et al. 1984, Hobson and Sealy 1986), as well as crèching behavior of Brandt's Cormorant (*Urile penicillatus*) chicks (Carter and Hobson 1988) with that work done prior to enrolling in graduate studies. Keith would later return to his interest in cormorants throughout his career (Hobson 2009, Ofukany et al 2015). However, circumstances compelled Keith to turn his attention to the protection of genetic parentage and cowbird parasitism in Yellow Warblers (*Setophaga petechia*) and he completed his M.Sc. degree (Hobson 1988). Keith was not content to only take on his primary M.Sc. research, however, and he simultaneously worked on several side research projects, including work on the contributions of marine proteins to the diet of the Northern Saw-whet Owl (*Aegolius acadicus*; Hobson and Sealy 1991), ground foraging behavior of swallows (Hobson and Sealy 1987), and female song in Yellow Warbler (Hobson and Sealy 1990), in addition to publishing several papers in archaeological science stemming from his early career (e.g., Collier and Hobson 1987).

Keith's M.Sc. field work was conducted at the University of Manitoba Delta Marsh Field Station (Hobson et al. 2012). Time there led him to realize the value of the Lake Manitoba shores as a migratory stopover site. As a result, Dr. Hobson became a Founding Member and Executive Board Member of the Delta Marsh Bird Observatory, which is part of the Canadian Migration Monitoring Network (CMMN). This early linkage to CMMN was the beginning of a career-long collaboration with the CMMN and Birds Canada, the CMMN's umbrella organization. Keith's work with Birds Canada has included serving as Chair of the Science Advisory Board (2006–2012), and work to determine the migratory origins of birds passing through CMMN stations (Dunn et al. 2006, Hobson et al. 2015).

After completing his M.Sc., Keith returned to studying seabirds as was his original interest by completing his Ph.D. with Dr. Malcolm Ramsay at the University of Saskatchewan. Based on the knowledge Keith gained during his time working in archaeology, he thought that stable isotopes should allow him to trace the flow of nutrients from primary producers through to top carnivores and his Ph.D. demonstrated that the high arctic ecosystem was a great testing ground for this approach (Hobson 1991).

After completing his Ph.D., Keith continued applying stable isotope methods to examine arctic ecosystem trophic ecology in a postdoctoral position with the Freshwater Institute of Fisheries and Oceans Canada. It was not long, however, before Keith's talents would lead to him quickly landing a permanent position. Indeed, in 1992, Keith was hired as a Senior Research Scientist with Environment and Climate Change Canada (ECCC), a position he held until his retirement in September of 2024. In the first years of his career with ECCC, Dr. Hobson quickly prioritized several lines of scientific inquiry. On one front, he continued to develop the application of isotopic tools for ecological studies. The other major focus of Keith's early ECCC

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research focused on the ecology and conservation of forest birds, including how anthropogenic disturbances influence forest bird communities.

Keith built upon his trophic ecology work by completing laboratory studies to address key assumptions in application of isotopes to dietary studies (Hobson and Clark 1992a, b, Gloutney and Hobson 1998). Combined with his earlier work demonstrating that nutrients could be traced through food webs (Hobson and Welch 1992, Hobson et al. 1994), his studies became foundational to how isotopes were applied in food web ecology. It was also at this time that Keith began long-term collaboration with Dr. Len Wassenaar, who at the time was a Research Scientist with ECCC specializing in stable isotope hydrology. Together, Len and Keith realized that spatially predictable patterns of hydrogen isotope ratios in rainfall known from data collected by the International Atomic Energy Agency should also be reflected in the tissues of animals. After obtaining known-origin feathers from across much of North America, they demonstrated that the technique could be used for tracing molt origins of migratory birds (Hobson and Wassenaar 1996). Len and Keith followed up on this work with a combination of captive rearing of Monarch butterflies (*Danaus plexippus*) on known isotope ratio waters across the breeding range in addition to sampling Monarch wings in their wintering colonies (Wassenaar and Hobson 1998). Not only did this provide further evidence of the value of the method, but it also introduced Keith to his soulmate B. Xiomara Mora Alvarez whom he met while they were both working in Monarch colonies in Mexico. In addition to those breakthroughs, Keith's collaboration with Peter Marra's demonstrating that arrival dates of American Redstarts (*Setophaga ruticilla*) on the breeding grounds was influenced by wintering ground habitat quality (Marra et al. 1998) helped to spur emphasis on migratory connectivity and cross-seasonal effects in ornithology in the subsequent decades.

It was not long before Keith and his colleagues demonstrated how isotopic methods could trace the flow and biomagnification of contaminants in the environment (Atwell et al. 1998, Fiske et al. 2001). These approaches have allowed Keith and colleagues to tackle pressing questions such as whether increases in contaminants have contributed to declines in the endangered Ivory Gull (*Pagophila eburnea*; Bond et al. 2015). Importantly, these methods allow for examination of whether changes in contaminant concentrations derive from shifts in diet versus increases in the background contaminant levels (Bond et al. 2015, Choy et al. 2022).

Although Keith's innovative isotope ecology work has received much of the spotlight, he also had a reputation for his applied conservation work. When he began his career with ECCC, Keith recognized that increasing anthropogenic disturbance in the boreal forest required directed research. He quickly began addressing the impact of forest change and fragmentation on nest predation rates (Bayne and Hobson 1997) and avian community composition (Hobson and Bayne 2000), how leaving live patches of residual trees within forest harvests influenced community change (Hobson and Schieck 1999, Schieck and Hobson 2000), and avian responses to various experimental forestry techniques (Van Wilgenburg and Hobson 2008, Kardynal et al. 2011). An important aspect of Keith's focus with this applied research was to inform policy, and much of this work resulted in either the creation or support for specific forestry guidelines to mitigate impacts of forest harvesting on the bird community.

Keith has long said that conservation of migratory birds is futile if threats across the annual cycle are not also considered (Faaborg et al. 2010). True to this conviction, Keith recently focused on working with Latin American scientists to address conservation of Neotropical migrant and endemic birds by supporting and mentoring local scientists. The work Keith supported in Latin America had significant conservation implications, with key examples including examining the value of shade coffee plantations for migratory birds (González et al. 2020, 2021), catchment origins of birds migrating though a geographic bottleneck (Cardenas-Ortiz et al. 2020), the role of overwintering sites in shaping migration strategies (Bayly et al. 2020), risk of avian influenza being introduced into Cuba (Rodríguez-Ochoa et al. 2024), shifts in migratory origins (Gómez et al. 2021), and factors influencing the occupancy and abundance of Blackpoll Warbler (*Setophaga striata*) in Colombia (Morales-Rojo et al. 2024). Keith was also instrumental in the recent expansion of the Motus wildlife tracking network (https://motus.org/) in Colombia (2017) and Cuba (2024). As a result of these collaborations and mentoring Latin American students, Keith's efforts made a significant impact on strengthening Neotropical ornithology and the capacity of Latin American ornithological science.

Although most of Keith's career was spent as a senior Research Scientist with ECCC, he very quickly developed associations with numerous universities where he had a profound role in teaching and mentoring young scientists. Keith was an adjunct professor at the University of Saskatchewan (1992–2024), Research Scientist in residence and adjunct professor at Western University (2015–2017) where he was later appointed as a Distinguished Professor (2018–2024), and an adjunct professor at Dalhousie University (2017–2024). In these roles, Keith supervised 13 Ph.D. students, 29 M.Sc. students, and was an external examiner for at least 9 other graduate students.

Beyond the influence Keith's publications have had, Keith also made enormous contributions to Canadian and international ornithology through peer-review and editing. Dr. Hobson was a firm believer in supporting the peer-review process and provided peer-review for over 48 scientific journals and granting agencies. Keith served as Editor of *Waterbirds* (2005–2008) and was on the editorial boards of *Auk*, *Condor*, *Écoscience*, *Journal of Ornithology*, and *Marine Ecology Progress Series*. More recently, Dr. Hobson became a topic editor (New frontiers in the application of stable isotopes to ecological and ecophysiological research) for *Frontiers in Ecology and Evolution*. In addition, Keith's tenure as Editor-in-Chief of *Avian Conservation and Ecology* (2012–2020) saw an era of unprecedented growth in the number of contributions, readership, and citations. Under Keith's guidance, *Avian Conservation and Ecology* went from 12 articles published and 33 citations per year to 45 articles published and 697 citations in 2020. The international reach of *Avian Conservation and Ecology* has since blossomed, with recent contributions not only from Canada and the USA, but also Australia, China, Mexico, Taiwan, the Philippines, Korea, Bangladesh, and the South Pacific, to name a few. Keith also used these positions to further mentor young scientists by emphasizing

peer-review opportunities for graduate students and invited several young scientists to join the editorial boards of the journals he edited.

Keith received numerous awards in recognition of his significant contributions and innovation. Keith was awarded the AOS's Elliot Coues award (2007) for outstanding contributions to Ornithology, the Loye and Alden Miller Research Award (2010), and the Katma Award (2011) for the paper "Migratory double breeding in Neotropical migrant birds" (with Drs. Sievert and Vanya Rohwer; Rohwer et al. 2009). In 2011, Keith won the Society of Canadian Ornithologist's Doris Huestis Speirs Award. Keith also received awards from ECCC including the Geoff Howell Citation of Excellence for Innovation (2005 and 2018), and was made a Fellow of the American Ornithologists Union (2004), the Royal Society of Canada (2013), and the International Ornithological Union (2018), as well as a corresponding Member of the German Ornithologist's Society (2011).

Keith displayed his extraordinary dedication until his final days, still providing reviews and comments on manuscripts to young graduate students only days before his demise. He was always quick to provide his opinion and advice and has both mentored and inspired a new generation of young scientists in Canada and abroad. In addition to being known for his dedication to science and conservation, he was well known for his quick wit, charm, and ability to reduce a problem to the essential facts. Keith will be missed by his friends, colleagues, mentees, and family, but his legacy as a scientist and mentor will leave a mark on Canadian ornithology for decades to come.

Fig. 1. Keith A. Hobson (Photograph by Adam Crosby).

Author Contributions:

All authors contributed to the writing and editing of the essay.

Acknowledgments:

We thank Adam Crosby for providing the photograph of Keith. We also thank Keith's many friends and colleagues who supported him throughout his career and for all anecdotes and background information provided that assisted us in preparing this in Memoriam. We thank A. Bond for comments on an earlier draft of the in Memoriam. Special thanks to S. G. Sealy, H. E. Welch, and L. I. Wassenaar.

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