

Poster; Travel Scholarship; Presentation Award
Studies of Fall–Winter Food Use by North American Dabbling Ducks: 1900-2008

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Extended Abstract: Proper management of waterfowl habitat depends on reliable information on food use by these birds. Managers often create and manipulate foraging habitat consistent with our current state of knowledge of waterfowl food use at migration stopovers and wintering areas. We sought to determine the extent of literature properly describing dabbling duck (*Anas* spp.) food use and preference for use by habitat managers. We reviewed information on dabbling ducks, because this taxon is often a focus of habitat conservation initiatives and management of food resources during the non-breeding season of waterfowl (e.g., North American Waterfowl Management Plan, Farm Bill conservation programs). We thoroughly reviewed peer-reviewed literature on fall and winter foods of dabbling ducks to determine if the frequency of diet studies of these ducks had declined, especially following refinements in collection and processing techniques between the 1960-70s and 1990s. Herein, we describe the history of literature on food use by dabbling ducks, detail the paucity of information useful for management of dabbling duck foods during fall and winter, and provide suggestions to improve our understanding of food use and preference by these birds.

Botulism, lead poisoning, and other waterfowl diseases prompted biologists to understand diets of waterfowl in the early 1900s. In these studies, researchers used hunter-harvested birds and species-specific diets and habitats often were not reported. Following a substantial increase in fall and winter food use studies of dabbling ducks in the 1950s, frequency of such studies declined for

two decades. This decline coincided with increased research on waterfowl breeding habitat. Research on food use by dabbling ducks increased again in the 1980s, possibly in response to evidence suggesting that conditions during the non-breeding season might limit waterfowl populations (Weller and Batt 1988). Similar to the period following the 1950s, a three decade decline in studies occurred from the 1980s to the present (Fig 1).



Figure 1. Number of food use studies of North American dabbling ducks during fall and winter by period and diet analysis methods, 1900 – 2008.

Another notable difference between the periods of 1950s–1970s and 1980s–2000s was the change from the use of gizzard samples toward nearly exclusive use of proventriculus and esophageal samples following Swanson and Bartonek’s (1970) publication which reported bias associated with data from gizzard samples. Researchers changing from hunter-harvested bird samples toward experimental collections following

methodology described by Sheeley and Smith (1989) also likely improved food use data in recent years.

Because managers use available literature to guide management of foraging habitat for nonbreeding waterfowl, we caution readers of literature based on hunter-harvested ducks and gizzard-only samples because of inherent biases. We further caution use of literature that did not investigate food preference or collect birds in an experimental manner (Sheeley and Smith 1989). We reviewed 57 studies of dabbling duck food use and found that only 6 studies investigated food preference, another 8 studies made some reference to food availability in the discussion, and no studies investigated foraging rate or food use on the scale of home ranges of wintering dabbling ducks. Overall, we found that 5% of 57 studies properly tested for food preference of experimentally collected dabbling ducks and used proventriculus and esophageal samples in analyses.

Understanding food use and preference is important in developing waterfowl bioenergetics models used to prioritize conservation and management of wetland habitat. Thus, our ability to allocate funds to improve conservation and management of waterfowl habitat may be hampered by our current state of knowledge.

Although a large number of food use studies exist, we found few that would be useful in determining the most economic and efficient management of foraging habitats for dabbling ducks. Often, we were unable to determine the types of habitats from which ducks were collected, or ducks were collected from a various habitats and combined to quantify food use. Further, when gizzards and hunter-harvested birds were used or food potentially available to ducks was not measured concurrently, we question utility of the data for scientific and management use. We are not suggesting that current management of food resources by managers is incorrect, simply that there is little unbiased literature to direct management rigorously. We continue to lack data on waterfowl food use within certain habitats (e.g., dry and flooded agricultural fields), although we know waterfowl exploit these habitats.

Given our extensive review of published food-use studies of North American dabbling ducks combined with current biases in much of the literature, we caution against prevailing assumptions of dabbling duck food resource preference which we think strongly influence management and conservation. We find this uncharacteristic of the field of wildlife management and encourage a multifaceted, landscape-scale, and experimental approach to understand food use by dabbling ducks during fall and winter.

To improve measurements of food use within specific habitats, we specifically recommend a multi-scale approach including 1) satellite- or radio-telemetry monitored ducks to measure real-time habitat use and better characterize migration and winter home ranges, 2) development of time-activity budgets within habitats used for construction of energy budgets and determination of time spent foraging, 3) determination of diets by experimental collection of foraging ducks along with measurement of available food resources within specific habitat types. Results of such studies should provide managers with the necessary information to refine landscape level management plans (i.e., National Wildlife Refuge complexes, Joint Venture scale) to improve food resource management for migrating and wintering dabbling ducks.

Literature Cited

- Sheeley, D. G. and L. M. Smith. 1989. Tests of diet and condition bias in hunter-killed northern pintails. *Journal of Wildlife Management* 53:765-769.
- Swanson, G. A. and J. C. Bartonek. 1970. Bias associated with food analysis in gizzards of Blue-winged teal. *Journal of Wildlife Management* 34:739-746.
- Weller, M. W. and B. D. J. Batt. 1988. Waterfowl in winter: past, present, future. Pages 3 – 8 in M. W. Weller, editor. *Waterfowl in winter*. University of Minnesota Press, Minneapolis, USA.