

# Wildlife in Urban Landscapes: Use of Golf Course Ponds by Wetlands Birds<sup>1</sup>

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## Introduction

As development associated with urban growth continues to alter and degrade natural habitats, created habitats in urbanized landscapes may become increasingly important for the conservation of wildlife. Unlike many types of developed landscapes, golf courses usually include large amounts of green space. Therefore, golf courses may provide unique opportunities for creating wildlife habitat in urbanized landscapes. Created wetlands in the form of ponds and other water hazards can provide habitat for a diverse array of wetland-dependent species, particularly birds. This document describes the numbers and types of wetland-dependent birds, collectively referred to as “waterbirds,” recorded using golf course ponds during a study of 183 ponds on 12 golf courses over a 2-year period in Southwest Florida. We also provide recommendations based on this study that can be implemented to improve habitat on golf course and stormwater retention ponds for waterbirds.

## Waterbird Use of Golf Course Ponds in Southwest Florida

This study focused on aquatic birds that are wetland-dependent species. Members from the following orders of birds were surveyed: Ciconiiformes, Gruiformes, Pelecaniformes, Anseriformes, Podicipediformes, Coraciiformes, and Charadriiformes. Birds from these orders represent a

variety of bird sizes, morphology, foraging behaviors, and habitat preferences. From an ecological perspective, a useful approach is to group different species by their foraging behaviors because these behaviors strongly influence habitat preferences. We identified six foraging guilds defined by major foraging techniques, food types, and substrates for each species (Table 1). Foraging guilds also provide a useful approach for evaluating the influence of habitat changes on community dynamics and allow for the development of management recommendations to benefit groups of birds rather than individual species.



Figure 1. Wood storks, cormorants, herons, and egrets are among waterbirds observed at a golf course pond in southwest Florida. Credits: UF/IFAS

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During January–April 2001 and 2002, 10,474 waterbirds were observed during surveys of 183 ponds on 12 golf courses (Table 2). We observed 42 species of waterbirds (30 in 2001 and 40 in 2002) over both years. Although a large number of birds and species were recorded, the low densities of birds (~1 bird per acre) suggests there is opportunity to increase the habitat value of golf course ponds to waterbirds.

Observations during our study revealed that waterbirds primarily used golf course ponds for foraging activities, and nesting was the least common behavior recorded. The most abundant waterbird guild recorded using golf course ponds was the Diving Birds guild (n = 4,588 observations). The two most abundant species from this guild were double-crested cormorants (*Phalacrocorax auritus*) and anhingas (*Anhinga anhinga*). Anhingas (in 2001) and double-crested cormorants (in 2002) were also observed on more study ponds than any other species (Table 2). The second most frequently observed guild was Open Water Waders (n = 3,040), with little blue herons (*Egretta caerulea*) most abundant over the 2-year study period. The Dense Vegetation Wader guild was observed least frequently (n = 119).

## Habitat Preferences and Recommendations

The wide range of habitat variables selected by each foraging guild indicates that providing a diversity of habitat features among ponds within a golf course would provide the greatest benefits to the largest number of species. To accomplish this goal, ponds could be managed as a wetland complex, whereby different ponds or sections of ponds are enhanced or modified to represent different types of habitat. For example, creating areas along ponds that have dense shrub cover would benefit dense-vegetation waders; trees can provide roosting sites; and the creation of shallow foraging areas will benefit wading birds and numerous other species. Not all pond features were attractive to waterbirds. For example, man-made structures, such as walls and ledges around pond perimeters, were avoided by some species (Dipping and Dabbling Foragers), probably because these structures impeded movement into and out of the water.

Habitat management designed to benefit waterbirds may also provide cost savings for the golf course. Maintenance problems associated with wet areas along edges of ponds may be ideal for modifications (e.g., increasing the littoral zone) to benefit waterbirds while simultaneously reducing management costs. Consequently, opportunities likely exist

on many golf course ponds to improve habitat for waterbirds, while providing financial savings and generating positive public relations for practices that provide benefits to wildlife.

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## Additional Sources of Information

De Graaf, R. M., N. G. Tilghman, and S. T. Anderson. 1985. "Foraging guilds of North American birds." *Ecological Management* 9: 493–536.

Ehrlich, P. R., D. S. Dobkin, and D. Wheye. 1988. *The Birder's Handbook*. NY: Simon Schuster, Inc.

Gawlik, D. E. 2002. "The effects of prey availability on the numerical response of wading birds." *Ecological Monographs* 73: 329–346.

Hoyer, M. V., and D. E. Canfield, Jr. 1990. "Limnological factors influencing bird abundance and species richness on Florida lakes." *Lake and Reservoir Management* 6: 133–141.

Kushlan, J. A. 1978. Feeding ecology of wading birds. In: S. Winckler, editor. *Wading Birds*. National Audubon Society. Research Report No. 7, New York, New York. P. 249–97.

Kushlan, J. A. 2000. Research and information needs for heron conservation. In H. Hafner, editor. *Heron Conservation*. San Diego, CA: Academic Press. P. 331–42.

Weller, M. W. 1999. *Wetland Birds: Habitat Resources and Conservation Implications*. Cambridge, UK: University Press.

White, C. L. 2003. Waterbird Use of Golf Course Ponds in Southwest Florida. M.S. Thesis, University of Florida, Department of Wildlife Ecology and Conservation, Gainesville, FL.

Table 1. Foraging guilds with general description of foraging techniques used for classification and representative species for each guild.

Foraging Guild	General Description	Species
Diving Birds	Forage in a variety of water depths, but were generally observed in open water	Grebes, cormorants, anhingas, mergansers, scaup, ruddy and ring-necked ducks
Open Water Waders	Forage in shallow water with low density vegetation	Hérons, egrets, ibises, storks, cranes
Dense Vegetation Waders	Forage in shallow water surrounded by dense vegetation	Night and green herons, bitterns
Dipping/Dabbling Foragers	Forage by surface dipping or dabbling in shallow water	Mottled ducks, blue-wing teal, moorhens, coots
Moist-soil Foragers	Forage in muddy or moist-soil areas along the shoreline	Sandpipers, yellowlegs, stilts, willets, killdeer, snipes, gulls
Aerial Piscivores	Generally use perches to search for prey and then dive from a height to capture prey	Terns, kingfishers, eagles, osprey, pelicans

Table 2. Waterbird species observed during surveys of 183 golf course ponds in Southwest Florida during 2001 and 2002. Total abundance, average density (average abundance/total acres for all golf course ponds), and number of ponds where species were observed in 2001 and 2002 are listed. Species are ranked by numbers observed within each guild classification.

Species	Total abundance	Average density (#/acre)	Occurrence (Number of ponds)	
			2001	2002
Diving Birds				
Double-crested cormorant ( <i>Phalacrocorax auritus</i> )	3,078	2.66	105	107
Anhinga ( <i>Anhinga anhinga</i> )	943	0.81	111	119
Pied-billed grebe ( <i>Podilymbus podiceps</i> )	247	0.21	38	7
Hooded merganser ( <i>Lophodytes cucullatus</i> )	240	0.21	9	3
Lesser scaup ( <i>Aythya affinis</i> )	78	0.07	N/A	25
Ring-necked duck ( <i>Aythya collaris</i> )	1	0.00	N/A	1
Ruddy duck ( <i>Oxyrura jamaicensis</i> )	1	0.00	N/A	1
Open Water Waders				
Little blue heron ( <i>Egretta caerulea</i> )	677	0.58	100	21
Great egret ( <i>Ardea albus</i> )	533	0.46	107	79
Snowy egret ( <i>Egretta thula</i> )	530	0.46	74	79
Tricolored heron ( <i>Egretta tricolor</i> )	420	0.36	73	108
Great blue heron ( <i>Ardea herodias</i> )	340	0.29	85	2
Glossy ibis ( <i>Plegadis falcinellus</i> )	249	0.21	24	68
White ibis ( <i>Eudocimus albus</i> )	208	0.18	31	78
Wood stork ( <i>Mycteria americana</i> )	76	0.07	18	29
Sandhill crane ( <i>Grus canadensis</i> )	7	0.01	2	14
Dense Vegetation Waders				
Green heron ( <i>Butorides virescens</i> )	96	0.08	21	1
Black-crowned night-heron ( <i>Nycticorax nycticorax</i> )	22	0.02	4	35
American bittern ( <i>Botaurus lentiginosus</i> )	1	0.00	N/A	4
Dipping and Dabbling Foragers				
Common moorhen ( <i>Gallinula chloropus</i> )	511	0.44	17	2
Mottled duck ( <i>Anas fulvigula</i> )	475	0.41	58	8
Blue-winged teal ( <i>Anas discors</i> )	130	0.11	16	28
American coot ( <i>Fulica americana</i> )	48	0.04	2	1
Wood duck ( <i>Aix sponsa</i> )	2	0.00	N/A	70

Hybrid (mottled duck and mallard)	1	0.00	N/A	1
<b>Moist-soil Foragers</b>				
Killdeer ( <i>Charadrius vociferous</i> )	497	0.43	99	2
Unidentified shorebird	362	0.31	22	2
Greater/lesser yellowlegs ( <i>Tringa melanoleuca/flavipes</i> )	288	0.25	58	0
Ring-billed gull ( <i>Larus delawarensis</i> )	162	0.14	19	10
Common snipe ( <i>Gallinago gallinago</i> )	35	0.03	12	60
Laughing gull ( <i>Larus atricilla</i> )	8	0.01	N/A	3
Willet ( <i>Catoptrophorus semipalmatus</i> )	7	0.01	4	9
Black-bellied plover ( <i>pluvialis squatarola</i> )	3	0.00	N/A	36
Black-necked stilt ( <i>Himantopus mexicanus</i> )	4	0.00	1	45
Bonaparte's gull ( <i>Larus philadelphia</i> )	1	0.00	1	45
<b>Aerial Piscivores</b>				
Bald eagle ( <i>Haliaeetus leucocephalus</i> )	4	0.00	N/A	4
Belted kingfisher ( <i>Ceryle alcyon</i> )	157	0.14	33	67
Brown pelican ( <i>Pelecanus occidentalis</i> )	2	0.00	2	0
Forster's tern ( <i>Sterna forsteri</i> )	7	0.01	2	2
Least tern ( <i>Sterna antillarum</i> )	2	0.00	N/A	1
Osprey ( <i>Pandion haliaetus</i> )	16	0.01	N/A	10
Royal tern ( <i>Sterna maxima</i> )	5	0.01	2	1
<b>STUDY SUMMARY</b>	<b>10,474</b>	<b>9.04</b>		