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Use of urban stormwater control impoundments by wetland birds.—This note reports marsh bird and shorebird use of different types of stormwater control impoundments in Columbia, Howard Co., Maryland. Mallard (*Anas platyrhynchos*) pair and brood use of these impoundments was reported earlier (Adams et al., Wildl. Soc. Bull. 13:46–51, 1985).

Detention and retention basins are used extensively in modern stormwater control. Detention basins are designed to hold water temporarily and release it slowly to a receiving body of water. They are usually dry or muddy between storms. Retention basins are designed to maintain a permanent water pool.

Study area and methods.—Columbia is located in the Piedmont Plateau physiographic region which is characterized by rolling hills with numerous stream valleys, many of them wooded. Soils in the area are strongly acidic with high available moisture capacity.

Thirty-four stormwater control facilities were studied during the spring and summer of 1982. The facilities included 3 lakes, 22 permanent water ponds, and 9 detention basins. Permanent water ponds were subclassified as deep (13 ponds) or shallow (9 ponds), and detention basins as located within or above stream bottoms. For further description of the study area see Adams et al. (Wildl. Soc. Bull. 12:299–303, 1984; 1985).

A standardized bird census was conducted at all basins twice per week from 1 March to 15 May 1982, and once per week from 15 May to 15 July 1982. Counts were made between 30 min after sunrise and 30 min before sunset, and they were allocated randomly among days of the week (Monday–Friday) and hours of the day. Each lake, pond, and dry basin was treated as a single sample unit. To facilitate data acquisition, lakes were divided into sectors which were numbered on maps for easy reference in the field. Sector observations were combined for each lake census.

The observer (LWA, LED, or TMF) slowly walked the perimeter of each pond, basin, and lake counting all marsh birds and shorebirds in the area. Data were recorded individually by pond, basin, and lake sector. The census was conducted when weather conditions provided good visibility, little or no precipitation, and light or no wind.

A bird-use index (UI) was calculated for each impoundment as:

$$\mathrm{UI}=(F + N + I)/A$$

where:

F = percentage of censuses with ≥ 1 bird,
N = number of birds/number of censuses,
I = percentage of impoundments of each type used by birds,
A = impoundment size (ha).

The migratory bird UI was calculated with data collected during March–May and the breeding bird UI was calculated with data collected during June.

Results and discussion.—Use of detention basins by wetland birds was very low, a reflection of the unsuitability of such basins as habitat for these birds. Four Killdeer (*Charadrius vociferus*) and three Red-winged Blackbirds (*Agelaius phoeniceus*) were recorded during the study.

Spotted (*Actitis macularia*) and Solitary (*Tringa solitaria*) sandpipers, and Red-winged Blackbirds were the most common migrants using permanent water ponds and lakes (Table 1). The three species made up between 80 and 91% of the total wetland bird observations at these impoundments during migration. Several other wetland bird species were recorded during migration, but only the Red-winged Blackbird remained in substantial numbers during the breeding season (Table 1). It was found primarily at ponds. Lakes received very

TABLE 1

SPECIES COMPOSITION (%) OF MIGRATORY AND BREEDING MARSH BIRDS AND SHOREBIRDS AT PERMANENT WATER IMPOUNDMENTS, COLUMBIA, MARYLAND, 1982

Season	Species	Impoundment type		
		Shallow pond	Deep pond	Lake
Migratory (March–May)	Green-backed Heron	4.1	4.0	2.9
	Killdeer	3.6	0	4.6
	Common Snipe (*Capella gallinago*)	5.6	1.1	0.6
	Spotted Sandpiper	7.7	10.3	33.1
	Solitary Sandpiper	10.8	6.9	6.3
	Yellowlegs (*Tringa* spp.)	0.5	0	1.1
	Least Sandpiper (*Calidris minutilla*)	0	0	0.6
	Red-winged Blackbird	67.2	74.1	40.6
	Unidentified shorebird	0.5	3.4	10.3
	Total percent	100.0	99.8	100.1
	Total birds	195	174	175
Breeding (June)	Great Blue Heron	0	0	16.7
	Green-backed Heron	19.7	5.2	50.0
	Killdeer	1.5	0	0
	Red-winged Blackbird	78.8	94.8	33.3
	Total percent	100.0	100.0	100.0
	Total birds	66	97	6

little use by marsh birds and shorebirds during the breeding season. Only one Great Blue Heron (*Ardea herodias*), three Green-backed Herons (*Butorides striatus*), and two Red-winged Blackbirds were recorded at lakes during June.

During migration significant differences (Kruskal-Wallis test: $H = 12.0$, df $= 2$, $P < 0.005$) (Hollander and Wolfe, Nonparametric Statistical Methods, John Wiley & Sons, New York, New York, 1973) were noted in wetland bird use of impoundments. Multiple comparisons based on the Kruskal-Wallis test indicated differences (at an experimentwise error rate of 0.15) between shallow and deep ponds, shallow ponds and lakes, and between deep ponds and lakes. The median UI value for shallow ponds was 13.9 (range = 4.5–44.7, N = 9) compared to 4.3 for deep ponds (range = 1.5–16.8, N = 13) and 0.3 for lakes (range = 0.3–0.5, N = 3).

Significant differences (Kruskal-Wallis test: $H' = 9.3$, df $= 2$, $P < 0.01$) in use of Columbia's permanent water impoundments by wetland birds also were observed during the breeding season. The median UI value for shallow ponds was 17.2 (range = 3.7–66.3, N = 9) compared to 7.4 for deep ponds (range = 1.3–45.2, N = 13) and 0.1 for lakes (range = 0.1–0.2, N = 3). Multiple comparisons based on the Kruskal-Wallis test (at an experimentwise error rate of 0.15) indicated that shallow and deep ponds were used significantly more than lakes, but no significant difference in use was observed between shallow and deep ponds. Fewer species and total bird observations were recorded during the breeding season than during migration, and variability was greater during the breeding season. These factors may have contributed to the lack of statistical significance between bird use of shallow and deep ponds during the breeding season.

Almost 80% of the shallow ponds contained sediment bars at stream inlet channels. Wetland birds made extensive use of the mudflats and shallow water edges associated with these sediment deposits. Only 15% of the deep ponds had sediment bars extending above the water surface. In addition, the gently-sloped sides of shallow ponds contrasted sharply with the steep-sided deep ponds and lakes and contributed to the increased wetland habitat value of shallow ponds. These features also were considered important in greater use of shallow ponds by mallard pairs and broods (Adams et al. 1985).

Implications.—Our data indicate that man-made wetland habitat can be created in urban areas in connection with modern stormwater management practices. There is public support in Columbia, Maryland for such effort (Adams et al. 1984), and guidelines for considering wildlife in the design of urban stormwater control facilities have been published (Adams and Dove, Urban Wetlands for Stormwater Control and Wildlife Enhancement, National Institute for Urban Wildlife, Columbia, Maryland, 1984). We encourage biologists to work closely with engineers, landscape architects, municipal and other governmental officials, planners, developers, and others to create and manage such habitat.

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Extra-pair feeding in Western Grebes.—Among grebes only the solitarily nesting Australasian Little Grebe (*Tachybaptus novaehollandiae*) breeds cooperatively (Lane, Sunbird 9: 2, 1978). I report here three observations of extra-pair feeding in Western Grebes (*Aechmophorus occidentalis*) and discuss the possible function of that behavior.

I observed with a 15–60× spotting telescope 75 pairs of colonially breeding, dark-phase Western Grebes for 275 h between 8 May and 14 August 1983. The colony was on Duck Lake, 15 km NW of Creston, British Columbia (49°14'N, 116°37'W). I determined sex by body and bill size (Palmer, Handbook of North American Birds, Vol. 1, Yale Univ. Press, New Haven, Connecticut, 1962). Hereafter, A-male and A-female refer to paired grebes; B-male refers to unpaired, "auxilliary" male grebes (sensu Emlen, pp. 245–281 *in* Behavioural Ecology, Krebs and Davies, eds., Blackwell Scientific Publ., London, England, 1978).

At 17:38 on 30 June an A-female took a 6-cm yellow perch (*Perca flavescens*) from a B-male and ate it while the A-male was diving. Between 17:39 and 17:58 the A-male captured 10 fish, ate one, and gave nine to the A-female who fed eight to a <7-day old chick. At 17:58 the A-male chased the B-male away. On 18 July I observed a pair of grebes with four, 3-week old young. At 16:08, while the A-male was sleeping, the A-female took a 6-cm yellow perch from a B-male and fed it to one of the young. At 16:09 the A-male awoke and the B-male moved away from the A-pair. At 16:15 the A-female received the B-male in a "ratchet-pointing" posture (sensu Nuechterlein and Storer, Condor 84:351–369, 1982). At 16:16 the A-male caught a 4-cm yellow perch and gave it to the A-female, which in turn fed