Avian use of planted versus unplanted wetland basins at Olentangy River Wetland Research Park

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Introduction

Wetlands are created or restored to mitigate wetland losses. One of the potential values of such wetlands is to provide habitat for fish and wildlife. There is a need to better assess the effectiveness of techniques used to create or restore wetland ecosystems. The Olentangy River Wetlands were created in part to develop proper design criteria for wetland construction and to measure their success. Two wetlands were created with essentially identical initial conditions except that one was planted with *Acorus calamus*, *Sagittaria latifolia*, *Saururus cernuus*, *Scirpus fluviatilis*, *Sparganium eurycarpum*, *Spartina pectinata*, and *Juncus effusus*. Both wetlands appeared to have similar ecological functions (Mitsch et al., 1998), but the vegetation structure of each wetland differed after three years. Although both wetlands include the same plants, the unplanted basin has a higher percent cover of *Typha* spp. (Bouchard et al., 1997). These differences could affect settling patterns of bird species that breed in or use these wetlands (Orians and Wittenberger, 1991; Turner and McCarty, 1998). Orians and Wittenberger (1991) found yellow-headed blackbirds responded in complex ways to the structure of vegetation and distribution of food supplies when choosing their nest sites. We examined distribution of birds between the planted and unplanted basin to determine how these differences in vegetation structure may be affecting avian species distribution within this wetland complex.

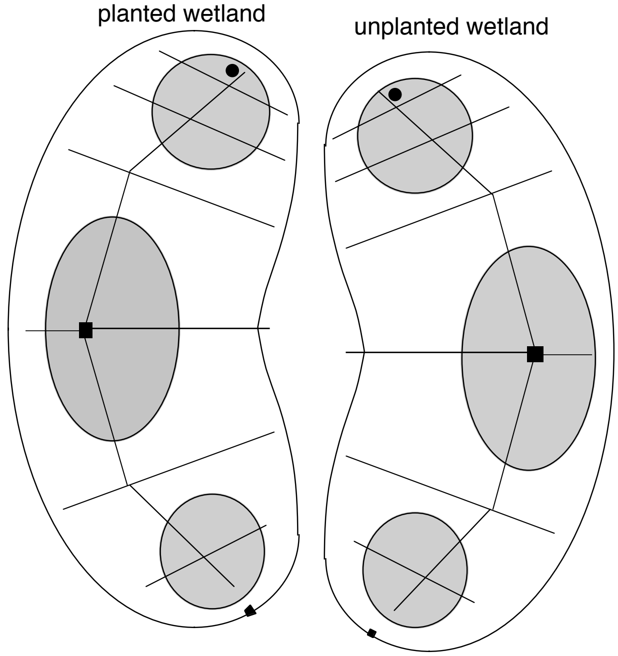

Figure 1: Location of planted and unplanted wetland basins at ORWRP.

Methods

Bird surveys were conducted at the Olentangy River Wetlands Research Park (ORWRP) on The Ohio State University campus, in Columbus, OH. Bi-weekly censuses were conducted during 16 March, 1999 - 15 June, 1999 to quantify bird species richness and abundance in the planted and unplanted basins (Figure 1). Thirteen censuses were conducted. Counts were initiated within the first two hours after sunrise. The sky was clear on 11 of the 13 sampling days, and overcast on 2 days. Wind speed was less than 5 mph except during 2 sampling days when it was between 5-10 mph. We recorded whether birds were detected by sight or sound and recorded the wetland basin they were detected in. Singing birds were more conspicuous and easily counted. We assume singing birds were reliably detected to identify differences between avian use of the two wetland basins. The only species that used the wetlands in sufficient numbers for analysis were mallards (*Anas platyrhynchos*), red-winged blackbirds (*Agelaius phoeniceus*) and song sparrows (*Melospiza melodia*). Mean numbers of mallards, red-winged blackbirds and song sparrows per sampling day were calculated. We used t-tests to compare differences in use of wetland basins ($p = 0.05$). Mean numbers of singing red-winged blackbirds and song sparrows were calculated and compared between wetland basins using t-tests.

Results

There were 10 bird species observed in the planted basin and 12 species observed in the unplanted basin (Table 1). Mallards, red-winged blackbirds, and song sparrows were the most abundant species in both wetlands. Mallards were often observed foraging within both wetland basins, and mallard broods were observed in both basins during July and August. There were no differences in mallard use between wetland basins ($t = 0.921$, $P = 0.374$, $df = 13$).

More red-winged blackbirds were observed in the unplanted basin, while song sparrows were observed more frequently in the planted basin (Table 2). Red-winged blackbird use of the unplanted basin was greater for both mean numbers of singing males ($t = 2.654$; $P = 0.015$; $df = 22$) and mean number of individuals ($t = 2.678$; $P = 0.014$; $df = 22$). Song sparrow use of the unplanted basin was greater for mean numbers of singing males ($t = 2.774$, $P = 0.011$, $df = 22$), but there was a marginally significant difference in mean numbers of individuals observed between the two wetland basins ($t = 1.960$, $P = 0.063$, $df = 22$).

Table 2. Mean numbers (Standard error) of birds observed using the Olentangy River Wetland Research Park during March-June 1999.

Species		W1-Planted basin	W2-Unplanted basin
Red-winged blackbird			
	Singing	1.9 ±0.3	3.5±0.5
	Total	4.6±0.7	7.1±0.6
Song sparrow			
	Singing	1.8±0.3	0.7±0.2
	Total	3.0±0.5	1.8±0.4
Mallard			
	Total	3.5±0.8	2.4±0.8

Discussion

While no differences were detected in mallard use of the two wetlands, it was difficult to determine the exact numbers of mallards using each basin due to the dense vegetation. Mallards also use the wetlands for foraging rather than nesting, so they may not be as sensitive to vegetation structure as birds that nest in the wetlands.

Song sparrows and red-winged blackbirds did not distribute themselves evenly among the planted and unplanted wetland basins. Two possible explanations for these differences include food availability within the wetlands and differences in vegetation structure. Hart et al. (1996) found no differences in relative abundance of macroinvertebrates between the two wetlands. These results are not surprising because each wetland is close to the other and water is pumped into each basin from the Olentangy River. Although both wetlands have similar floristic composition, vegetation structure differs. Planting management has helped control the spread of *Typha* spp. after four growing seasons (Bouchard et al., 1997), while *Typha* dominates the unplanted basin. *Typha* stem density explained a substantial amount of variation in red-winged blackbird breeding density in southwestern Michigan (Turner and McCarty, 1998), consistent with our findings. Red-winged blackbirds occurred in greater numbers in the unplanted basin, with greater *Typha* cover. While the unplanted basin seemed to be more attractive to red-winged blackbirds, song sparrows were found more frequently in the planted basin. Song sparrows were harder to detect than red-winged blackbirds. Singing males probably provide a better estimate with which to compare avian use of the two basins. Song sparrows typically nest under dense vegetation along watercourses and coasts, marshes, forest edges, clearings, and bogs (Ehrlich et al., 1988), and may be more sensitive to vegetation structure. Larger clumps of grass near the edge of the planted wetland provide ideal nesting sites, possibly explaining differences in song sparrow use between the two basins.

Table 1. Locations of bird sightings in the planted and unplanted wetland basins at the Olentangy River Wetland Research Park during March-June 1999.

Species	Planted basin	Unplanted basin
Great blue heron	-	X
Green heron	-	X
Canada goose	X	X
Wood duck	X	X
Mallard	X	X
Blue-winged teal	X	X
Solitary sandpiper	X	-
Common snipe	-	X
Willow flycatcher	-	X
Great crested flycatcher	X	-
Eastern kingbird	X	-
Marsh wren	-	X
Song sparrow	X	X
Swamp sparrow	X	X
Red-winged blackbird	X	X

It appears there are differences in use between the two basins, but we still do not know how individuals distribute themselves within the wetland complex. Understanding how individuals distribute themselves in the wetland and in what condition they are in could help define which basin provides higher quality nesting habitat. Nesting productivity would also provide a better indication of the quality of habitat. We might assume that the unplanted basin is more productive since there is a greater density of red-winged blackbirds. This may not be true since high nest density may increases competition for food resources. Considering the close proximity of the two wetland basins, birds probably forage in both basins. Lower *Typha* cover in the planted basin may limit nesting within the basin due to insufficient vegetation to place nests, but those that do nest in the basin may experience greater success due to lower competition for resources.

Vegetation structure and composition appears to play an important role in attracting different species. As we learn more about the requirements of wetland species and how we might influence the composition and structure of vegetation, the better we will be able to manage for higher quality, diverse wetlands.

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