

I. Project Summary

This project examines the conservation value of golf courses in the Midwestern landscape by focusing on two indicator taxa: birds and butterflies. Specifically, we are assessing the distribution and abundance of these two taxa on six golf courses, analyzing this information with respect to both small-scale habitat features within each golf course and large-scale habitat features of the landscape surrounding these courses, and developing guidelines for golf course design aimed at both taxa. We expect this project to result in methods for creating and conserving habitat for native biodiversity on golf courses rather than creating habitat for wide-ranging, edge species.

II. Research Initiated

This project began in June 2000. The objectives for the first year of the project are to:

1. *Establish sampling protocols for both birds and butterflies at the six participating golf courses.*
2. *Conduct the first summer's sampling at the six golf courses.*
3. *Initiate analysis of large-scale landscape features of the courses.*

III. Progress

We have accomplished Objectives 1 and 2.

The participating golf courses include:

- Two courses managed by the City of Hamilton. Potter Park Golf Course is an older, site-restricted course, surrounded by moderately dense single-family housing. Twin Run Golf Course is a newer course on the edge of town bordered by low density housing, forests, and farm fields. They are managed by:

Dave Fenimore, Superintendent of Golf
City of Hamilton
Rm. 203 Municipal Building
20 High Street
Hamilton, Ohio 45011
(513) 868-5874

- Two courses managed by the County of Hamilton. Miami-Whitewater Golf Course is a newer course in the middle of an extremely large county park. The course is surrounded by forests and wetlands. Mill Course is an older suburban course bordered by low density housing, on two sides and forested park on two sides. They are managed by:

John Klein, Land Manager,
Hamilton County Park District,
10245 Winton Rd, Cincinnati, OH 45321
(513) 728-3551 ext. 227

- One private country club. Oxford Country Club is a nine-hole facility (the only one of the study sites) and is severely site-restricted. It is bordered by housing on three sides and a railroad track and trailer park on the fourth side. It is managed by:

Tom Blomquist,

Oxford Country Club,
 6200 Contreras Rd.,
 Oxford, Ohio 45056
 (513) 523-5505

• One course managed by the State of Ohio. Hueston Woods Golf Course contains substantial rough that is highly managed. The course is not site restricted. It is bordered by farmland on two sides and forest preserve on the other two sides. It is managed by:

Bill Lodder,
 Hueston Woods State Park Golf Course
 RR 1
 College Corner, OH 45003
 (513) 523-1655

We have established sampling protocols at the six courses and conducted the first year's census of birds and butterflies at these sites. We have also completed a substantial portion of the vegetation assessment, which, originally, was to be completed in Year 2 of the grant. Finally, we have not started Objective 3 for Year 1-- the large-scale landscape assessment. We will start this process in January. We have obtained aerial photos of all of the sites and the necessary software to complete these assessments.

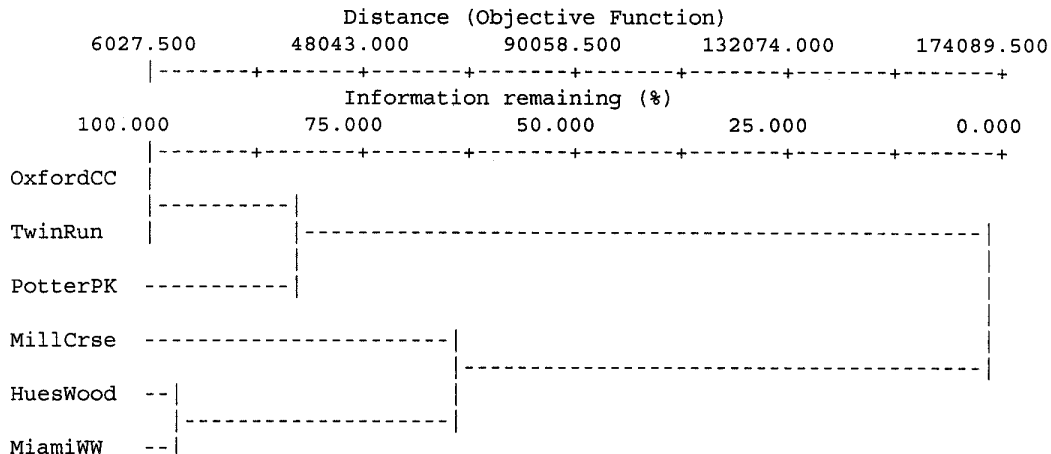
IV. Results of Current Year

Below are the raw counts of each bird species seen in eight visits to each course.

Bird Species	Oxford Country Club	Potter Park	Twin Run	Mill Course	Hueston Woods	Miami Whitewater
American Crow	0	0	0	28	15	0
American Goldfinch	63	61	56	74	32	78
American Robin	347	490	335	248	107	103
Baltimore Oriole	0	0	10	18	56	14
Barn Swallow	0	0	0	0	11	0
Blue-gray Gnatcatcher	0	12	0	0	40	57
Blue Jay	36	0	22	19	0	0
Brown-Headed Cowbird	0	17	11	45	26	41
Canada Goose	0	0	0	114	39	0
Carolina Chickadee	25	23	25	34	13	28
Carolina Wren	11	0	0	0	0	15

Cedar Waxwing	34	72	20	0	97	41
Chimney Swift	0	53	27	35	0	0
Chipping Sparrow	70	52	80	34	72	62
Common Grackle	168	61	82	37	66	46
Eastern Bluebird	0	0	16	23	0	34
Eastern Towhee	0	0	0	0	0	12
Eastern Wood-peewee	15	0	10	0	12	24
European Starling	25	55	14	47	0	26
Grey Catbird	0	21	0	0	0	29
House Finch	0	18	0	0	15	0
House Sparrow	0	14	34	53	0	19
House Wren	14	0	0	0	0	0
Indigo Bunting	0	0	0	0	0	20
Killdeer	0	28	0	0	0	0
Mallard	0	16	0	14	0	28
Mourning Dove	47	22	45	0	20	0
Northern Cardinal	39	53	40	79	41	53
Northern Mockingbird	0	0	0	0	0	15
Red-bellied Woodpecker	19	0	0	12	19	15
Red-eyed Vireo	0	0	0	0	0	18
Red-winged Blackbird	0	0	15	55	27	28
Song Sparrow	0	0	0	25	0	32
Tree Swallow	0	0	17	21	9	0
Tufted Titmouse	0	0	10	0	0	20
White-breasted Nuthatch	13	0	0	0	11	0
Willpw Flycatcher	0	0	0	0	0	12
Yellow Warbler	0	0	0	0	0	31

These numbers indicate that the golf course span a range of environmental conditions. This may also be discerned by a crude cluster analysis of these data, which appears below.

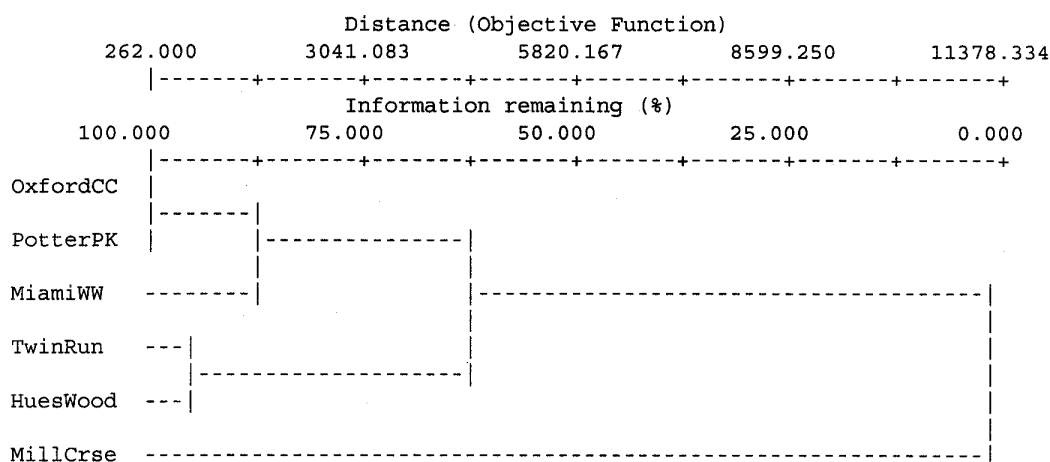


This diagram demonstrates that the species composition of Hueston Woods and Miami Whitewater are similar, as are Oxford Country Club and Twin Run. Potter Park and Twin Run appear to fall somewhere along the spectrum between these two endpoints.

Butterfly	Oxford Country Club	Potter Park	Twin Run	Mill Course	Hueston Woods	Miami Whitewater
Black Swallowtail	0	0	0	5	0	6
Buckeye	0	0	3	0	0	0
Cabbage White	55	67	105	165	101	69
Clouded Sulphur	2	0	9	4	3	4
Common Wood Nymph	0	0	3	0	0	2
Eastern Tiger Swallowtail	5	3	3	10	10	15
Eastern Tailed Blue	6	17	54	7	23	22
Great Spangled Fritillary	0	0	3	0	6	16
Hacberry Emperor	0	0	0	5	2	3
Least Skipper	3	3	6	6	0	0
Little Glasswing	0	0	0	0	0	3
Little Wood Satyr	0	0	4	0	15	0
Monarch	3	0	3	0	2	0
Orange Sulphur	3	2	6	5	2	4
Swallowtail (sp.)	0	0	0	0	3	0
Pearly Crescent	0	6	9	0	2	17
Peck's Skipper	28	14	16	20	5	5

Pipeline Swallowtail	3	0	0	0	7	2
Question Mark	0	0	0	0	0	2
Red Admiral	0	0	0	0	2	0
Red Spotted Purple	0	0	0	3	0	6
Silver-spotted Skipper	0	0	0	17	0	4
Spicebush Swallowtail	0	0	3	0	3	14
Spring Azure	0	0	0	0	0	2

A similar cluster analysis of the butterfly data presents a different view of the biota on the golf courses.



This analysis suggests that the butterfly fauna of Hueston Woods and Twin Run are similar as are those of Oxford County Club and Potter Park. It suggests that Miami Whitewater lies between these two extremes and that Mill Course does not compare to the other courses in any recognizable fashion.

These are preliminary analyses of the bird and butterfly fauna only. We have not placed them within any environmental context – that of the specific features of each golf course or that of the surrounding land use. We will conduct a preliminary examination of these features over the following year and a half.

V. Executive Summary

Purposes and Goals

This project examines the conservation value of golf courses in the Midwestern landscape by focusing on two indicator taxa: birds and butterflies. The Midwest has more land that is directly manipulated by humans than any other region of the country. This pattern of land use presents a challenge to conservation biologists because they cannot rely solely on public lands in their conservation efforts.

Golf courses have the potential to play a significant role in overall conservation plans. They may directly provide habitat for specific groups of organisms as they are lush, green parcels of open space. They may also provide buffer zones between developed and natural areas. However, golf courses are also accused of consuming an inordinate amount of freshwater, pesticides, fertilizers, and native habitat. Consequently, some people consider them a wonderful use of land while others consider them detrimental to the landscape. This difference in views often leads to conflict in the public arena that is based on opinion rather than on scientific evidence.

This project will identify the relative contribution of landscape features within and around golf courses that affect native birds and butterflies and provide some guidance to golf course designers and managers as to how much effort they should devote to working on features within and outside of their course. We expect this project to result in methods for creating and conserving habitat for native biodiversity on golf courses. It will also provide evidence of whether or not golf courses can be a component in larger conservation planning.

Methodology

We will determine bird and butterfly distribution and abundance on the six golf courses using scientifically established procedures. Detailed information on the small-scale landscape features within the golf courses, such as types of vegetation, will be collected as well. We will also quantify the proportion of the surrounding landscape occupied by different types of landscape, such as pavement, buildings, and trees. This data will be collected over the course of two years and was begun in May 2000. We will analyze the data collected to determine which landscape features are the best predictors of bird and butterfly distribution and abundance.

Results and Importance to Golf Industry

The first year of fieldwork -- surveying bird and butterfly species, and vegetation features -- is in process. The principle benefit to the golf course industry of this project will be the development of scientifically defensible, golf-course design guidelines that conserve native species. These guidelines will be most useful for new golf-course construction but will also provide direction for golf-course managers who are trying to improve conditions on existing courses. The approach taken will identify those features that golf course designers and managers can directly control — such as ponds within the golf course boundaries — as well as those features that they would need to address in the context of the surrounding landscape — such as land use contiguous to the course.