



Research on wildlife habitats associated with golf courses is sponsored in part by the USGA.

Ecology and golf: Saving wildlife habitats on human landscapes

Golf can be kind to wildlife by leaving 'islands' and buffers for habitat.

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Many ecologists realize that saving native vegetation and restoring wildlife habitat on human landscapes such as golf courses may be key to preserving nature's legacy against an expanding human population that threatens the ecological balance of the planet and its wealth of species (1,7,14).

Golf courses figure prominently in the landscape. Green ribbons of fairways are visible when flying over most cities and towns. They now occupy almost every terrestrial habitat from ocean shorelines, flood plains, marshes, forests, grasslands and mountain slopes to even deserts. They even appear on old landfills, mining sites and gravel pits. Naturalistic golf courses such as Prairie Dunes Country Club in Hutchinson, Kan., illustrate how these areas might help preserve wildlife habitat.

Darwin, Leopold and ecology

Today's science of ecology grew from the experiences of the planet's earliest explorers. Plant geographers in the 1700s nourished the science until a century later, when naturalists such as Charles Darwin dramatically advanced the discipline. Ecology's expansion continued with the insights and eloquence of Aldo Leopold in the 1940s (6) and other scholars in later decades.

Spurred by the environmental movement of the 1960s and the rise of its applied disciplines (conservation biology, landscape ecology and

restoration ecology) in the 1980s, ecology is now ready to help solve real problems. Ecology is answering a basic question: How can we learn to live with the rest of creation without destroying it and ourselves?

The ecological study of human-dominated landscapes is still in its infancy. The right questions are just now being addressed by experts in urban ecology (1), conservation biology (9) and landscape ecology (3). We suspect that a connected landscape mosaic of large natural areas and small patches of native vegetation will maintain ecosystem functions and provide nesting sites, food and shelter and thus help save many species from becoming extinct. However, many questions remain.

The first attempts at developing human landscapes that incorporate habitat conservation plans have already begun, and the results are mixed (5). Simply incorporating small patches of habitat into a developed area may not be adequate to maintain the ecological balance and biodiversity of the landscape. Many ecologists believe that approximately 75 percent of a watershed (an area draining into a major waterway) must be preserved in natural and multiple-use conditions to meet ecological life-support needs (7). This allows 25 percent to be urbanized.

Furthermore, critical wildlife habitats must be in the correct configuration

KEY POINTS

- With planning and a little management, a golf course can preserve "islands" of habitat for wildlife in the urban environment.
- Buffer zones around the perimeter of golf courses may provide even more effective protection of habitat than "islands" within the golf course.
- Modern technology can aid designers as they include native habitat in golf course plans.



Photo courtesy of Max Terman

Like stepping stones across a stream, islands of wildlife habitat on golf courses such as Prairie Dunes CC allow wildlife to migrate across urbanized landscapes.

and connected by corridors to allow for genetic exchange between metapopulations (small isolated groups) of various plants and animals. How can we accomplish this kind of land-use planning?

New technology will help

Technological improvements in remote sensing using satellites, aerial photographs, and computer-enhanced layering (geographic information systems) will help (9). Besides presenting an aerial view of the golf course, this amazing technology even shows land relief and topographical features.

Golf courses can be designed on computerized representations of actual landscapes before construction begins. Using GIS technology, planners can strategically place golf courses where they can best serve an integrated economic and ecological purpose.

Studies on Prairie Dunes

Prairie Dunes CC is a naturalistic golf course that includes significant on-course habitat patches and a surrounding natural buffer zone. The on-course habitat patches support many species of birds, including some species that are threatened and in need of protection,

such as Bell's vireo (*Vireo bellii*). The patches compare favorably with a nearby natural area in the suite of bird species it supports (11,12). The only species missing from the golf course proper are disturbance-sensitive species (13) requiring isolation from human activity and larger areas of native vegetation.

But these sensitive species occur in the buffer zone around Prairie Dunes. A three-year study of the natural buffer found grassland birds such as Henslow's sparrow (*Ammodramus henslowii*) during the late autumn in the grass-shrublands approximately 100 meters off the fifth green. The sparrow needs protection because of drastic population declines in past years (4). Habitat loss and fragmentation are suspected as prime causes.

Buffer zones on golf courses

Other sensitive species such as wild turkeys (*Meleagris gallopavo*), bobwhite (*Colinus virginianus*), grasshopper sparrows (*Ammodramus savannarum*) and yellow-billed cuckoos (*Coccyzus americanus*) also frequent this buffer-zone habitat. Although it's unlikely that buffer zones would make all naturalized

golf courses the equivalent of a natural area, research found this to be true when comparing Prairie Dunes and a nearby Kansas state park (11). Buffer zones should thus significantly reduce the impact of development on habitat (3).

These buffer zones might include hiking trails and nature walks, if the resident species aren't too sensitive. Many golf courses in Europe allow non-golfers to use their natural areas for walking and hiking (2). Where the activities can coexist without excessive danger to the hikers, perhaps U.S. golf courses should re-examine their policies concerning this issue, particularly the public courses.

A natural relationship

Ecology and golf have a natural relationship where the understanding of one enhances the well-being of the other. Today, golf and the environment are sometimes at odds. Enabled by technology, golf has often forgotten nature and has drawn so deeply on earth's resources that many view the sport as a ravager of nature, forcing itself on an unwilling landscape (8,10).

Said Aldo Leopold, the University of Wisconsin ecologist noted for eloquence in defending natural resources: "A thing is right when it tends to preserve the integrity, stability and beauty of the biotic community. It is wrong when it does otherwise." (6)

Believing and following this simple admonition may be the ultimate paradigm shift that assures us a bright future for both golf and ecology. ■

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Photo courtesy of Matthew Redmond

Developers of this golf course west of Denver left open space and a buffer zone along a boundary with a neighborhood.

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