



Photo Courtesy of Joanne Davis, 1000 Friends of Florida

“There is a delight in the hardy life of the open. There are no words that can tell the hidden spirit of the wilderness that can reveal its mystery, its melancholy and its charm. The nation behaves well if it treats the natural resources as assets which it must turn over to the next generation increased and not impaired in value. Conservation means development as much as it does protection.”

– Theodore Roosevelt (26th President of United States)

The elimination of traditional wildlife habitat through urbanization of natural and agricultural areas has increased the importance of urban and suburban green space as habitat for wildlife. In this regard, golf courses are being increasingly recognized for their potential to provide a reasonable level of wildlife habitat. A shift in philosophy has been emerging from the golf course management community, as well as from golfers, supportive of integrating habitat and wildlife features into golf course design. Interestingly, more than 70 percent of many golf courses are rough and non-play areas that feature natural grasses, wetlands, trees, shrubs, and other plants that have habitat potential.

Florida has more golf courses than any other state—more than 1,250. Palm Beach County alone has more golf courses than any other county in the nation. In Florida, golf course community development, as well as public city and county golf courses, present opportunities to conserve and create wildlife habitat adjacent to human habitat. The difference between wildlife-depauperate and wildlife-friendly golf courses is good planning, design, and management and an understanding of plants and animals and their particular needs. A properly designed and maintained golf course can serve as a “buffer” to the “hardscapes” associated with development.

From a pure wild lands perspective, golf courses are contrived and heavily managed lands. The highest intensity of landscape management is practiced on golf course “greens,” with progressively less on tees, fairways, and minimal management in the “rough” area. With development steadily increasing, it is becoming more important that golf courses and the habitat fragments located in and around them play a role in conservation of native species and ecosystems.

PLANNING FOR HABITAT AND WILDLIFE BASICS

When a new golf course community is planned, or when an older course is being redesigned or upgraded, the landowner

and local planning and community development departments should address habitat and wildlife needs at the landscape level of planning. It is important to consider the context in which the entire golf course is sitting. Different layouts and routings of a golf course playing area will shape the available habitat areas, their size, connectedness, and physical makeup. Follow the steps below as planning and designing efforts proceed.

Know the Site and the Surrounding Landscape – As a basis for formulating the layout of a course, conduct an inventory and carefully map the site’s basic natural features, topography, and resident and potential wildlife habitats. It is important to record typical or potential species to the area, noting seasonal variations. Seek local expertise and consult with environmental experts familiar with local plants and animals.

Study the course with an eye to providing the basics for wildlife survival: food, cover, water and diversified space accommodating breeding, nesting and foraging. Cluster buildings, parking lots, clubhouses and guest amenities together so as to leave the greatest amount of undisturbed and connected habitat available for wildlife. Think outside the boundary of the golf course, and ask adjacent land owners if they would coordinate to optimize wildlife habitat linkage potentials.

Think large patches, connectivity, and diversity of cover. Many animal species prefer large patches of habitat with fewer opportunities for predators to intrude and more “interior space” wherein environmental parameters (humidity, light, substrates, etc.) tend to remain constant. Wherever possible, protect and enhance the site’s large habitat patches. This includes expanding existing habitats by adding or allowing natural expansion of native plants and by working to connect smaller habitat patches. If larger patches are unavailable, even small habitat patches—such as individual trees, small wooded areas, ponds, and wetlands—can add value, particularly to birds, small mammals, and reptiles.

SUSTAINING FOX SQUIRRELS, AS IS TRUE OF MANY SPECIES, MAY TAKE A LITTLE PLANNING

In Florida's developing world of fragmented habitats, golf courses can be an attractive location to fox squirrels if planned and managed appropriately. According to wildlife biologist Rebecca Ditgen, "Fox squirrels are a very graceful squirrel. They leap and move around a lot and people find them beautiful to watch."

Fox squirrels are native to pine forests with open understory and spend a lot of time on the ground, so golf courses with open pine and cypress stands are good habitat for them. They often favor mature long-leaf pines with open wiregrass understory forests that burns periodically. The most productive habitats have a variety of tree species with mature mast-producing trees (often over 40 years) with good nesting cavity potential. These squirrels use edges of forests and open lands and will feed in large pastures or fields hundreds of yards from the nearest tree.

Landscape-scale factors are strongly related to sustaining fox squirrel presence on a given golf course. There appears to be a strong "nearest neighbor" effect, in that fox squirrels move between golf courses or adjacent favorable habitat patches. Thus, courses with fox squirrels on their nearest neighbor are several times more likely to have a fox squirrel population, regardless of other course habitat factors. Land cover factors appeared to have relatively less influence on the probability of fox squirrel presence than proximity to other fox squirrel populations.

In planning a golf course to support and sustain fox squirrels efforts should be focused on linkage to other source populations such as regional sub populations and adjacent localized populations.



Fox Squirrel

Golf course managers and other large landowners in the region should be encouraged to cooperate to preserve movement corridors between habitat patches in order to allow continued fox squirrel dispersal. Other factors to note are differences in habitat characteristics such as tree size, presence of snags and nesting cavities, and multiple food sources. To enhance forest stands for squirrels, golf course designers should:

- Leave hardwood corridors along stream sides, between pine stands, and in drainages unsuitable for pines.
- Clear-cuts should be 50 acres or less.
- Protect large mast producing hardwoods and den trees within pine regeneration areas.
- Combine prescribed burning with thinning in pine stands to create and maintain an open understory. The resulting habitat is desirable for fox squirrels.

Photo Courtesy of Judy Hagan and the Florida Wildlife Federation

- During controlled burns, protect adjacent hardwood trees and shrubs (including food producers such as dogwood, blackgum, live oak, hickory, beech and other mast trees.
- Within hardwood stands exclude fire from existing timber.
- When harvesting hardwoods, leave at least one den tree (cavity tree) and five mast trees per acre. These are minimum requirements. Not every mast tree will produce each year, so the more nut producing trees that are left, the better.
- Thin young hardwood stands to favor mast trees and promote faster growth and crown development.

Finally, golf course design should strive to protect understory trees, shrubs, and vines. Many of these understory plants produce important food for squirrels. Planning needs to emphasize that courses plant more native vegetation to provide more year-round food sources for the squirrels. The exotic plants many courses use can be showy but frequently do not provide the best food for the animals. Suitable habitat must contain food sources through all seasons. Food is provided by fruit and nut-producing hardwoods, fungi, conifers, agricultural crops, and the buds, flowers, and inner bark of some trees and shrubs.

Sources: Alexander, B.G., *Fox Squirrel Management in East Texas*, Texas Parks & Wildlife Department, 1994; *The State of Georgia, the Georgia Department of Natural Resources, Wildlife Resources Division, Small Game Management in Georgia-Gray and Fox Squirrels*; and, Cindy Spence, *Threatened Squirrels Can Call Golf Course Home*, University of Florida online news service covering research of wildlife ecologist Rebecca Ditgen, 1997.

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Photo Courtesy of Judy Lynn Malloch and Charles Littlewood, respectively and the Florida Wildlife Federation

A marsh rabbit and a pair of raccoons.

Establish Corridors and Large Habitat Patches –

Corridors connect patches of wildlife habitat, enabling animals to safely travel and forage for food. It is important to establish natural travel corridors at least 30 yards wide for birds and other wildlife. Stream-side and wetland corridors are particularly important because they offer ample cover and food sources (e.g., insects, amphibian and small mammals) for birds and other predators. Attracting birds, foxes, bobcats and other wildlife to golf courses requires designing for and catering to smaller animals on which they depend for food. These smaller animals (many nocturnal), including squirrels, mice, rabbits, toads, lizards and such, are the little big shots of the animal kingdom, meriting consideration in golf course design and management plans.

Maintain as Natural or Naturalize Out-Of-Play Areas –

Look for non-play areas that are naturally vegetated or currently maintained with mowed grasses or disturbed areas that are visually unappealing. Areas between fairways, below elevated tees, in roughs and bordering woodlands and wetlands may be especially suitable for naturalization. Naturalized areas need not be large - they can start small and expand over time. The design of the course should enhance and protect special environmental resource areas and, when present, improve or restore previously degraded areas through the use of plants that are well adapted to the region. Seek opportunities to create and/or preserve habitat areas that enhance the area's ecosystem.

Conserve Native Habitat and Species –

Endangered or Otherwise!-In Florida, the objective is to keep common species common as well as working to improve the situation for threatened and endangered species. Wherever possible, protect existing native habitat. Some of the world's most beautiful and challenging golf courses emphasize their sites' natural characteristics. Left undisturbed or enhanced, native scrub, long leaf pine stands or wetlands alongside a fairway in out-of-play areas can provide valuable wildlife habitat without compromising the game. With easy access to food, water, and cover planned as a part of the course design, these areas can be refuges for many local wildlife species.

Design in Permanent and Seasonal Wetlands –

Golf course wetlands (both permanent and seasonal) provide a haven to local wildlife. Seasonal wetlands are especially important because of the diversity of species they support. Because of the complexity of creating wetlands, the best strategy is to avoid disturbing existing wetlands in the first place by taking advantage of a site's natural topography and features and incorporating them into the master design.

Where impacts to native on-site wetlands cannot be avoided, created wetlands may be incorporated. However, extraordinary care must be taken to ensure that created wetlands provide both the functional and aesthetic qualities of their natural counterparts. Again, leaving the native wetlands on-site and avoiding and minimizing disturbance is the best game plan. Wherever possible, maintain a direct connection between wetlands and wooded upland areas, or establish habitat corridors that link the two. While government regulations rarely stipulate that these connections be preserved, the linkage is essential for a number of species that live in uplands but feed or reproduce at water's edge.



Photo Courtesy of Joanne Davis, 1000 Friends of Florida

Raptor Bay Golf Club, a WCI Communities course in Lee County, created lakes and ponds on site with significant vegetated littoral zones that support a wide variety of bird life and also act in a stormwater bio-filtration role.

CASE STUDY

Twin Eagles Golf Course and Linkage to the Corkscrew Regional Ecosystem (CREW)

Bonita Bay Group has been working to establish a regional wildlife corridor running from the CREW lands in Collier County, Florida, along the western boundary of Twin Eagles Golf Course Community, across Immokalee Road and through the Immokalee Road South property. These components were developed and designed in conjunction with the Florida Fish and Wildlife Conservation Commission, Florida Wildlife Federation, Corkscrew Swamp Sanctuary and Collier County Audubon Society. The adjacent Twin Eagles land plan provided an Audubon International Gold Signature Golf Course, lakes with abundant littoral shelves, and single-family residential adjacent to the wildlife corridor. This regional corridor not only provides benefits for wildlife movement in the region but also provides hydrologic benefits in the height of the wet season. The effort:

- Increased the size of the adjoining Corkscrew Regional Ecosystem (CREW) preserve.
- Improved the southward conveyance of water flows originating north of the project.
- Created wading bird foraging marshes and intermittent drawdown pool habitats adjacent to CREW. The marsh habitats created from farm fields were graded to include different elevations to provide a variety of inundated areas and timing of foraging opportunities to the benefit of wood stork and other wading birds.

- Re-forested upland and wet pasture adjacent to on-site corridor which increased corridor width for wildlife.
- Provided environmental educational signage along key points of the preserve for educating the residents and golfers.
- Provided a wildlife underpass connecting the Bonita Bay East Golf Club and Twin Eagles wildlife corridor with the Immokalee Road South greenbelt/wildlife corridor.
- Provided Outstanding Florida Water (OFW) level of water quality treatment from the project's water management system.

Immokalee Road wildlife crossing between the north and south portions of the Twin Eagles Golf Course Community in Collier County (red dot on Map). Corkscrew Regional Ecosystem (CREW) preserve is the shaded green area on the map.

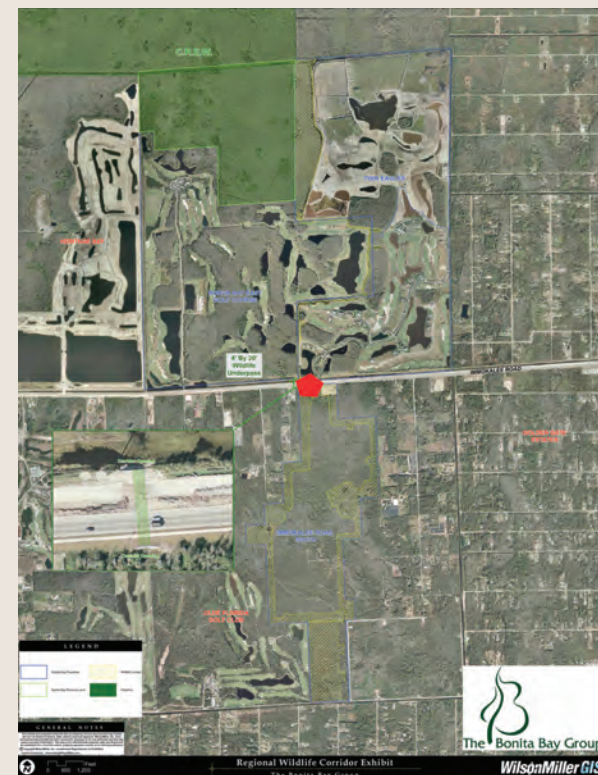


Photo Courtesy of Dan Pennington, 1000 Friends of Florida and graphic by the Bonita Bay Group.

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Photo Courtesy of Joanne Davis, 1000 Friends of Florida



An example from The Old Collier Golf Club in Southwest Florida of a dead tree snag retained to provide wildlife habitat needs. The tree has been cropped to limit liability concern from falling branches or a tree trunk

QUICK BASIC PLANNING FOR WILDLIFE FEATURES

- Identify the different types of habitat specific to the site and the likely mix of animals supported and identify the habitat requirements (food, water, cover, space) for identified wildlife species.
- Identify common as well as federal and state threatened and endangered species, and state species of special concern inhabiting or near the site, and preserve critical habitat and set-aside areas for on-site species that need protection, conservation or assistance.
- Identify and preserve local wildlife corridors and functional linkages. Linkage within the course and/or off-site to surrounding properties ought to be maintained, enhanced or re-established.
- Retain dead trees and natural debris snags for cover, nesting and feeding sites, cropping them if necessary where they pose danger to people or property.
- Retain or provide substantial "rough" native vegetated riparian buffers along waterways and waterbodies to protect water quality and provide food, nesting sites, and cover for wildlife. Sufficient upland buffer areas ought to be included to assist the life cycle requirements of many water and wetland dependent species that use uplands for reproduction, food or body temperature regulation needs.
- Design and locate cart paths to minimize environmental impacts. If possible, construct the cart paths of permeable materials and bridge wetlands and waterbodies instead of using fill and culverts.

- Avoid or minimize crossings of wildlife corridors. Design unavoidable crossings to accommodate wildlife movement and strive to separate golfers and carts from these wildlife areas.
- Remove nuisance and exotic/invasive plants and replace them with native species that are adapted for the particular site.
- Design perimeter fences or walls to be wildlife porous, especially where water, wetland or sound habitat features cross off-site and should provide sufficient clearance between the ground and the lowest portion of a fence or wall, except in areas where feral animals need to be excluded.
- Construct and place birdhouses, bat houses, and other animal nesting sites in out-of-play areas and plant butterfly gardens around the clubhouse and out-of-play areas.

Need help? Consult with environmental experts familiar with local plants and animals. Local Audubon and Native Plant Society chapters and environmental agencies are good starting points as well as:

- The United States Golf Association (USGA)
- The Audubon Cooperative Sanctuary Program for Golf Courses
- Audubon International
- The Environmental Institute for Golf - Online Information (EDGE)
- Florida Department of Environmental Protection

Source: *Best Management Practices for the Enhancement of Environmental Quality on Florida Golf Courses*, Florida Department of Environmental Protection, 2007; and, *Audubon International, Principles for Sustainable Resource Management, Fact Sheet*.



Photo Courtesy of Dan Pennington, 1000 Friends of Florida

Top: At Harmony in Osceola County careful bridging of onsite wetlands connects various portions of the course minimally impacting wildlife habitat.

Bottom: Bat house on the golf course at Harmony, Florida.

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Photo Courtesy of Rebecca Weegan, Coastal Plains Institute and Land Conservancy

Ornate Chorus Frog and Gopher Frog – These great croaking voices benefit from use of ephemeral wetlands.

From a conservation standpoint, numerous isolated seasonal wetlands scattered across a habitat mosaic of forested and open areas on a course may create a biodiversity boon for amphibians and some reptiles.

Increase Biodiversity with Seasonal Wetlands – Golf courses should incorporate seasonal wetlands, either in out-of-play areas or as course hazards. From a design standpoint, the incorporation of seasonal wetlands into a course layout has the potential to make a course more varied, aesthetically pleasing and challenging. From a conservation standpoint, numerous isolated seasonal wetlands scattered across a habitat mosaic of forested and open areas on a course may create a biodiversity boon for amphibians and some reptiles. Increased

landscape diversity of wetlands equals higher diversity of amphibians. One study revealed that most golf course water hazards had a lower diversity of amphibians than comparison seasonal wetlands (that is, similar-sized, natural wetlands with variable hydroperiod). Consequently, researchers predict that incorporating more seasonal wetlands into the design of golf courses will increase the biodiversity of amphibians and other semi-aquatic animals.

AUDUBON INTERNATIONAL’S PROGRAMS TO HELP GOLF COURSES AND COMMUNITIES BE WILDLIFE-FRIENDLY

Audubon International is a not-for-profit, 501(c)(3) organization dedicated to educating and assisting golf courses and communities to design and build new developments. As a part of their contracts with member courses and communities, they emphasize the big picture ecosystems approach with: good building and community design practices; water conservation and water quality protection features; efficiently designed transportation systems; and, efficient waste management and energy systems (including renewable energy sources). From a wildlife perspective, Audubon International works with golf courses and communities by following a prescribed planning and design format that:

1. **Performs an Initial Site Specific Assessment** – Before land-use changes take place, it is crucial to understand the characteristics of the site subject to proposed changes.
2. **Strives to Understand Local Habitat Sensitivity** – Sustainable resource management entails careful attention to the wildlife habitat of an area or region. Managing land in a habitat sensitive way includes:
 - Protecting ecologically sensitive areas from all degrading impacts.
 - Not disturbing local wildlife populations by degrading food or water sources, shelter (from predators or weather), or breeding habitat.
 - Not posing threats to species directly or indirectly through increased air or water pollution.

- Avoiding or minimizing increases of ambient noise levels in the area during and following changes in land use.
- Providing for migratory species’ access to habitual routes, food and water sources, and breeding grounds.
- Maintaining corridors and greenspace that will allow for the movement of plants and animals among habitat areas.

3. **Emphasizes Natural Landscaping** – Sustainable wildlife friendly resource management emphasizes landscaping using a variety of materials and resources native to an area, and maintaining them in a natural condition. Natural landscaping includes:

- Preserving or enhancing species of vegetation native to the natural region and, to the extent practical, removing species of vegetation not native to that region.
- Maximizing the size and number of natural or naturalized patches within the area and maximizing the use of natural or naturalized corridors to tie those patches together.
- Preserving and adding species to establish a wide variety of plants native to the region.
- Preserving or enhancing a variety of different types of habitat, such as forest, wetland, stream-sides, pond margins, and meadows and grasslands.
- Preserving or enhancing a variety of vertical layers of plants, such as canopy and understory trees, shrubs, and ground cover.
- Retaining dead standing trees, fallen trees, logs, and vegetative litter, such as fallen branches, twigs, and leaves.

- Not using pesticides, herbicides, fertilizers, or irrigation in natural or naturalized areas, patches, or corridors.

4. **Designs for Greenspace and Corridors** – Urban parks, forested zones, native grassland areas, and stream corridors reaching into urbanized areas are important elements of sustaining local habitats and wildlife and can include:

- Identifying and preserving greenspaces and corridors of high wildlife habitat and water quality value within cities and other communities.
- Maintaining corridors that connect areas and allowing for wildlife movement through and across property boundaries and between adjacent areas.
- Providing access to appropriate greenspaces for educational and recreational experiences.

Sources: Audubon International, *Principles for Sustainable Resource Management Fact Sheet*; and, *personal communications with Ronald Dodson of Audubon International.*



Aerial photo of St. James Bay an Audubon International Signature golf course in Franklin County.

Photo Courtesy of Ron Dodson, Audubon International

Photo Courtesy of Rebecca Meegan, Coastal Plains Institute and Land Conservancy

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It is important to determine what bird species are already on the site and make sure to not to destroy habitat features and linkages essential to their survival. It is also important to identify which bird species could potentially be attracted to the course. High quality bird habitat contains a large proportion of native vegetation that provides the basics – a mix of food sources, water and shelter, as well as minimum disturbance from golfers. Positioning high quality patches together is highly preferable to locating them alongside a degraded or busy area.

PLANNING FOR THE BIRDS

It is important to determine what bird species are already on the site and make sure to not destroy habitat features and linkages essential to their survival. It is also important to identify which bird species could potentially be attracted to the course. High quality bird habitat contains a large proportion of native vegetation that provides the basics – a mix of food sources, water and shelter, as well as minimum disturbance from golfers. Positioning high quality patches together is highly preferable to locating them alongside a degraded or busy area.

To support a mix of bird species plan accordingly by investigating the habitat requirements of those species and making appropriate modifications. These include:

- Using a mix of native plants, especially fruit-bearing varieties, as habitat and food sources is vastly superior to using exotic plants.
- Leaving dead trees or large snags standing in out-of-play areas and cropping them where necessary to limit liability concerns.
- Providing bird houses for specific species where natural cavities are lacking.
- Building birdhouses out of wood and positioning them away from human activity.
- Placing bird feeders and baths 8 to 10 feet from trees and cleaning regularly.
- Providing a variety of water depths, perching sites, and vegetation with water features.
- Designing vertical layers of habitat including ground, low, medium, and tall vegetation, and planting clusters rather than isolated plants.

- Establishing buffer zones to protect the nests of large nesting birds, and protecting areas with large numbers of nests and birds. At least a 100-foot buffer is ideal, but carefully placed screening vegetation can reduce the distance required.
- Encouraging the presence of birds and bats to control pests.



Yellow-crowned night heron

Photo Courtesy of David Woynehan Photography

UNIVERSITY OF FLORIDA IFAS STUDY SAYS GOLF IS FOR THE BIRDS

Golf course ponds can be used to enhance food sources, shelter, and habitat for resident and migratory water birds, according to a recently completed two-year study conducted by the University of Florida’s Institute of Food and Agricultural Sciences. During a study of 183 ponds on 12 golf courses in Southwest Florida over a 2-year period the study evaluated the extent to which created wetlands within golf courses are used as habitat by resident and migratory water birds.

Results indicate that the wide range of habitat variables selected by various bird species 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 can 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.

In general terms, the study shows golf course ponds may benefit wading birds in several ways:

- Provide permanent sources of water, which is critical during dry spells.
- Reintroduce water and food sources for indigenous water birds in areas that once supported wetland areas, such as land used for agriculture.
- Add water bodies to areas where none existed before.



Photo Courtesy of Joanne Davis, 1000 Friends of Florida

Golf Course pond at Raptor Bay in Lee County had a double littoral design (shoreline vegetated area and another vegetated rise several feet off-shore) that supports a wide variety of bird life.

- Provide substantial food sources and foraging areas for all categories of water birds studied; potentially limit human disturbances of feeding and habitat areas.

According to Martin Main, the study’s principal investigator, water birds travel great distances to find food, and the surface area of golf course ponds aids the birds to locate sources.

Source: *Wildlife in Urban Landscapes: Use of Golf Course Ponds by Wetlands Birds*.

C. LeAnn White and Martin B. Main, Institute of Food and Agricultural Sciences (IFAS), University of Florida, 2007.

Prescribed fire is a cost-effective management tool that should be a welcome addition to other integrated pest management techniques. Without periodic fire, the type and distribution of plant communities change in these habitats and they become increasingly unsuitable for wildlife that adapted to these environments.

INTEGRATE FIRE DEPENDENT NATURAL COMMUNITIES AND GOLF COURSES

Golf courses containing remnant fire adapted ecosystems can make effective use of prescribed fire to restore and maintain their rough areas. Prescribed fire is a cost-effective management tool that should be a welcome addition to other integrated pest management techniques. Without periodic fire, the type and distribution of plant communities change in these habitats and they become increasingly unsuitable for wildlife that adapted to these environments. Prescribed burning is by far the most cost effective treatment to reduce fuel loads and sustain native habitats. Burning functions to sustain the native composition and density of the vegetation reduce competing invasive plants, control pest problems, and open space between or below the tree canopy. Below are various planning and design issues requiring forethought within golf course communities and fire adapted ecosystems.

- **Smoke and Liabilities** – Properties adjacent or proximate to managed golf course lands receiving ecological burns should be zoned, or within, a designated overlay area wherein a “Notice of Proximity” is issued (see Chapter 7, Managing for Fire).
- **Strategic Separations** – Stormwater ponds can be planned and located strategically along an outer edge of developed areas and the managed golf course land to act as fire breaks between homes or other buildings.
- **Placement of Development** – Development can be clustered via conservation subdivision design with the common set-aside areas strategically placed as fire break between the prescribed fire-managed areas and residential or other developed sites.
- **Hydrological Restoration** – Golf course landowners can institute surface and groundwater restorative actions for previously altered or over-drained land and habitats. Such hydrological

restoration actions can help define and limit the extent of fire adapted ecosystems.

- **Managing Excessive Understory Growth and Exotic Plants** – These problem spots may contribute to heavy fuel loads. To avoid intense damaging fires, these areas sometimes may require mechanical or chemical treatment for thinning or removal prior to initiation of prescribed burn cycles.

BUFFERS FOR WATERBODIES AND WETLANDS

Buffers around the shore of a waterbody, or other sensitive areas, filter and purify runoff as it passes across the buffer and provides useful areas of habitat. Ideally, plant buffers with native species provide a triple play of water quantity and quality benefits, pleasing golf course aesthetics, and habitat and food sources for wildlife. Buffers generally have several zones inclusive of some upland, a riparian or damp soil area, and an in-water area with emergent vegetation. Depending of the design of the in-play areas, natural buffers adjacent to water and wetlands may need to be strategically reduced or eliminated, providing for managed-grass fairways or greens right to the wet edge. These “sharp” edges of managed grass to water or wetlands should be the exception rather than the rule, and should represent areas of frequent play. Areas outside of frequent play should be designed and managed as soft edges, i.e., natural buffered inclusive of uplands, riparian wet soils, and water emergent plant zones.

A measure of protection can be achieved by instituting special management zones around waterbodies and wetlands. In managed areas around a golf course, the first 25 feet landward should be a No Spray Zone (no pesticides used), and from 25 to 50 feet landward should be a Limited Spray Zone (selected pesticide use, based on a risk assessment protective of aquatic life). The No Spray Zones and buffers occupy the same space. It is important to note, however, that Limited Spray Zones and a policy of “no direct

discharge” provide advantages to all wildlife by maintaining water quality. Efforts are wasted if water quality is not sufficient for wildlife use. Some species, especially aquatic animals that cannot move large distances, are extremely sensitive to even trace amounts of standard fertilizers and pesticides. It is critical to design buffers that incorporate sufficient protective measures to maintain water

quality and wildlife habitat. Effective course BMPs for these buffer and near-to-buffer areas may include site-specific natural/organic fertilization (slow release forms) and limiting pesticide use.

The only downside to native vegetation buffers usually concerns the play of the golf game. Sometimes a waterbody is situated such that a native buffer would take up too much space, obstruct the view, or otherwise interfere with the play of the game. In this case, a grass buffer may be used. A 25-foot buffer of turf mowed at 3 inches and only minimally fertilized with slow-release or organic based products provides an effective buffer from a water quality standpoint, though wildlife benefits are lost.

GOLF COURSE STORMWATER TREATMENT TRAINS AND CAPTURING WILDLIFE HABITAT VALUE

Golf course stormwater management should include “natural systems engineering” or “soft engineering” approaches that maximize the use of natural systems to treat water.

Stormwater treatment is best accomplished by a treatment train approach, in which water is conveyed from one treatment to another by conveyances that themselves contribute to the treatment. For example, stormwater can be directed across a vegetated filter strip through a swale into a wet detention pond, and then out through another swale to a constructed wetland system. Each of these stormwater catchment, transmission, and treatment components can incorporate wildlife habitat features with care taken to manage for removal of trapped pollutants.

Stormwater treatment facilities can accumulate levels of pollutants that are toxic or that may cause chronic problem to wildlife. Proper golf course management recognizes this potential and strives to limit these problems through regular treatment train management actions, use of IPM, and limited strategic fertilization.

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Photo Courtesy of Matthew Paulson and the Florida Wildlife Federation

Watching you watching us - a pair of otters alongside a lake or waterway within a golf course setting is enjoyable and memorable experience.

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Getting outdoors and reconnecting with nature are among the top reasons why people play golf. Additionally, studies of residents of golf course communities indicate that many do not play golf but seek the “natural” aspects, including the greenspace and open areas the course establishes. It is critical to design courses to educate and engage golfers and residents to be good stewards of the land and living community.

GOLF COURSES AND WILDLIFE FRIENDLY ENVIRONMENTAL PRACTICES

Use Integrated Pest Management (IPM) – The design and implementation of Integrated Pest Management reduces the consumption of pesticides, fertilizer, water and time, thus producing a substantial reduction in operational costs. Essentially this means golf course managers and landscape maintenance personnel are educated to regularly and carefully observe the course and prudently apply pesticides only to the area of infestation and only in quantities sufficient to address the particular problem. The proximity of small mammals to the ground makes them particularly susceptible to harmful chemicals and bioaccumulation of harmful pollutants tends to increase “up the food chain.”

Limit Local Environmental Contamination from Chemical Mixing and Course Equipment Wash-Off Areas. For any golf course, a cornerstone design feature is to site and design the golf course maintenance facility to ensure all chemical mixing areas (insecticides, nematocides, fertilizers, etc.) have spillage catchment design on non-porous concrete surfaces.

RECYCLE AND USE RECYCLED MATERIAL

Use BMPs in recycling water and materials, heating and cooling practices, lighting and energy management and cleaning of equipment. Additionally, golf course bridge surfaces, benches, trash cans, and water coolers can be made of 100 percent post consumer plastics of the highest quality.

Source: The Florida Department of Environmental Protection, Best Management Practices for the Enhancement of Environmental Quality on Florida Golf Courses, 2007.

ENGAGE GOLF COURSE STAFF AND GOLFERS

Getting outdoors and reconnecting with nature are among the top reasons why people play golf. Additionally, studies of residents of golf course communities indicate that many do not play golf but seek the “natural” aspects, including the greenspace and open areas the course establishes. It is critical to design courses to educate and engage golfers and residents to be good stewards of the land and living community.

SUMMARY

There are great opportunities to accommodate wildlife when planning a golf course in a community. In general, the design progression ought to be: identify existing or potential habitats and wildlife connections first; establish or maintain stepwise buffer areas around waterbodies, wetlands, and other environmentally sensitive areas second; and then design the golf course layout with the community’s hardscape areas (homes and developed space). Take cues from the surrounding topography and landscape and incorporate natural features and amenities.

Remember that where habitat is concerned, size and shape matters. One large naturalized area is superior to several small fragments. Nevertheless, enlarging and connecting smaller habitats also creates habitat value. Distance counts too. Animals tend to avoid isolated habitat patches that require them to travel long distances or across open areas where the risk of predation is high. Locating habitat patches in close proximity to one another, or creating natural corridors with less managed or manicured grass areas connecting smaller patches, can increase wildlife value. The more natural vegetation and ground cover within a retained habitat, the more likely it is to attract and sustain a diversity of indigenous animals. Natural food, clean water, native cover, and limits on disturbance are the pre-requisites for local wildlife. Plan and design golf courses to sustain these elements and wildlife will always be present.

CASE STUDY

Encouraging Burrowing Owls at Golf Courses

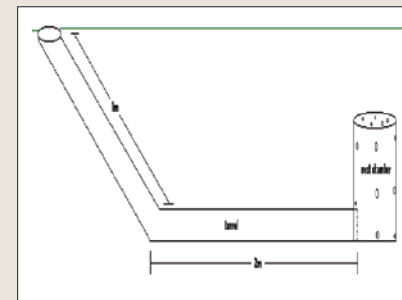
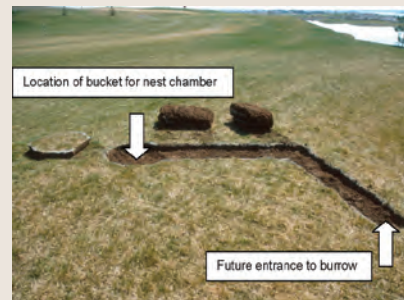
Golf course communities can play a role in helping to restore declining wildlife populations, such as the burrowing owl, by preserving burrowing habitat where it exists, and also by providing artificial nesting burrows on suitable areas. Burrowing owls may be attracted to golf courses because they prefer to nest and forage in open areas with short grass. Burrowing owls may benefit local golf courses by:

- Controlling rodent populations. Owls eat small rodents.
- Preventing outbreaks of insects. Owls feed on invertebrates such as locusts, grasshoppers, beetles, crickets, scorpions, and earwigs.
- Providing wildlife viewing, education, and focus for golfers. The owls are a popular species that people enjoy watching and learning about.
- Providing positive publicity. Golf courses receive positive local publicity by helping conserve a high-profile species of wildlife.

An artificial nesting burrow consists of a 5-gallon plastic bucket buried upside-down (without the lid) approximately 4.25 feet below ground. Ten feet of 4-inch corrugated drainage tubing is used to create a sloped tunnel leading from the ground surface down to the nest chamber. The 4-inch opening of the drainage tubing and a small patch of dirt are all that is visible after an artificial burrow is installed. Tunnel openings should not stick out above grass height so

that mowing and other maintenance can continue without interruption. The 10-inch by 14-inch patch of dirt at the tunnel entrance provides a search image that may help owls locate vacant burrows.

Source: How To Install Artificial Nesting Burrows For Burrowing Owls: A Guide For Golf Course Superintendents And Grounds Crews. By: Courtney J. Conway, Matt D. Smith, and Lisa A. Ellis 2002.



Burrows should not be installed near sprinkler heads, and should preferably be greater than 150 feet from the nearest sprinkler. Burrows should be installed in non-maintained areas (areas with minimal watering and mowing) with a minimum of 100 feet between the burrow and the nearest maintained area.