



## Creating a Haven for Fox Squirrels

*A mixed tree stand dominated by native species, with an open understory and full palms, is a rich habitat for feeding and nesting. Photo by Rebecca Ditgen*

### Only a Few Courses Offer Habitat Suited for Large Populations

BY REBECCA SELFRIDGE DITGEN  
*University of Florida, Department of Wildlife Ecology and Conservation*

**F**rom August 1995 to December 1997 I was fortunate to spend my days on 60 golf courses in south west Florida. I was there not to play golf but to search for and study one of my favorite animals, the Big Cypress fox squirrel (*Sciurus niger avicennia*).

The Bureau of Nongame Wildlife, Florida Game and Fresh Water Fish Commission, funded the study to see if golf courses can offer long-term refuge to these native squirrels which do not survive the pressures of dense development.

Squirrels and golfers know that all golf courses are not alike. The 30 months of field work clearly showed that some courses provide much finer habitat for fox squirrels than others.

On the larger scale, it became clear that planning and design strategies are critical to fox squirrels. Squirrel population levels are affected by isolation and clustering of courses, by traffic flow within and around a course, and by the density of development in and around a course.

On a smaller scale, at the level of course management, it is clear that tree species, ground cover, and human interactions can strongly influence squirrel numbers. Only a small number of courses offer habitat suitable for relatively high numbers of squirrels, and even these may not be secure for the long term. Given the variation in

landscape quality, I was able to identify management practices which can enhance habitat for fox squirrels if the species is present on a course.

Managing portions of a golf course for fox squirrels requires that you attempt to mimic elements of their native habitat. In southwest Florida fox squirrels live in open pine forests and make use of cypress stands, hammocks and occasionally the mangrove edges along the Gulf. They frequently move

**Editor's Note:** *The Florida Green has followed and reported on this study in two previous articles since its inception in 1995. We are pleased to present Ms. Ditgen's results and suggestions for ways golf courses can enhance the fox squirrel habitat.*



and feed on the ground and so benefit from an open understory. Managing the roughs and forested stands within a course with these habits in mind enhances opportunities for fox squirrels to feed and nest.

A consideration of tree species, understory management, palm trimming, and human activities will serve as a short introduction to landscape practices that can benefit these colorful squirrels.

### **Vegetation types**

Pines appear to be a key element in fox squirrel habitat. Squirrels harvest the annual crop of cones, feeding on the seeds and depositing the stripped cores at the base of trees. The trees are also used for nesting, escape routes and resting.

Important though pines are, fox squirrels need a variety of tree species to flourish. Native cypress trees can furnish a high quality food source as

soon as the trees are old enough to produce their small round cones. The grand old cypress trees gracing the fairways of fortunate clubs provide excellent nesting sites in the large airplants clinging to their main branches and in cavities found high in their broad trunks.

Native oaks produce excellent food, as do figs, maples and a range of native trees and shrubs. Cabbage palms can offer safe nest sites and food. Whether nesting in palms, cavities, stick nests or airplants, fox squirrels use Spanish moss to line their nests whenever it is available. The maintenance or development of mixed wooded areas of native species, complete with airplants and Spanish moss, creates critical habitat for fox squirrels.

A wide variety of non-native species supplement wildlife feeding on some of the older courses in southwest Florida. Few of these tree species are being planted today and so I will not

*In southwest Florida fox squirrels live in open pine forests and make use of cypress stands, hammocks and occasionally the mangrove edges along the Gulf. They frequently move and feed on the ground and so benefit from an open understory.*

# **Because close isn't good enough.**



*If you've got problems due to water repellent turf conditions, then you need a product that not only gets water into the thatch and top soil, but actively works below the surface. Nothing is better or faster than Respond Penetrating and Wetting Agent at moving water through the hydrophobic layer and into the root zone, where it can effectively fight compaction, drought stress and localized dry spot.*

## **RESPOND**

**Concentrated Wetting and Penetrating Agent**

**800-457-0415**



**United**  
Horticultural Supply.





*Another study subject enjoys a large fungus dug from the rich litter layer beneath an open pine stand. Photo by Rebecca Ditgen*

elaborate on them. I would instead encourage concentration on planting native species, both trees and shrubs, as they often require less care and water and they can provide food and shelter for native wildlife.

### **Understory**

An open understory in tree stands is critical for the success of fox squirrels. Creating and maintaining an open understory is controversial and not part of the landscape plan of every course, but it is an essential landscape element in fox squirrel habitat. It benefits the squirrels even if all the trees are not native species. Native saw palmetto can be present but fox squirrels are not favored in a landscape with a heavy palmetto understory.

The open understory is most helpful to fox squirrels if it is covered with a layer of pine needles. The needle layer provides excellent areas for burying pine cones and acorns for later consumption. The acidic pine litter layer also appears to enhance the growth of mycorrhizal fungi which facilitate nutrient uptake by tree roots. The fungi are vital to pine survival and they provide a much-used food source for fox squirrels. Recent studies have shown that

squirrels spread the fungal spores as they defecate, providing further inoculation of pine roots. This is a good story for trees, fungi and squirrels.

### **Palm trimming**

One of the easiest management techniques for fox squirrels, and a host of other native wildlife, is moderation in palm trimming, especially the native palms. Cabbage palms — by no accident the Florida state tree — have the look and grace of wild Florida. The layered leaves and long leaf bases of a cabbage palm provide a wonderfully protective shelter from tropical rains and winds, creating homes for native wildlife.

I was fortunate to witness more than one litter of fox squirrels starting life in the shelter of some rather full cabbage palms. The fullness of the palms was accomplished without distracting from the beauty of well-maintained courses.

The tropical palm trim so common on a number of courses may provide a “clean” look, but it turns our state tree into a useless remnant of a palm as far as wildlife is concerned. There are compromises in palm trimming. The extreme trim may be used on a few palms placed at dramatic points around the course if members prefer that look and the palms

in more secluded areas or near pine stands may be left with fuller crowns.

You do not need to stop trimming palms altogether to create usable habitat, but save enough leaves so that a dense upper crown remains and also keep long leaf bases in the crown to create a protected shelter in the top of the tree.

A few non-native palms found on golf courses can provide some of the benefits of the cabbage palms. Though I would not encourage you to plant the non-native palms, if you already have queen palms you know the fruits are highly sought after by fox squirrels.

The queen palm fruits can help the squirrels in the low food season of late winter and early spring. If you want to cut off the fruits so they will not litter the ground around the trees you might try placing them in an out-of-the-way area where squirrels can get to them for feeding.

### **Human interactions**

Because golf courses are essentially human places, people who play there and squirrels who live there will eventually meet. Everyone will benefit and be happier if some thought is given to what people can do for and to squirrels.

Feeding — I have been on several courses where fox squirrels were common yet they were still wary of humans. They did not approach carts and they ran for cover when people or carts approached. That is the healthiest situation for both squirrels and humans. Squirrels should never be fed from golf carts or otherwise handed by people. They must never associate food and people.

Once fed from carts or otherwise by hand, fox squirrels become pests. They hang around tees and greens waiting for distracted golfers and then make off with the food supply. Cart-fed squirrels have a greatly increased risk of dying in a one-sided cart-squirrel accident or being pounded over the head by a golf club. They become unpopular and members may even lobby for their removal.

It is of course best to have an ongoing understanding and notices for members



about not feeding squirrels or other animals. Even one member who habitually feeds the animals can train them to be problem animals. If you already have problem cart trespassers try squirt guns to discourage them. Squirrels just need to get the idea that a cart will offer an unpleasant experience.

Feeding fox squirrels is not necessarily a bad thing to do, but it needs to be done so it helps the squirrels and does not aggravate the members. If you want to feed fox squirrels, it is best done by scattering food on the ground in an isolated location away from heavy cart traffic.

Placing it about on the ground instead of in feeders in trees may reduce transmission of diseases such as skin fungus. In the wild, fox squirrels eat nuts, seeds and some fruit. You will need to follow that pattern. Commercial seed mixes can be appropriate squirrel food and you may also place the fruits of trimmed palms in the mix. Squirrels should not be fed bread or processed foods and peanuts are not nuts.

### Nest boxes

If your course is one of the many

with few ideal nesting sites, you may want to provide additional nesting sites in the form of nest boxes. Wood duck nest boxes work well for fox squirrels. Ideally they should be placed fairly high in pine or cypress trees, at least 25 feet from the ground, and be in a mixed cluster of trees.

You will need holes in the bottom for drainage and some circulation under the roof section. These boxes are often well used, both by females with litters and by individuals during extremely heavy rains and wind.

### Education

One of the best ways to benefit fox squirrels is by providing information to members and guests. This might include signs asking players to watch out for darting squirrels along cart paths or club roadways or writing columns about habitat enhancement, feeding restrictions, or natural history of wildlife species that are common on your course.

Many club members are not familiar with our native wildlife and plants and a little information may go a long way in helping them to understand and appreciate the unique and beautiful natural heritage of Florida.

***Squirrels should never be fed from golf carts or otherwise hand-fed by people.***

### In review

Whether you are the manager of an existing course with fox squirrels or you are involved in the planning of a new course, knowing what fox squirrels need can allow you to manage for their survival. Just remember the main areas of attention:

- Plant and maintain pines, cypress, oaks, maples, figs and other native trees and shrubs
- Maintain an open understory and create areas with a pine litter layer
- Trim palms moderately or not at all
- Consider human interactions- feeding, nest boxes, education

With careful planning, well-directed efforts, and good fortune you can help increase the feeding and nesting opportunities of the unique Big Cypress fox squirrel of southwest Florida.

**An acknowledgment:** In the course of my study I met a host of helpful and hardworking superintendents and assistant superintendents, many of whom shared my affection for these delightful fox squirrels. Their generosity and patience gave me access to the fox squirrels and their urban homes and I am deeply grateful for their assistance.

### About the Author

*Rebecca Ditgen is a wildlife ecologist in the Department of Wildlife Ecology and Conservation at the University of Florida. She conducted research on urban populations of Big Cypress fox squirrels as a Ph.D. student in that department and plans to continue her study of the species with a project in Big Cypress National Preserve. RSDitgen@ufl.edu.*



*A moderately trimmed cabbage palm provides a mid-day resting site for a Big Cypress fox squirrel whose fondness for pecans allowed him to be part of a radio-tracking study. Photo by Rebecca Ditgen*





## 'Naturalizing' Means Restoring Ecosystems, Not Going Native

BY TOM STONE

*President, Nature Golf, Inc.*

The Audubon Cooperative Sanctuary Program, GCSAA, and the USGA have ignited an interest in naturalizing non-play areas on golf courses. The reasons vary greatly from environmental stewardship to cost reductions and everything in between.

But what might be right for the front nine may be entirely wrong for the back. Ensuring success in this process may be as simple as letting nature tell you what to do.

In naturalizing areas of the golf course, the long-term goal should be to develop a self-sustaining habitat which will survive with minimal outside assistance after it is established. Planting the wrong plant in the wrong area will probably lead to less than favorable results, requiring additional water, fertilizer, chemicals and labor. A little research before you plant will pay off greatly.

Most golf courses cannot be totally restored to their original native environment, but they can be naturalized to what they have become! The construction process moves soils around, changes elevations affecting water flow and drainage, and generally alters the original ecosystem. For instance, a wetland forest which has been drained, probably will not survive as it had naturally, and should be naturalized according to its new environmental features.

There are 17 different and distinct natural ecosystems throughout Florida. Some of the more familiar ones are coastal uplands, fresh water marshes, pine flatwoods, wetland forests and mesic-hardwood forests. Each ecosystem has natural plant communities affected by site conditions like soil type, water availability and climate. These plant communities are made up of trees, understory trees, shrubs, vines



*Naturalizing out-of-play areas like this tee slope can save you labor hours. It is important to choose the right plant material that will adapt and thrive in the new conditions. Photo by Tom Stone.*

and groundcovers, wildflowers, and aquatics.

Naturalizing the golf course is more than just planting some native plants. The following steps will allow this to be more successful:

1. Identify wildlife species whose habitat you are trying to enhance. What specific features are required for them: nesting areas, food sources, shelter, cavities, etc. Encompass their needs into your overall plan.

2. Identify the areas to be naturalized. Use a map of the individual hole or the whole golf course to mark out the areas to be considered. Consider corridors for wildlife to move within the course.

3. Determine how naturalizing an area will affect playability of the golf course. Will it slow down play or make the hole too difficult? Trees may be unacceptable because they close off a dogleg across water but native grasses may have a place in these areas.

4. Classify the areas being considered. Determine what type of ecosystem would occur in these areas naturally. Do water levels fluctuate, does this area stay flooded for months at a time, is this area well drained after a 4-inch rain?

5. Determine what types of inva-

sive plants or trees are already located in these areas. Implement a plan to eradicate or remove these species prior to naturalization.

6. Develop a plant palette of species which will survive naturally in these specific areas. You wouldn't expect a bald cypress to live on top of a sand hill or a pine tree to survive submerged for three to five months, so put the right plant in the right place.

7. Plant, fertilize, irrigate and use pre-emergent herbicides for the first year or two to allow for a successful establishment, then turn off the water, eliminate the fertilizer, and let nature do the rest.

The end result will be the successful restoration of ecosystems and habitat within the golf course.

The golfing experience will be greatly enhanced, allowing golfers to experience a more natural environment and see wildlife which they may not see anywhere else

Besides improving habitat for wildlife, naturalizing non-play areas of the golf course will reduce expenses for irrigation, fertilizer, herbicides/pesticides, and labor to maintain these areas.



## IPM Principles Apply Indoors as Well as Outdoors

BY JEAN CIBROROWSKI

*Minnesota Department of  
Environmental Protection*

Integrated pest management is typically associated with treating pest problems which occur in landscape settings or agricultural fields.

How many of you have ever thought of employing IPM when treating indoor pest problems?

In most cases, when an indoor pest problem arises, people want the quickest solution; however, in the long run, a "quick fix" may not be the most appropriate. Just as in outdoor settings, indoor settings can also benefit from well-planned IPM programs which are proactive in nature.

The same principles which apply to outdoor IPM are also applicable to indoor IPM. Remember the six IPM "How To" steps: gather information and assess your situation; establish monitoring procedures; establish injury levels and develop economic thresholds; determine corrective actions; establish a good record-keeping system, and finally, evaluate your program's effectiveness.

It makes good sense to use IPM in indoor settings where humans and pets live, work and play. The goals of a good IPM program stress:

- 1) the importance of minimizing the risks to human health and the environment;
- 2) providing effective control of a pest complex by including alternative pest management strategies which are

least toxic to non-target organisms;

3) ease in carrying out a pest management program safely and effectively;

4) maintaining cost effectiveness both in the short and long term; and

5) appropriateness to the site.

When implementing a pest management program in buildings it is important to consider not only the pest but the environment in which the pest is found.

What factors are contributing to the pest's ability to survive and propagate? Where is the pest located, i.e., throughout the building or just locally in a specific area?

In order to manage the pest, you must be aware of its habits and location. The more information you collect, the better able you will be to make

***Sanitation goes a long way in eliminating pest populations. Eliminating sources of water and food for potential pests is very important. Storage of items in the proper containers, off the floors, and in dry spaces can aid in preventing problems. Physical controls, including vacuuming, caulking cracks, placing traps and removing pests by hand play an important role too.***

informed pest management decisions. Often by simply monitoring the pest, you will be able to determine its location and then, using one or more of several treatment options, control the pest so that it is below your accepted aesthetic, economic and/or safety threshold.

Remember, when treating any pest you must be aware of its life cycle so that you treat the pest during its susceptible life stage. Treatment of dormant stages will prove unsuccessful and a waste of time and money.

Broadly speaking, what are the treatment options for indoor pests? I will touch briefly on four general categories:

education, habitat modification, physical controls and chemical controls.

• **Education:** Often indoor pest problems can be drastically reduced or eliminated by education. If people understand what causes a pest problem, they may be better able to avoid behaviors which can lead to pest problems. For example, people may not realize that by leaving food and drinks out and not cleaning up spilled foods, they are creating the perfect environment for pests.

• **Habitat modification:** It is important to keep things clean. Sanitation goes a long way in eliminating pest populations. Eliminating sources of water and food for potential pests is very important. Storage of items in the

proper containers, off the floors, and in dry spaces can aid in preventing problems.

• **Physical controls,** including vacuuming, caulking cracks, placing traps and removing pests by hand play an important role too. Choosing least-toxic chemical controls such as desiccating dusts and insect growth regulators can also

contribute to your IPM program.

• **When chemical control is necessary,** consider the safety of the pesticide for humans, pets and the overall environment. Try to use a chemical which is species specific and always follow label directions.

Keep in mind that the aim of an IPM program is to manage pests over long time periods. You want to implement a program which will be viable now with continued efficacy into the future.

*Reprinted with permission from the  
October 1998 Minnesota Hole Notes.*