Tree inventory software eases the pain of tree removal

By ANDREW OVERBECK

"There are only two kinds of courses in this country," said Dave Oatis of the U.S. Golf Association, "ones that are overplanted and ones that will be overplanted."

Despite constant prodding by organizations like the USGA, most courses are just now starting to pay attention to their tree-management practices and implementing selective tree-removal programs.

According to Oatis, more courses are starting to feel the effects of tree-planting schemes that were popular 20 to 30 years ago.

"The top three problems are improper selection of species, improper location and planting too many trees," said Oatis director of the Northeast Region of the USGA Green Section.

These problems can lead to increased tree disease, weaker, poorly developed trees and increased competition with surrounding turf areas for sunlight, water and nutrients, said Dr. Jay Sipes of Virginia Tech University in Blacksburg, Va.

"The first step to combating these difficulties is to prepare a tree inventory," said Sipes. "First, identify the trees; second, scout for disease and pest presence and damage; third, identify pests; fourth, implement a management plan to take care of these problems."

GPS AND GIS

The second step, according to forester Jack Swaze of Swaze Burris Terra Turf and Trees in Houston, is to map the golf course with Global Positioning System (GPS) and Geographic Information System (GIS) software that provides superintendents and greens committees with a visual idea of how trees and turf are interacting on the golf course.

"Most courses are on a collision course with nature and they are going to have to manage trees just as they manage the turf in order to have optimum conditions," said Swaze. "We catalog and identify trees on an aerial map that assesses what they have and then the software can predict what a tree is going to do down the line."

The PC-based software program is prepared for each golf course and is a "working tool" that can be used as a constantly evolving management device to change and update course conditions over time. Swaze recommends that an arborist review the data every four to five years to ensure that a proper management program is followed.

An aerial image prepared by Terra Turf and Trees identifying tree placement on the 10th hole at BraeBurn Country Club in Houston.

Jason Bass, certified arborist and president of Point Forestry in Eagan, Minn., prepares similar turnkey software programs for golf courses.

"We do GPS and GIS tree inventories and we catalog tree species, condition, damage and disease," said Bass. "Then we show the superintendent where trees are too thick, where the trouble trees are,

Continued on page 24

Who can take an oak tree? The Stump Man can

"Have stump grinder will travel..." is the raison d'être of the Crews Service Co.

By ANDREW OVERBECK

WALNUT GROVE, Mo. — Sick and tired of dealing with the hassles of owning a medium-sized tree-service company, Ted Crews sold his share of the business to his brother four years ago and struck out on his own. Crews, a certified arborist, is now waging a one-man battle to rid a seven-state region of a persistent evil...tree stumps.

"I wanted to do something that I could do by myself," said Crews. "A stump grinder was the only machine that one man could operate and make a living with."

And what a living Crews makes. In order to make his business feasible, he owns the most powerful stump

Continued on page 24

Dead trees have their uses.

What use is a dead tree?

By RON DODSON

What is a snag?

A snag is a dead or dying tree that is left standing. To many people, a snag is just firewood waiting to be cut, and until recently, foresters systematically removed dead trees because it was thought that they harbored disease and insect pests. In fact, most dead trees do not harbor active diseases or damaging insects.

It is now widely recognized that many bird species feed heavily on insects and thereby help to prevent serious insect outbreaks.

But how does a tree become a snag?

Continued on page 22

Ron Dodson is president of Audubon International, headquartered in Selkirk, N.Y.

Trees versus turf: A constant battle over water

By JACK SWAYZE

That's a fine little sapling you planted there. It may not consume much water today, but have you considered the future?

A plant's leaf surface area basically determines its water usage. The larger the leaf surface, the greater the water loss. Evapotraspiration (ET), the loss of moisture into the atmosphere through the leaves, is effected by temperature, humidity, time of year, wind exposure and sun.

In the winter, for instance, dormant trees and turf require less water due to lack of foliage, cooler temperatures, and shorter daylight hours. Conversely, in the summer the usage can be significantly greater due to higher temperatures, sunlight, wind, and so on.

Cultural practices such as mowing keep the golf turf leaf surface area at a prescribed height. The moisture loss by the relatively small leaf surface area of turfgrasses is minimal compared to tree leaves. The ET is still affected to a great degree by the temperature, wind, humidity, etc.

Overall, the water requirement of the turf is constant from year to year as it covers only the same given area with no change in height or biomass. The golf course will probably always average the same annual water consumption for the turf year after year.

However, trees differ from turf in that they have woody conductive and support tissue that connects foliage with the tender root hairs in the soil. The canopy of the tree is in equilibrium with its roots in the fact that one physiologically supports the other. Leaves are responsible for photosynthesis (carbohydrate production), while roots absorb moisture and nutrients. One can not exist without the other.

Trees have root systems that can extend for hundreds of feet and are often two or three times as long as the tree is tall. Tree roots' influence on turf can be considerable as they can extend into and grow across fairways. Trees can outcompete turf for moisture, nutrients and oxygen.

Continued on page 22

Jack Swayze is a forester and president of Terra Trees Turf, LLC, headquartered in Houston.

Swayze on trees

Continued from page 21

By contrast to turf, trees are ever increasing in size. Each year they add more biomass in the form of leaves, twigs, trunk tissue and roots. This added tissue growth means an added amount of water, nutrients and oxygen needed to sustain the tree. A small tree requires only a few gallons of water a day. But as it grows, each year the amount needed increases proportionately. As the tree gains height, it is also subject to more extremes in wind and exposure, which can increase the ET rate and thus increase its water needs.

Water consumption for large trees such as the large live oak can possibly exceed 1,000 gallons per day when the ET rate is high. Should a golf course have thousands of trees, the moisture consumption rate of those trees will often well exceed the turf requirements. This amount of water for trees can run into the hundreds of thousands of gallons per day.

Another common misconception is that tree roots grow at deep depths. Generally, this is not true. Trees, like turf and all other plants, require oxygen for root growth, and therefore roots are only found where oxygen is present. In fact, oxygen availability to the roots is a singular limiting factor for any plant. Since oxygen is more readily available near the soil surface, tree roots are most often found in the turf root zone. Keep in mind that a golf course is irrigated, fertilized, and aerated for better turf quality.

Trees are opportunistic and will send roots where conditions are optimum. In general, the better turf conditions are, the better it is for trees. If irrigation practices are to water lightly each night, then over time tree roots will evolve at a more shallow depth to pick up the available water. Deeper watering will help keep tree roots slightly deeper.

To help in keeping golf turf healthy with less tree-root influence, superintendents should root prune and/or use root barriers.

Root pruning along fairways, tees and greens can give several years of results, but can also damage the trees and cause stress problems if trees have become dependent on the turf irrigation. This approach should be done with caution if valuable trees are at risk.

Removing unnecessary trees as well as pruning will reduce overall moisture losses to trees. Pruning is remedial, though, unless major structural limbs are removed to permanently reduce the tree's size. This can get into aesthetic issues and likewise should be carefully addressed.

Nature has provided a natural selection of tree species for all plant zones. In arid regions, species survive on minimal water and should be used where practical. The same is true for wetter regions where water issues are of less concern. In any case, planting the correct species in the right place is important. Keep in mind that the trees will grow and will require more water. Hopefully, the tree will have its needs met without compromising the turf quality. Remember that the game of golf is played on turf.

(Above) Roots pruned in 1996 at Riverside CC in Lake Jackson, Texas, show turf in the fairway and less on the tree side. (Below) Workers install a Biobarrier to prevent root encroachment at Riverside.

Dead trees

Continued from page 21

Once a tree dies, the process of decay begins. Snags become areas of insect activity, fungal growth, and overall decay. Holes, or cavities, occur in both living and dead limbs and may occur through the process of natural decay, or wind, or lightning damage. Large cavities can occur where major limbs die and fall from the trunk. As snags decay, hardwood softens, and damaged areas become insect-infested. The cavities are enlarged by birds and mammals digging into the cavities and picking apart the wood for insects and for shelter or nesting sites.

What wildlife uses snags?

Two main groups of wildlife use snags — primary and secondary cavity nesters. Primary cavity nesters are species that must make their own cavity nest by drilling or pecking it out of the wood of a tree. Secondary cavity nesters either live in cavities made by primary cavity nesters, or in holes that have been left through the process of natural decay or damage.

Insect-eating wildlife species that are primary cavity nesters and that are attracted to snags include all of the woodpecker species and nuthatches. Secondary cavity nesters include chickadees, tufted titmouse, brown creepers, as well as several species of larger birds such as the screech owl and American Kestrel.

Some of the larger trees, such as the shag bark hickory, also provide roosting and resting places for several species of bats, which are the single most important form of night-flying, insect-eating wildlife.

In addition to bird species, a variety of mammals, amphibians, and reptiles may also benefit from the food and shelter provided by decaying trees.

What are the benefits of snags?

Leaving dead and dying trees standing when they don't pose a threat to the safety of humans provides valuable resources for a wide range of wildlife species. Insect-eating activity is just one benefit of tree snags — nature's own way of controlling pests. Equally important is their role as nesting sites for a variety of wildlife species.

Continued on next page

Dead trees

Continued from page 21

Dead trees can also be used to mount additional nesting boxes, increasing the available nesting sites for cavity nesting birds. Snags also serve as valuable sites for perching and shelter.

Snags overhanging water provide perches for spotting fish for prey by kingfishers and herons, or at the edge of fairways for catching insects by flycatchers.

They may also serve as den sites for small mammals. Den trees have trunks or large limbs hollowed out by rotting with an opening to the outside. This includes some snags, but den trees typically are still alive enough to continue to produce mast (nuts and acorns) or fruit. Den trees are used by honey bees, birds, and mammals varying in size from a mouse to a black bear. Hollow trees broken off at the top and open to rain and snow provide less protection, but are sometimes used by birds like great horned owls for nesting protection.

Once a snag falls to the ground it continues to be beneficial to wildlife as a source of food and shelter, as well as to return nutrients to the soil. A fallen snag and other downed limbs, twigs and debris may also be used as part of a brush pile providing additional wildlife shelter and protection. Brush piles placed in sheltered areas along the edges of fields, fairways and woods provide escape, cover, nesting sites and den sites for rabbits, weasels, woodchucks, skunks, Northern prairie skinks, red foxes, garter snakes and many other species. Brush piles can also provide important reptile, amphibian, and fish habitat if placed on the edge of a small pond so part of the brush is submerged.

What can you do?

- Do wildlife a favor and start a snag conservation program if you don't already have one.
- Develop a management strategy to retain snags in various stages and in a variety of habitats.
- Monitor snags for safety and development of undesirable pest problems.
- Provide additional nesting sites for birds by leaving snags as a source shelter and food.
- Reduce the amount of trees and limbs you have to dispose of by leaving them standing to help all of the cavity nesting forms of wildlife that are looking for homes.
- Use decaying snags and limbs in brush piles.
- Educate club members about the economic and environmental benefits of leaving dead trees to enhance habitat and provide nature's resources for the living.
- Write a short article for your club newsletter, post a sign on a snag explaining its natural resources, take slides and post photos to demonstrate the integration of nature's way as part of the golf course — a contribution to the environment as well as to the aesthetic uniqueness of the course.

Tree software

Continued from page 21

and we offer solutions ranging from pruning to cleaning, or removal.

"We also have a three-dimensional feature that lets you view the tree over time so that you don't put a $400 tree in the wrong place 15 years down the line."

However, Bass has found that superintendents are still too reactive when it comes to tree management.

"Many are calling us too late. We have seen trees that have been planted too deep, that were suffering from compaction, neglect, poor pruning and structure," said Bass. "People need to remember that it costs three times more money to remove a tree than it does to maintain one."

Terry Gill, superintendent of BraeBurn Country Club in Houston, is learning this lesson the hard way.

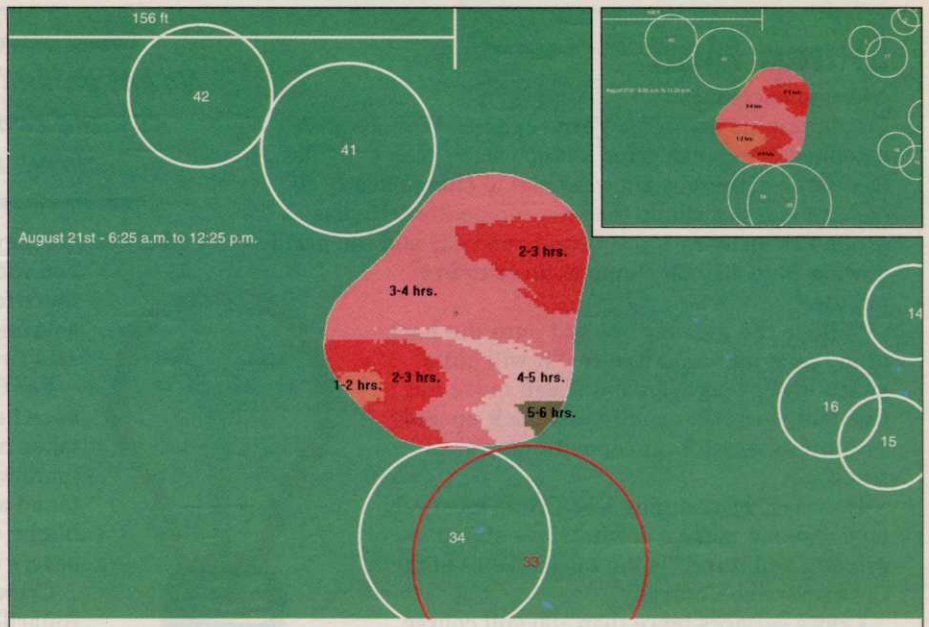
Swaze's Terra Turf and Trees completed a three-hole tree inventory pilot program at BraeBurn in August and the results of that work are already proving to be worthwhile. "We identified 50 'problem trees' and did pruning and removal and they were able to come in and sod areas where they couldn't before," said Swaze.

The impact of the tree work became more evident in early September when a storm packing 60 mph winds caused extensive tree damage, except on the three fairways in the pilot program.

"The trees that had been trimmed we had no damage on, but on the rest of the golf course, we had substantial damage," said Gill. "It took the better part of four days with 18 guys working to clear it out, not to mention laying new sod."

The cost of Swaze's tree inventory was around $14,000 and the subsequent tree work will cost the BraeBurn close to $100,000 this year and $30,000 for the next three years to get the course onto a proper tree-management program.

The average cost of a tree inventory that includes maps, software and recommendations for a management program runs around $15,000 per 18-hole course, according to Point Forestry's Bass.



Sun-mapping software shows how trees (white circles) affect the number of sunlight hours on this green. Note how the inset image (before tree removal) has fewer sunlight hours than the large image, which has one tree removed (red circle).

SUN-MAPPING

While GPS and GIS help in identifying, cataloging and mapping the course and its trees, sun-mapping technology developed by Toronto-based Arbor Com Inc. is revolutionizing tree-removal practices.

Arbor Com generates sun-mapping software around green and tee areas that are suffering from inadequate sunlight and poor turf growth.

The software is extremely complex and as a result is not a turnkey solution. But it does offer the most accurate calculations and recommendations for tree removal. For example, it can identify which branch on a tree that needs to be removed in order to improve sunlight penetration.

"We take longitude and latitude measurements on site and that tells us how the sun moves through the property," said Scott Robinson, vice president of Arbor Com. "Then, using surveying technology, we measure 45 points around the green and that tells the software where the green is so it can generate a three-dimensional map."

From there, Robinson measures and identifies the trees surrounding the green, including vertical and horizontal heights so the software knows where the trees are in relation to the green.

"Then we have a model where we can get the computer to show us how shadows move on the green and how many sunlight hours the green is getting," said Robinson.

Robinson then compares the needed light penetration for the particular turfgrass with amount of sunlight hours that the green is actually getting. "If it is deficient and not meeting the goal, we can identify the problem trees and run the model to see what part of the tree is blocking out light," said Robinson.

This simulation process usually begins

Continued on page 24