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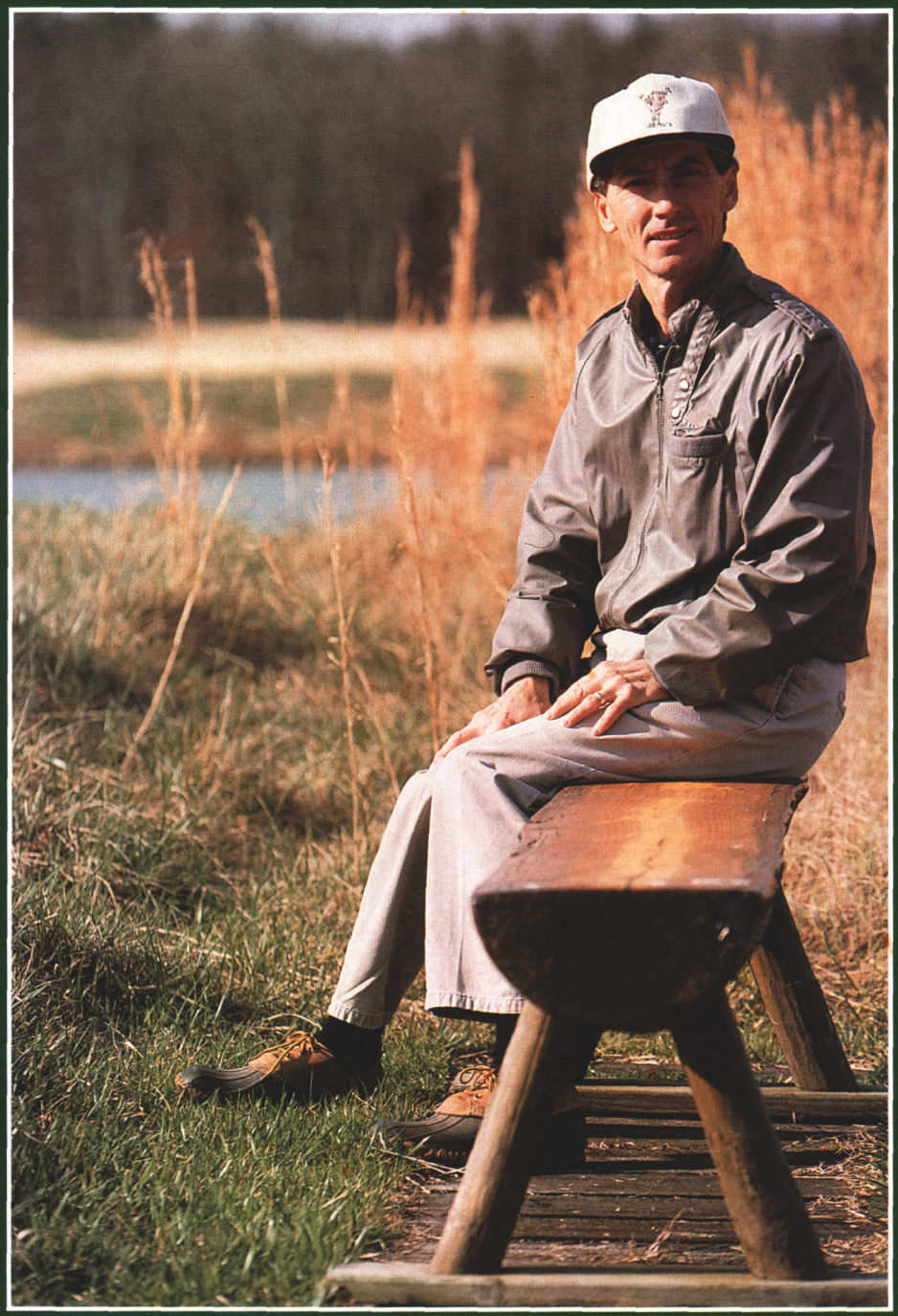

USGA GREEN SECTION 75th Anniversary 1920-1995

David Stone

1995 Green Section Award Recipient

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Cover Photo:

David Stone's accomplishments have established him as a leader in the golf course management profession.

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NATIONAL OFFICES:
United States Golf Association, Golf House
P.O. Box 708, Far Hills, NJ 07931 • (908) 234-2300
James T. Snow, *National Director*
Dr. Kimberly S. Erusha, *Director of Education*
Marty Parkes, *Manager, Green Section Communications*

P.O. Box 2227, Stillwater, OK 74076 • (405) 743-3900
Dr. Michael P. Kenna, *Director, Green Section Research*

GREEN SECTION AGRONOMISTS AND OFFICES:

Northeastern Region:
United States Golf Association, Golf House
P.O. Box 4717, Easton, PA 18043 • (610) 515-1660
David A. Oatis, *Director*
Robert Y. Senseman, *Agronomist*

99 Lawrence St., Palmer, MA 01069 • (413) 283-2237
James E. Skorulski, *Agronomist*

Mid-Atlantic Region:
P.O. Box 2105, West Chester, PA 19380 • (610) 696-4747
Stanley J. Zontek, *Director*
Keith A. Happ, *Agronomist*

Southeastern Region:
P.O. Box 95, Griffin, GA 30224-0095 • (404) 229-8125
Patrick M. O'Brien, *Director*
Christopher E. Hartwiger, *Agronomist*

Florida Region:
P.O. Box 1087, Hobe Sound, FL 33475-1087 • (407) 546-2620
John H. Foy, *Director*

Mid-Continent Region:
720 Wooded Crest, Waco, TX 76712 • (817) 776-0765
James F. Moore, *Director*

Paul H. Vermeulen, *Agronomist*
P.O. Box 1130, Mahomet, OK 61853 • (217) 586-2490

North-Central Region:
P.O. Box 15249, Covington, KY 41015-0249 • (606) 356-3272
Robert A. Brame, *Director*

11431 North Port Washington Rd., Suite 203
Mequon, WI 53092 • (414) 241-8742
Robert C. Vavrek, Jr., *Agronomist*

Western Region:
5610 W. Old Stump Dr. N.W.
Gig Harbor, WA 98332 • (206) 858-2266
Larry W. Gilhuly, *Director*

22792 Centre Dr., Suite 290
Lake Forest, CA 92630 • (714) 457-9464
Patrick J. Gross, *Agronomist*
Michael T. Huck, *Agronomist*

Turfgrass Information File (TGIF) • (800) 446-8443

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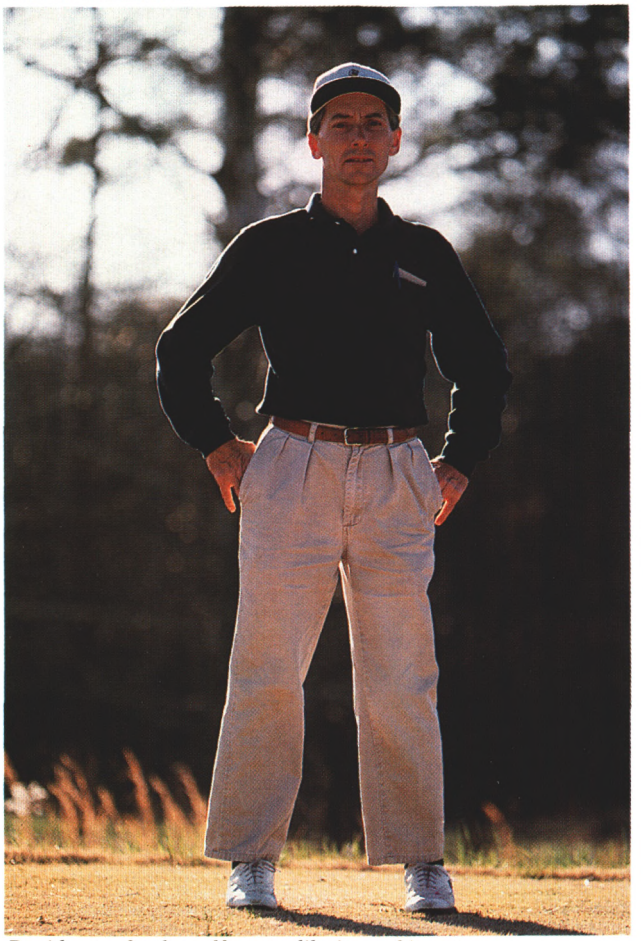
DAVID STONE — 1995 Green Section Award Recipient

DAVID STONE, golf course superintendent of The Honors Course in Chattanooga, Tennessee, has been selected as the recipient of the 1995 Green Section Award. Granted by a distinguished panel of experts, this annual award recognizes persons for distinguished contributions to golf through work with turfgrass. Stone received the award in February at the Golf Course Superintendents Association of America Conference in San Francisco, California.

A Tennessee native, Stone grew up on his family's dairy farm and became interested in the game of golf, like so many in those years, by watching Arnold Palmer play on television. He built his first green on the dairy farm so he could practice his game. When he realized he would probably never be accomplished enough as a player to become a professional, Stone decided upon a career in golf course maintenance. His interest led him to enroll at the University of Tennessee in Knoxville, where he received a B.S. degree in Ornamental Horticulture in 1971.

Upon graduation, Stone labored in golf course maintenance until landing his first superintendent's job in 1974 at Crockett Springs Golf Club in Nashville. He stayed there until 1977, when he assumed superintendent duties at Holston Hills in Knoxville. In 1982, Stone moved to Chattanooga and The Honors Course.

The Honors Course has received recognition for its programs promoting conservation and preservation of wildlife habitat. The site has already proved worthy of welcoming important national championships such as the 91st U.S. Amateur Championship and the 1994 Curtis Cup Match. Stone's work throughout his dozen years at The Honors Course has attracted many accolades, including the Turfgrass Professional of the Year Award from the Tennessee Turfgrass Association, nomination to the Tennessee Golf Hall of Fame, and service as past-president of the Tennessee Turfgrass Association and the East Tennessee Golf Course Superintendents Association. He has spoken at more than 100 local, state, and national turfgrass meetings, and at several Golf Course Superintendents Association of America meetings.



David cares for the golf course like it was his own. His commitment to the environment is evident with his every project at The Honors Course.

Stone has received the recognition of his peers for several innovative agronomic accomplishments while at The Honors Course. Among these innovations:

- Establishing the first zoysiagrass fairways in the southeast region in 1984;
- Experimenting with herbicides to control bermudagrass in zoysiagrass in 1988, which led to Fusilade being labeled for this use on turfgrass;
- Formulating experiments in 1989 with a new experimental fungicide called Prostar that proved effective in controlling zoysia patch;
- Overseeing a four-acre experimental area for several turfgrasses in 1989 to test various cultural practices, including overseeding zoysiagrass with perennial ryegrass;
- Conducting a bentgrass variety trial in 1991 in both a full-sun and good-air-movement area, and in a partial-shade and poor-air-movement area, which quickened the acceptance of the new heat-tolerant bentgrass varieties over the old standard, Penncross;
- Assisting last year in the planning of The Little Course at Aspen Grove near Nashville, which is operated by the Tennessee State Golf Association and the Tennessee PGA. It will serve as a turfgrass research station and provide opportunities for junior golfers to learn to play the game.

David's soft-spoken and gentle manner underscores the feelings of accomplishment and tranquility he has developed from his job. As an example, his ongoing efforts to construct nestboxes to promote the bluebird population of The Honors Course is obviously a labor of love. The tone of his voice reveals all the affection and warmth of a parent as he describes the nurturing of generations of bluebirds that have inhabited the property. His commitment to promoting such harmony between the golf course and its surroundings is always in evidence, and serves as a worthy example to others.

Although he admits that the days spent by a golf course superintendent are often tense, hectic, and long, David Stone clearly wouldn't want to do anything else. He and his wife, Mary — a schoolteacher and fellow bluebird enthusiast who obviously has resigned herself to having a husband who is often near home but not at home — live at The Honors Course. One receives the unmistakable impression they live a fulfilling, joyous life there.

David Stone's nomination for the 1995 Green Section Award attracted widespread and enthusiastic support. One letter, though, seemed to sum up best the underlying sentiment: "David Stone, in my opinion, is the epitome of the golf course superintendent. The profession is a cross between science and art. David is that blend."

1995 GREEN SECTION EDUCATION CONFERENCE

A New Attitude: Green Efforts for Tomorrow

February 27, 1995, San Francisco, California

FOR THE 14TH CONSECUTIVE YEAR the annual Green Section Education Conference was held in conjunction with the Golf Course Superintendents Association of America International Turfgrass Conference and Show. This year more than 1,400 people attended the Green Section's program on Monday, February 27, at the Moscone Center. Thomas W. Chisholm, Chairman of the Green Section and member of the USGA Executive Committee, introduced the afternoon's program of 18 speakers who addressed this year's theme, "A New Attitude: Green Efforts for Tomorrow." Following are the full proceedings.

These greenhouse lysimeters were used to obtain information about pesticide leaching through turfgrass profiles. University of Georgia.

The USGA's Environmental Strategies: What We've Got and What We Need

by JAMES T. SNOW
National Director, USGA Green Section

EVERYONE who plays golf or is involved in the industry has a stake in the future of the game. Most of us enjoy the game and want to see it prosper as a pleasurable and affordable pastime for nearly 25 million Americans. Many others derive a living from the game and want to do whatever possible to ensure a secure future for the sport.

At the same time, everyone involved in golf is concerned about our environment and wants to make sure that it is preserved for our children and future generations. Thus, it is essential that every person in our industry, first, becomes aware of the environmental issues facing the game of golf and, second, takes action to ensure that our activities not only have the least possible negative effects, but also help enhance the quality of the environment wherever possible.

The Issues

It wasn't until the 1970s that golf courses began to receive attention from people who were concerned about how the game might be affecting the environment. A series of widespread droughts during the late 1970s and early 1980s, highlighted by a severe drought in California and other western states, resulted in extreme restrictions on the use of potable water by homeowners and businesses in hundreds of communities. Golf courses were among the first and most severely restricted operations in many areas, due in part to their visibility in their communities and because they were considered non-essential users of water.

During the golf course construction boom of the 1980s and 1990s, golf courses again

were under attack because of how golf course construction affected natural areas and because of the use of pesticides on existing courses. In many cases, unsubstantiated claims about the negative effects of golf courses were tossed around by anti-development groups in an effort to kill housing developments or commercial real estate development. Some of the environmental questions that people have raised about golf courses are based on sincere concern and deserve investigation and action by the golf industry. These concerns can be summarized as follows:

- The use of scarce water resources for golf course irrigation;
- Potential pollution of our water resources by pesticides, fertilizers, and other materials;
- The loss of natural areas due to golf course construction and associated development;
- Possible effects of golf course activities on people and wildlife.

The USGA's Environmental Strategies

For more than a dozen years, the USGA has made investments in research and educational programs that address the environmental concerns noted above. Although more needs to be done, a significant amount of work has been completed, and a well-balanced strategy has evolved for dealing with golf's environmental issues. The following list summarizes what we've got so far:

- Research results and information;
- Environmental publications;
- The Audubon Cooperative Sanctuary Program for Golf Courses;
- The Nature Links Program;
- Contacts with environmental agencies and organizations;
- Public relations programs.

Research Results and Information

Between 1983 and 1994 the USGA funded 90 research projects at 31 land-grant universities, at a cost to the USGA of more than $11 million. Each of these projects addressed one or more of the environmental issues noted earlier.

The USGA's Turfgrass Research Program has emphasized the development of new grasses for golf that use less water and are resistant to diseases and insects, thereby requiring less pesticide use. Basic information about water use rates of various turfgrasses was developed, and maintenance practices that result in less water use were investigated. Breeding programs for more than a dozen grass species, including several native and non-traditional turf species, were supported. New cultivars with improved characteristics emanate from these efforts, and many more will be introduced during the next five to ten years. The Turfgrass Information File, a comprehensive computerized database of turfgrass literature, was established at Michigan State University to make available the latest scientific information to the turfgrass industry.

The USGA's Environmental Research Program was conducted during the period 1991-1993. Significant data were collected concerning what happens to pesticides and fertilizers when they are applied to golf courses, including pathways such as leaching, runoff, and volatilization. Several studies investigated residues left on the turf surface after pesticide applications, and how golfers might be exposed to these residues. Other studies attempted to find ways to control turfgrass pests without the use of pesticides, including the use of biological controls. The environmental benefits of turfgrasses and golf courses were also investigated, and some initial work was done to characterize the effects of golf course activities on wildlife.

Information about the results of these studies is available from the USGA in the form of research reports and summaries.

Environmental Publications

Since 1990 the USGA has published a number of books, reports, and articles about golf's environmental issues and about the results of its sponsored turfgrass and environmental research work. In 1992, a 1,000-page literature review was published, titled *Golf Course Management & Construction: Environmental Issues*.

In 1993 the USGA published the *Landscape Restoration Handbook*. This book discusses principles for establishing naturalized areas on golf courses, provides lists of native plants on an eco-region basis and gives extensive information about each plant, and lists nurseries where the plants can be obtained. A second edition of this book is being written, and a how-to companion book also is being produced. These will be marketed as a two-volume set.

During 1993, the USGA sponsored a symposium on the use of recycled water for irrigating golf courses. A product of this conference was the book *Wastewater Reuse for Golf Course Irrigation*, published in 1994.

In addition, the USGA annually publishes summary reports about its turfgrass and environmental research. Articles about individual projects and compilations of research results also are published regularly in the *Green Section Record* magazine.

Currently, a series of technical and topical reports is being produced, reflecting the results of the USGA's environmental research conducted from 1991 through 1993.

The Audubon Cooperative Sanctuary Program

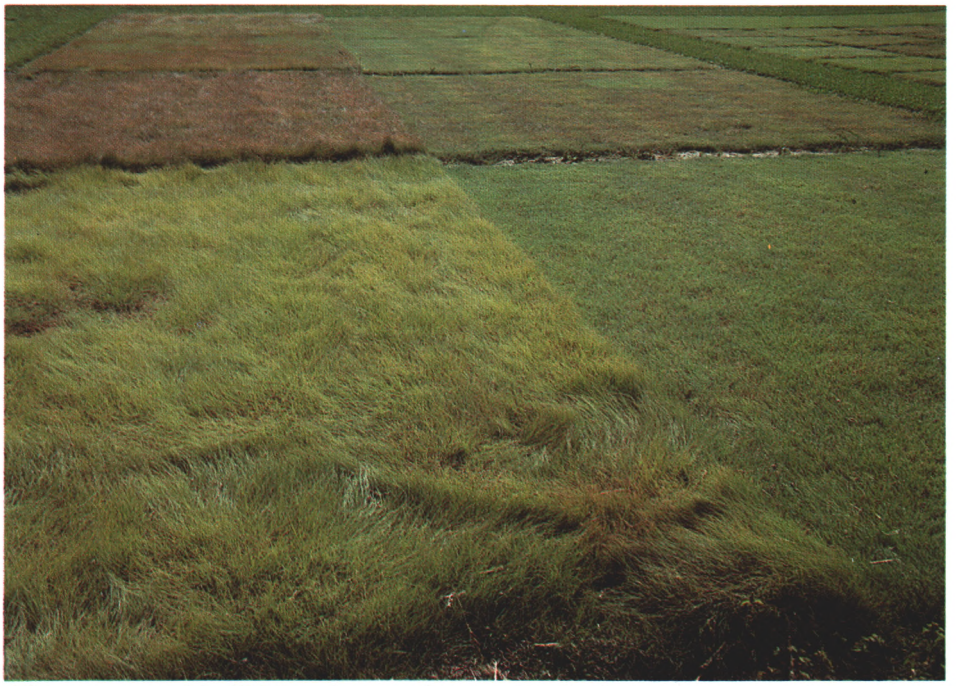
In 1990 the USGA and the Audubon Society of New York State teamed up to establish the Audubon Cooperative Sanctuary Program for Golf Courses. Among its objectives is to enhance wildlife habitat on golf courses and encourage active participation in conservation programs by golf course superintendents, course officials, golfers, and the public.

Participation in the program requires the completion of a resource inventory form describing the property and its existing features. New York Audubon then responds with ideas and technical information about what the participating course can do to enhance wildlife habitat and improve the environment. The course develops a plan of action and then acts on its plan. It can become certified in one or more of six categories by completing its plan and submitting documentation of its achievements to New York Audubon Society personnel, who decide if the actions merit certification. Certification can be achieved in the following categories: 1) Environmental Planning, 2) Member/Public Involvement, 3) Wildlife and Habitat Management, 4) Integrated Pest Management, 5) Water Conservation, and 6) Water Quality Management. The course pays a $100 annual fee to participate in the program.

Since its inception nearly five years ago, participation in the program has grown to more than 1,600 courses. The number of courses that have become certified in all six categories has reached 36, and another 66 courses have become certified in at least one category. Most important, many thousands of people involved in golf are being educated about issues related to wildlife and the environment, and are participating in conservation programs that benefit both. In return, participants achieve recognition in their communities for the work they do on behalf of the environment. It's definitely a win-win situation!

The Nature Links Program

From the book *Golf Course Management and Construction: Environmental Issues* it was evident that very little research work has been conducted concerning the issue of wildlife and golf courses. As part of its Environmental Research Program, the USGA sponsored a study of the effects of golf courses activities on wildlife at the Ocean Course at Kiawah Island, S.C., in cooperation with The Institute of Wildlife and Environmental Toxicology (TIWET) at Clemson University. This study marked a beginning, but many more questions need answers.



A key component of the USGA's environmental strategy is to develop new grasses for golf that use less water and require less pesticide use. Buffalograss is being improved for golf course use at the University of Nebraska, one of 13 turfgrass breeding programs funded by the USGA during the past dozen years.

Resistance of buffalograss selections to chinch bugs and sod webworms is investigated as part of the University of Nebraska breeding program.

As part of its ongoing Environmental Research Program, a portion of the USGA's research dollars is being set aside to support wildlife research. This facet of golf's environmental research will be called the Nature Links Program, and will be carried out in cooperation with the National Fish and Wildlife Foundation, a Washington, D.C., organization whose mission is to organize and help fund conservation projects that benefit wildlife and the environment. The NFWF will provide technical expertise to help establish objectives and identify worthwhile research projects concerning wildlife and golf courses.

As part of the program, the NFWF will establish a small advisory panel of experts representing various environmental organizations and other disciplines. The advisory panel will help establish objectives, review proposals, and monitor progress of the researchers. In addition, interested representatives of other environmental agencies and organizations will be kept abreast of the activities of the Nature Links Program and will be queried for suggestions. People tend to support what they help create, and one of the objectives of the Nature Links Program is to enlist the cooperation of people who may have concerns about the effects of golf courses on wildlife and who have expertise to offer in helping golf courses become even better friends to wildlife.

For its part, the USGA will contribute $100,000 annually to the Nature Links Program. It is hoped that other organizations in golf will donate, too, and become partners in the program.

Contacts with Environmental Organizations

When the USGA Executive Committee decided to move forward with the funding of environmental research in 1989, it was recommended that environmental agencies and organizations be contacted with the news. It was hoped that some of these groups would acknowledge the effort and at least lend some moral support to the program. Although dozens of organizations were contacted, the reaction was mostly no reaction.

During the next few years, as books and reports were published, as research work was completed and reported, and as the Audubon Cooperative Sanctuary Program grew, more and more agencies and organizations began to take notice and at least acknowledge the effort. We've learned that the USGA's environmental program has received more interest from environmental groups as the number of *accomplishments* has increased. A key to the modest success achieved with these groups is the balanced approach taken with reports of research results and other publications. It's not hard to understand that literature with an extremely pro-golf slant would not have much credibility with people outside of golf.

More recently, an effort has been made to develop contacts that can lead to collaborative projects with various agencies and groups. If the golf industry can develop proactive programs with environmental organizations, such as that established with the New York Audubon Society, then everyone wins. I believe sincerely that some fundamental changes are occurring in the way golf courses are built and maintained because of the influence of the Audubon Cooperative Sanctuary Program, all to the benefit of wildlife, the environment, *and* the game of golf. There is no reason that building bridges with other organizations can't produce win-win situations, too.

Public Relations Program

One of the most frustrating aspects with our work on environmental issues has been to view the relentless assault of the media, which for the most part characterize golf courses as horrible polluters of our environment. Many of the statements made have absolutely no basis in fact, but the same contentions appear in article after article, on the radio, and in television reports. This is not to say that the golf industry doesn't need to tend to its environmental issues, but I believe that, on the whole, golf is in the process of doing just that.

It also is true that golf has not done a good job of publicizing its environmental successes and the changes it has made. Fortunately, the USGA and other organizations are stepping forward with public relations programs to get the word out to the media and to the non-golfing world about these changes and about the benefits of golf courses. Most of these PR efforts are just getting underway, and it will take time to see measurable results.

To be successful, the message will have to be balanced — acknowledging that changes were needed, and showing how the environment is benefitting from those changes. Given the significant commitment the USGA, GCSAA, and other golf groups have made to research and educational programs, the industry is in a much better position to enter into a public relations program now than it was just a couple of years ago.

What We Need

Looking to the future, as golf addresses the environmental issues that threaten its growth and success, what we need is *more* of what we've got: more research information; greater participation in the Audubon Cooperative Sanctuary Program; industry support for the Nature Links Program; ever higher environmental standards from golf course superintendents, architects, and builders; greater understanding of golf's environmental issues among golfers; more constructive interactions with environmental organizations; and widespread publicity for what golf is doing to benefit wildlife and the environment.

With respect to research needs, the USGA has committed $1.5 millon from 1995 through 1997 to follow up on the results of its previous three-year study. The recently completed work indicated a need for more information about the loss of pesticides due to volatilization and runoff, and these issues will receive greater attention in the forthcoming round of studies. Other investigations will determine best management practices (BMPs) that can be used to protect surface waters from the potential effects of pesticide and fertilizer runoff.

It was clear from previous studies that well-maintained turf, especially the thatch (a layer of stems, roots, and partially decomposed organic material that builds up between the zone of green vegetation and the soil surface), is an excellent filter for adsorbing and degrading pesticides and other potential pollutants. Several new studies will investigate how this occurs and how turf managers can take advantage of this characteristic.

A striking result of the previous investigations was the discrepancy between the runoff and leaching losses of pesticides predicted by commonly used computer models and the actual losses from turfgrass systems under controlled experimental conditions. What this indicates is that current computer models do not take into account the effects of the thatch and roots of turfgrasses in minimizing pesticide losses. An important facet of the USGA's environmental research work during the next three years is to work with the EPA and others to modify the computer models that predict pesticide fate from turfgrass systems. Once that is completed, the next step will be to develop a computer software program for golf course superintendents to help them make better-informed decisions about pesticide applications on their courses.

And last, but not least, the USGA is committed to funding research related to wildlife and their habitats through the implementation of the Nature Links Program.

* * *

We've come a long way in our understanding of how golf course activities affect our environment, but we have a long way to go to convince others outside the game that golf courses can be a positive for the environment.

Each one of us can play an important part in helping to ensure a secure future for the game of golf by doing the following:

1. **Become educated** about the issues and what can be done about them.
2. **Take action** to make sure that our course maintenance practices have the best possible effects on the environment.
3. **Educate others**, including your crew, golfers, course officials, and others outside of golf about the issues and what you are doing as a steward of the environment.

In doing so, you'll be doing your duty as a steward of the game of golf, too.

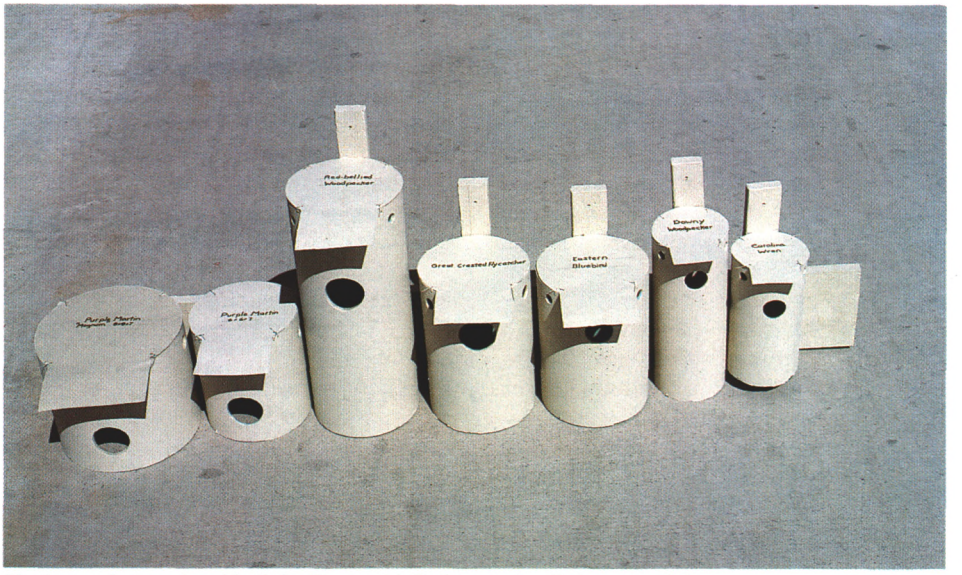
The use of potable water for golf course irrigation became an issue after a series of droughts in the 1970s and 1980s. Golf courses have responded by using recycled water, building their own water collection systems, and implementing conservation programs.

The Best Turf Tips of 1995

One of the most popular annual features of the Education Conference is the Best Turf Tips. This year, 14 of the Green Section's agronomists reported on some of the helpful ideas and ingenious innovations they came across while visiting golf course superintendents in every part of the country during 1994. The Turf Tips appear throughout this issue.

Recycling for Habitat

by JOHN H. FOY
Director, State of Florida, USGA Green Section



Nestboxes designed and built by George McBath come in all shapes and sizes.

ALL OF US KNOW that golf courses are not sterile environments that are devoid of wildlife, but it behooves us to give more specific attention to better habitat management. Regardless of whether a golf course is located in an urban or rural location, a nestbox program is an excellent means of attracting native species to a property and providing additional habitat.

A wide variety of nestboxes and birdhouses can be purchased or built to specification. A problem encountered in Florida is that wooden structures tend to deteriorate quickly as a result of the high humidity. This was a problem that ornithologist George McBath experienced after putting up nestboxes at Eagle Creek Country Club in Naples, Florida. A number of the wooden boxes rotted very quickly, and it was apparent that they would not last more than a year or two. Another problem was woodpeckers, which enlarged the entrance holes.

McBath, who is also a member of the Audubon Resource Committee at Collier's Reserve Country Club in Naples, has come up with an excellent solution to these problems. By using scrap PVC irrigation pipe and reprocessed plastics to build the nestboxes, he and the courses he has been working with have been *recycling for habitat.*

According to McBath, 6 percent of the purple martin's diet is mosquitoes. Even if the purple martin helps get rid of just a few of these nuisance insects, I think we would all agree that attracting purple martins is a worthwhile endeavor.

The actual martin "houses" are made of 6- or 8-inch-diameter PVC pipe scraps with sheet aluminum tops and bottoms. For all attachments, 30-lb. test fishing line is used, which can be cut and replaced when monitoring or cleaning the boxes. Unlike commercial aluminum martin apartments, no front porches are used on the boxes made by McBath. This minimizes crow and owl predation. The 3-segment pole is made of 3-inch-, 2-inch-, and 1.5-inch-diameter sections with pins in the middle to facilitate raising and lowering of the martin house for cleaning. The base of the pole is sunk about 3 feet into the ground. McBath recommends the martin houses be located in an open space at least 40 feet away from tall trees, but close to an open water source.

In addition to the purple martin houses, nestboxes for eastern bluebirds, Carolina wrens, great crested flycatchers, downy and red-bellied woodpeckers, kestrels, and screech owls have been constructed. For mounted boxes, *lumber* scraps from dock building jobs are attached to the backs of the boxes. This lumber is made of reprocessed #1 and #2 plastic soda bottles and milk containers. All of the boxes are painted a light color for heat reduction. In side-by-side comparisons conducted by the North American Bluebird Society, it was found that there was no preference in use between the PVC boxes and traditional wooden nestboxes.

McBath stresses that anyone starting a nestbox program is morally obligated to remove starling and English sparrow nests from the boxes. Besides taking over the nestboxes, these noxious imported species from Germany and England will invade any natural nesting cavities and displace the desired native species. He suggested plugging the entry holes to keep them out until the nesting season is about to begin.

Contact your local Audubon chapter for information about nestbox specifications or try your hand at recycling for habitat. Who knows what feathered friends you might call home!

Composting: Turn Your Eyesore Into Black Gold

by ROBERT Y. SENSEMAN
Agronomist, Northeastern Region, USGA Green Section

EACH YEAR golf courses generate a tremendous amount of organic waste in the form of collected grass clippings, excess thatch from renovation projects, leaves, brush, and other woody debris. Disposal of organic waste is taxing the capacity of landfills and is illegal in some areas of the nation. Skip Wade, the golf course superintendent at Cherry Valley Country Club, and Phil Anderson, the golf course superintendent at Old Westbury Golf and Country Club, are leading the way in the New York metropolitan area with their efforts at responsible recycling of landscape debris. Aside from the satisfaction that is gained by serving their communities through their recycling efforts, both are using the compost in new and innovative ways on their golf course. Each of these men is excited about the promising results that have been achieved by using compost in their daily maintenance operations and in construction projects.

Phil Anderson has developed a composting program that utilizes organic debris generated on site, and he has initiated a cooperative program with the Village of Old Westbury whereby the Club accepts disposal of municipal yard waste. This spirit of cooperation serves the Village of Old Westbury by lessening the demand placed on them to dispose of yard waste, while providing Anderson with the ingredients needed to produce rich composted soil. Thus far, he has composted between 8,000 and 10,000 yards of debris, of which 75 percent is generated by the Village.

Depending on the intended use, the aged organic matter is blended either with old bunker sand and soil or simply with soil. The compost is used as a fairway topdressing, as a protectant applied as a late-season topdressing on putting greens, as a divot mix, in all planting beds, and as an amendment in landscaped areas. The composted soil is redistributed in formally managed wooded areas to return the organic matter swept clean during fall leaf cleanup. Compost that is blended for use in rebuilding tees using sand, compost, and soil is applied 6" to 8" deep after the sub-grade is formed. The membership at Old Westbury Country Club is very proud of Anderson's composting operation and demonstrated this recently by purchasing an expensive new soil blender.

Skip Wade prepares compost using organic debris that is generated on site, and he also imports compost generated by the Village of Garden City, New York. He has devised a plan with the club's chef to compost much of the club's kitchen waste, which is in excess of 2,000 pounds per month. During the past year, more than 2,400 cubic yards of composted soil has been used for several projects, including the reconstruction of portions of two fairways and the construction of several bunkers and fairway mounds and moguls. It also has been used as a key ingredient in the divot mix used on tees, greens, and fairways and in the light topdressing used over newly seeded areas on the putting greens that were damaged last winter. Wade is striving to maintain his golf course using minimal amounts of pesticides, and the use of composted soil is a key component of this program. He has discovered that water requirements and the need for supplemental fertilizer and fungicide applications have been greatly reduced. Wade reports that turf areas constructed on composted soil green up more quickly in the spring than turf grown on the sandy native soils. Membership support for Wade's programs is nothing short of enthusiastic.

Some may regard composting as costly and time consuming, as it does require dedicated manpower, equipment, and space. Some specialized equipment such as rototillers, soil mixing equipment, brush chippers, and tub grinders may also be required. However, thousands of dollars can be saved annually by eliminating transportation and landfill fees. An added benefit is the readily available composted soil, which often eliminates the need to import costly topsoil for golf course projects. Perhaps the greatest tangible benefit is the opportunity to serve the community by responsibly disposing of organic debris.

Indeed, investing in the equipment and manpower needed to transform organic waste into black gold makes more sense today than ever before.

Even though the composting operation at Old Westbury Country Club is more elaborate than most, composting doesn't have to be complicated or expensive.

The Perfect Grass

by PATRICK M. O'BRIEN
Director, Southeastern Region,
USGA Green Section

Native grasses used in the rough, such as common broomsedge, reduce the need for pesticides and fertilizers.

THE STANDARD CLUB in Duluth, Georgia, is a golf course so heavenly it would have intimidated me except for one thing: common broomsedge *(Andropogon virginicus)*. If there is anything that is familiar and comfortable to the golfers in the South, it's the tawny spikelets of the plant that old-timers say God put here to hold the earth together where nothing else grows.

Common broomsedge is the most visible of our many native grasses. It appears quickly in areas that are unmowed, unfertilized, and uncultivated, environmental factors that favor its establishment and cultivation. Mark Hoban, the certified golf course superintendent who established the broomsedge in many areas of the primary rough, said, "Broomsedge is my favorite plant. It relieves the monotony of the bermudagrass fairways and rough with its attractive seedheads."

Broomsedge is a perennial warm-season bunchgrass that occurs widely throughout the United States. The three-foot-tall flowering stalks are the dominant feature, changing color during the season. Flowering stalks are a light tan color in spring, gray in the summer, orange in the fall, with a tan winter wheat look in the winter. With increasing restrictions being placed on fertilizer and water usage for recreational turf, the need to use native grasses that require lower maintenance has become of interest to the entire turf industry.

Mark's intent with the common broomsedge was to enhance the course design and replace the tall fescue that had become sites where golfers believed the *original mulligan* was invented. The tall fescue areas got so tall that nobody found stray golf balls. So Mark cut the fescue down, plowed and prepared the areas, and planted common broomsedge in late February. Before seeding, Mark stopped all mowing, fertilization, and pesticide applications to these sites. Broomsedge won't tolerate an alkaline soil, so he also made sure the soil was very acidic. Broomsedge is a perfect grass in that the less you do, the more perfect it will become. An annual July mowing helps to improve grass density and eliminates any undesirable woody growth.

Since the availability of broomsedge seed is limited and expensive, Mark harvested his seeds from the rights-of-ways of highways. He also obtained seed from an abandoned pasture that was full of broomsedge. The fluffy seed sheaths were removed with gas-powered hedge clippers, and the cuttings were stored in old seed sacks. Planting was easy, as the seed was shaken by hand from the spikelets over the former tall fescue areas. Mark just let the seed blow over the prepared site.

Mark also was just as successful in hydroseeding a few sites. Vegetative plantings will also work anytime of the year. If seeding, do it before the broomsedge greens up in the spring.

"You can find your golf ball in the broomsedge and play it," a happy Hoban says. Mark now has approximately five acres established and plans more in the future.

It may take a couple of years before the broomsedge comes into its own, and as Mark pointed out, "Like most young things, it has awkward stages. It takes between one and three years to get the broomsedge started from seed." Mark promises that these stages will pass and urges patience. The result will be "lovely, educational, and totally Georgian."

IPM, Monitoring, and Management Plans — A Mandate for the Future

by DR. CHARLES H. PEACOCK and DR. MILES M. (BUD) SMART
North Carolina State University Turf Science Group, Inc.

GOLF COURSE management for the 21st century must be different from the practices of the past. As you plan your golf course management strategies for the 21st century, add three factors concerning the environment to your list — credibility, accountability, and defensibility. Why? Because the public influences environmental laws. Because the public will insist that we protect our drinking water supplies. And because the public expects us, as turf managers, to act responsibly. We must be ready to show them a plan for management, how we evaluate that plan, and the results of that evaluation.

Sustainable Resource Management

Our golf course management decisions must be made based on the principles of Sustainable Resource Management. We define this as a pattern of human activity that can be supported indefinitely. This means it must be synonymous with progress. It also means we must become less dependent on non-renewable resources and that our activities must not have a negative environmental impact.

To many people, golf courses have an image as energy wasters and water polluters. Those of us knowledgeable about turfgrasses can offer many positive environmental influences such as oxygen production, cooling of the atmosphere, absorption of sound and glare, erosion prevention, and effective filtering of natural and synthetic contaminants. Equally, we could offer a second list that touches on the positive attributes dealing with our quality of life. It includes providing areas for popular recreational activities, increasing property values, providing greenspace and wildlife habitats in urban areas, and job creation. Less-informed individuals, and those whose agendas are anti-development or anti-golf, would list the following as negative impacts: destruction of wildlife habitat, sedimentation of wetlands, fertilizer and pesticide pollution, and wasting of valuable water resources.

Dr. Charles H. Peacock

Public Perception

Environmental quality has many aspects. Public perception and attitude are often influenced by the popular press. Consider the following article about the Neuse River, which flows through Raleigh, North Carolina, to the coast:

"City sewage, industrial wastewater, farm fertilizers, livestock manure, and lawn and golf course chemicals are changing the Neuse (River), choking it with nitrogen and phosphorus." — Julie Powers Rives, *Raleigh News and Observer.*

Upon inquiring as to the types of studies into the problems associated with environmental quality and the Neuse River that focused specifically on lawn and golf course problems, it was determined that there were none. The reporter admitted that she was just making a "generalization." The danger here is obvious. The public does not know what is a "generalization" (i.e., we use fertilizers and pesticides on lawns and golf courses, so they must create a pollution problem), and what is good, scientifically valid data that identify a specific problem we must correct. Perhaps environmental issues are being used to block development, whether they have merit or not.

Proactive Response

The response to these problems from the golf course perspective is clear. The industry must be proactive and not only point out the positive benefits, but must also address situations where golf course management intersects with environmentally sensitive areas and develop management strategies that will protect these areas. This proactive approach should include:

- Incorporating Best Management Practices (BMPs) into the design and management of the course;
- Using Integrated Pest Management (IPM) to achieve BMP goals; and
- Using a Risk Assessment approach to develop strategies for protection of environmentally sensitive areas, and using guidelines for pesticide selection based on this assessment.

A well-developed management plan will be thoroughly documented, detailed, and structured. Although some of the types of information may seem elementary at first, all are necessary to accurately construct a useful and realistic management plan. The management plan details your intentions and methods for managing the golf course in a responsible manner. This plan should

include, but not necessarily be limited to, the following:

Site Description and Evaluation: This includes a detailed description of the physical setting, preferably hole-by-hole with the surrounding environment, including drawings and/or aerial photographs (if available) to delineate where concerns must be focused. The description should also include details of the topography and how it intersects with natural areas and interacts with management practices. A general soils map should be included that classifies the native soils according to fertility, percolation, and depth to bedrock and/or groundwater. Surface water features should be described and located. Climate data should summarize conditions that relate to turfgrass growth and how conditions such as temperature, rainfall, potential evapotranspiration, length of growing season, and mean first and last frost dates will impact pest management strategies.

Golf Course Cultural Practices: Mowing affects playability, turf performance, stress tolerance, pest problems, and evapotranspiration. Mowing factors should be considered in terms of species, cultivars, and golfers' expectations. Mowing objectives during optimum and stress situations should be described. Irrigation factors such as slope, type of grass, height of cut, rooting depth, weather factors, soil types, and irrigation system performance should also be documented. Fertilization factors to be addressed should include the use of soil and plant tissue testing, objectives for growth, choice of materials, and environmental consequences. Supplemental practices such as aerification (which could affect pesticide/nutrient loss due to runoff), topdressing/vertical mowing (which affects thatch control and pesticide/nutrient response) and others are also important.

Safety: Details on storage, handling, disposal, and recordkeeping of pesticides related to worker protection, employee right-to-know, OSHA, and other regulations should be provided.

Best Management Practices: The management plan should rely heavily on use of Best Management Practices (BMPs). There are several goals of BMPs:

- Reduce the off-site transport of sediment, nutrients, and pesticides;
- Control the rate, method, and type of chemicals being applied;
- Reduce the total chemical loads by use of Integrated Pest Management, economic thresholds, alternative pest-control methods, and fertility testing.

Examples of some BMPs that can be put into place include:

- Use of vegetative buffers for filtering runoff or sub-surface drainage;

The News & Observer

Raleigh, N.C. Sunday, July 12, 1992

Hidden hazards: Golf vs. nature

Designing a "greener" golf course...

Green course

1. The developer maximizes use of native vegetation and grasses, which are more resistant to disease than exotic plants and require less watering and use of fungicides.
2. Course conserves water supplies by "spray irrigation," wastewater from its own treatment plant or retention ponds, rather than pumping fresh water out of streams or the ground.
3. By preserving wetlands and other sensitive acreage, designer maintains wildlife habitat and provides "buffers" for pollution runoff into the waterways.

...or a golfing development

Brown course

1. Fairways and houses are built on the edge of streams or other waterways, increasing the chance of lawn chemicals draining into waterways.
2. The design ignores natural contours of the land, requiring massive earth-moving and higher potential for silt running off the land.
3. Groundskeepers use highly toxic chemicals, such as chlorinated compounds, to fight pests and lawn diseases. Such chemicals take longer to degrade, and can kill birds and other wildlife.

Fraser Van Asch/The News & Observer

Greens mean gold to developers; environmentalists are seeing red

By STUART LEAVENWORTH
Staff writer

This weekend, thousands of North Carolinians will hit the golf course, driving tiny balls down tree-lined fairways, riding their carts past glassy lakes that border green carpets of lush grass.

Amid the trees and water, few may suspect that their golf pursuits cost anything more than money. But as more and more courses are being built, environmentalists say the layouts are disrupting wildlife, destroying wetlands and promoting an overuse of pesticides, fertilizers and bulldozers.

Golf course construction has been particularly strong in North Carolina, where 115 new courses have opened since 1980. Nationwide, North Carolina ranks ninth in total courses with 484 in place and 23 more under construction.

"Even in the best of circumstances, golf courses have a tremendous impact," said Millie Buchanan, an Asheville environmentalist who has been fighting golf courses planned around trout streams. "You are using a lot of land, you have chemical runoff. When you have a developer who is not committed to doing things right, it can be a real disaster."

Environmentalists acknowledge that golf courses do not rank with toxic dumps or polluting factories. But they say two trends in course design and development are moving golf up the list of environmental concerns.

First, developers have been seeking out spectacular backdrops — mountain streams, coastal marshes — and have been adorning their courses with features like bent grass greens, which require more pesticide spraying than greens of other grasses.

Second, the pattern of combining country clubs with high-density residential developments means that a new golf course usually involves a lot more than 18 holes and a clubhouse. More ground must be broken, more sewage treated and more storm-water runoff channeled. The combination of fairways and residential lawns also increases the amount of pesticides and fertilizers that can threaten waterways.

Concerned that the pollution debate could damage golf's image, the U.S. Golf

See NATURE, page 6A

■ **Pesticide use:** Disclosure by golf courses not required, page 6A.

■ **Water pollution:** Fertilizer runoff poses threat to tidal creeks, page 6A.

Test time: Golfers wait while Ron Hall, superintendent at Governors Club, takes a soil sample from a green to be tested for diseases

Staff photos by Jim Bounds

Public perception regarding golf courses and the environment varies widely and is often influenced by the popular press.

- Planting of more pest-resistant or stress-tolerant cultivars;
- Culturally or biologically controlling pests;
- Using soil testing and plant tissue analysis to help determine nutritional requirements.

There are many other examples that can be applied to meet the BMP goals as stated above.

Integrated Pest Management: Strategies for Integrated Pest Management (IPM) have been applied in agriculture for more than 30 years. Recently, the U.S. Department of Agriculture has launched an initiative to implement IPM methods on 75 percent of the total crop acreage by the year 2000. The U.S. Environmental Protection Agency supports this effort, and the Office of Pesticide Programs has been instrumental in helping golf course superintendents find ways to incorporate IPM strategies into their programs. The definition of IPM as put forward by the Responsible Industry for a Sound Environment (RISE) is as follows:

"A system of controlling pests in which pests are identified, action thresholds are considered, all possible control options are evaluated, and selected controls are implemented. Control options — which include biological, chemical, cultural, manual, and mechanical — are used to prevent or remedy unacceptable pest activity or damage."

The choice of control options is based on:

- Effectiveness
- Environmental impact

- Site characteristics
- Worker/public health and safety
- Economics

The basic components of IPM are **1) monitoring** — of potential pest populations and their environment; **2) determining** — pest injury levels; **3) decision making** — developing and integrating all biological, cultural, and chemical control strategies; **4) educating** — personnel on all biological and chemical control strategies; **5) timing and spot treatment** — utilizing either chemical, biological, or cultural methods; **6) evaluating the results** — an ongoing process. This necessitates that the turf manager and people involved in the IPM program have a thorough knowledge of turf and its pest problems, that there be a structured monitoring or scouting program, the intensity of which is determined by the value of the area and a knowledge of pest life cycles, and that detailed records are kept to measure the effectiveness of the program and serve as a basis for making future decisions. IPM is an evolutionary process.

Changes to the program are continually made as information is collected about the golf course, as new information on strategies for control becomes available, and as the options for control change.

There are six basic approaches for turf protection using IPM. They are: **1) regulatory** — using certified seed, sod, and sprigs; **2) genetic** — selecting the best adapted species/cultivars for the location; **3) cultural** — a healthy grass means fewer problems; **4) physical** — isolating areas where pests are a problem; **5) biological** — favoring natural competition; and **6) chemical** — which is selective, but may be necessary.

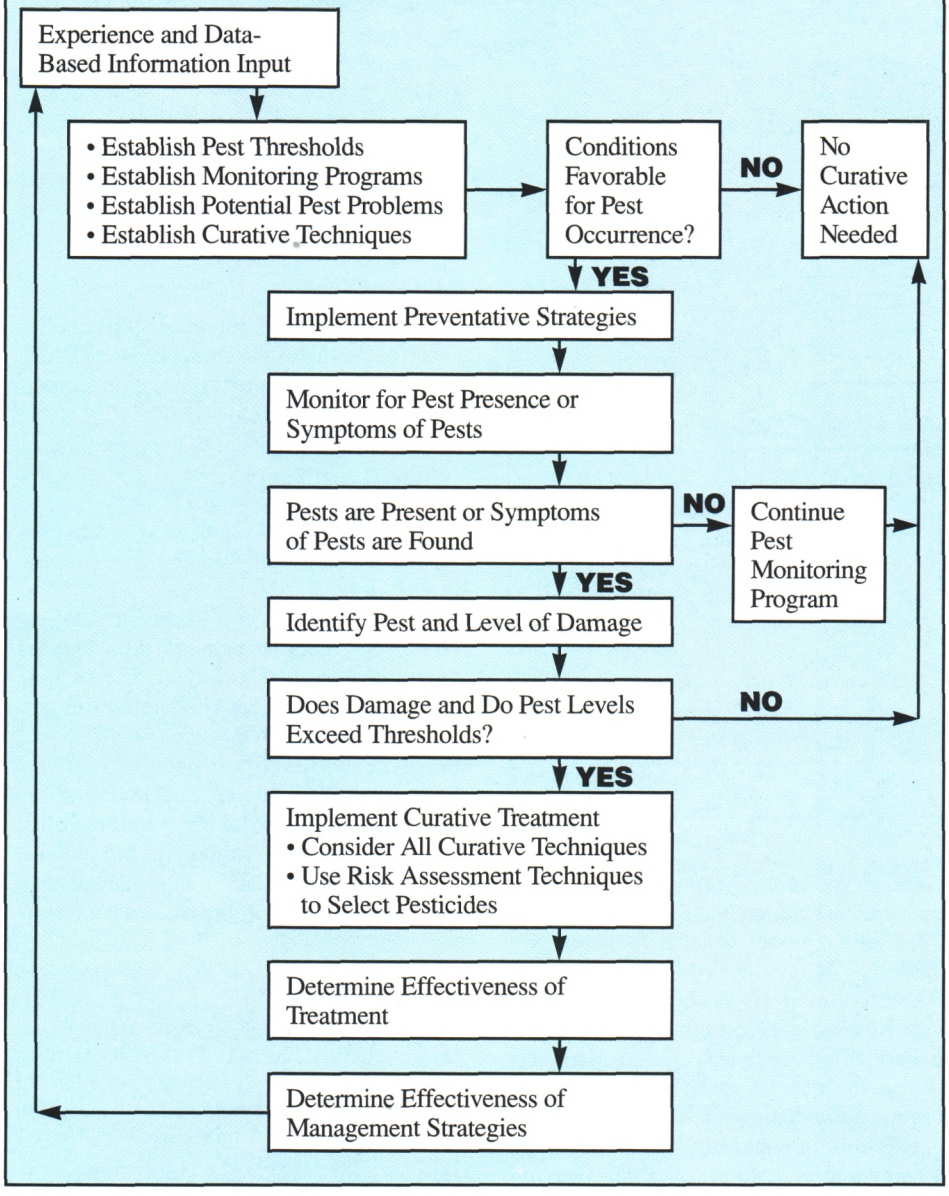
Selecting Thresholds

One of the critical strategies to an IPM approach is to set thresholds for pest problems and to use control treatments only when they are exceeded. This requires vigilant scouting by qualified personnel who are trained to recognize the pest problem at an early stage. Thresholds for insect pest problems are in many instances determined by location, since only a few insect problems are found uniformly across the country. Watschke et al. (1994) recommend insect thresholds for some of the more common problems as follows:

Insect	Threshold Number per Square Foot
White grubs	6 to 10
Sod webworms	5 to 10
Cutworms	
Fairways	0.5 to 1
Greens	1 per square yard
Skipper larvae	0.5 to 1
Chinchbugs	25 to 30
Black turfgrass Ataenius	>50
Asiatic garden beetle	>20

Establishing threshold levels for insects provides guidelines to the golf course superintendent. Control treatments are used only when the threshold level is exceeded.

Figure 1 — Integrated Pest Management Decision Flow Chart



These are also largely determined by the value of the area and the recuperative capacity of the turf. Information on the biology of insect problems common to your area should also be included in an IPM plan. For example, there is a degree-day model on billbug larvae and adults which uses climatic information on which to base the scouting program and plan the most effective treatment schedule.

Disease thresholds are less well defined and depend to a great extent on the turfgrass species, prevailing environmental conditions, economic or aesthetic value of the site, and the cost of chemical treatment versus renovation of damaged turf sites. Disease thresholds may also be based on previous history of infection at the site, particularly for problems such as spring dead spot, take-all patch, and summer patch. Similarly, weed problems can be handled with the same objective in mind.

A structured program is very important for success of the IPM program. Monitoring should be set up to use designated scouts (which should include the superintendent), detailed records should be kept, and results should be continually evaluated.

Risk Assessment

Risk assessment is the process of assigning magnitudes and probabilities of effects to ecosystems resulting from human activities or natural phenomena. The risk assessment protocols include procedures that characterize the source of the risk, the ecological resources at potential risk, the magnitude of the hazard, the exposure potential, and the assessment of risk.

Selection of Pesticides — Pesticides selected for use in golf course management should emphasize localized application of highly specialized materials that act quickly, effectively, and which then naturally and quickly are degraded. Pesticide characteristics of interest include toxicity, persistence, fate, mobility, and leaching potential. Selection of materials should be based on a screening risk assessment that includes characterization of the site, management practices, and chemical properties of materials; screening models; and in selective cases, computer simulation modeling.

Screening models use chemical properties of the pesticides as the basis for predicting whether pesticides will move in the environment. Data on the chemical properties of pesticides are found in the *USGA Green Section Record* (Kenna 1995) and in Wauchope et al. (1991). Several useful screening models for leaching potential include the GUS (Groundwater Ubiquity Score, Gustafson 1989) and PLP (Pesticide Leaching Potential, Warren and Weber 1995); and for surface runoff, Augustijn-Beckers et al. (1991) and the SCS screening rating provide information on movement (Goss 1991).

A list of pesticides appropriate for the site should be developed from this type of analysis. Based on the receptors on the property, restrictions for use of certain materials should be made where appropriate.

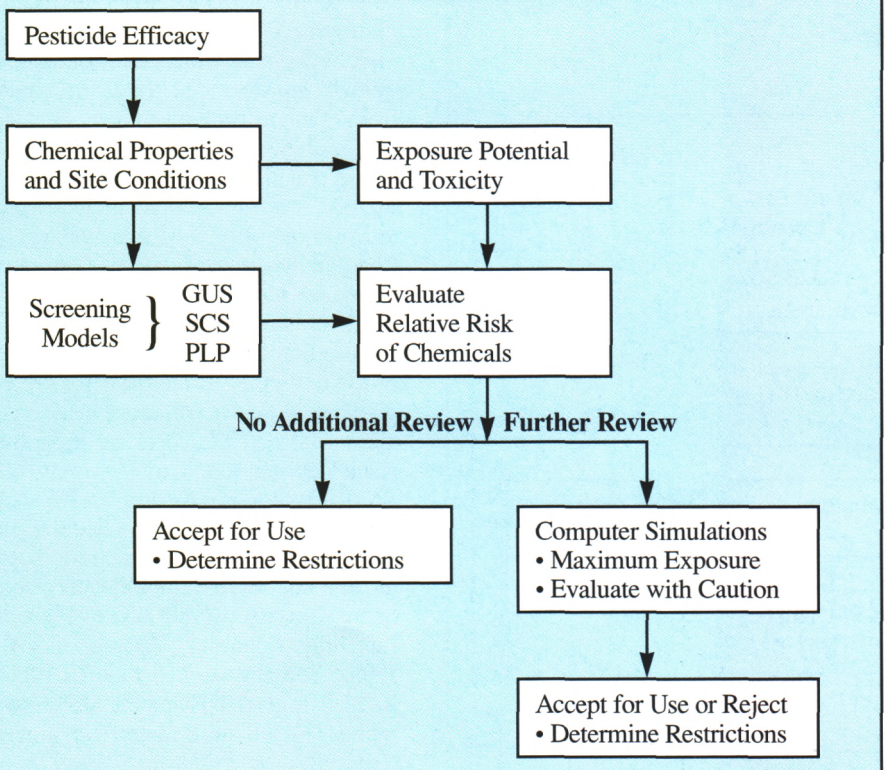
Computer simulation models attempt to predict the fate and transport of pesticides from golf courses to various environmental receptors, such as surface water and groundwater. Computer simulation models are not frequently used because they have not been calibrated for turfgrass situations. When compared to field measurement, computer simulations have overestimated the movement of materials (e.g., Kenna 1995). Results from computer simulations must be interpreted with caution.

Monitoring

Monitoring programs focus on two objectives: the IPM objective and the environmental objective. The **IPM objective** is to determine if pest populations are building to a threshold level that requires implementation of some form of control; the **environmental objective** is to determine if any environmental impact is occurring.

Monitoring for golf agronomic purposes can be grouped by frequency. There are those items that may need to be monitored on a daily basis, such as quality of cut, soil moisture, disease incidence, and weed infestation; on a weekly basis, such as soil temperatures, tissue nitrogen concentrations, algae and moss infestation, and the presence

Figure 2 — Pesticide Selection Process for Integrated Pest Management



of hydrophobic soil problems; on a monthly basis the soil profile should be examined for presence of fungi, compaction, infiltration rate, and soil pH, and the irrigation system should be checked for calibration; and at least annually a complete soil analysis should be performed, drainage should be evaluated, and air movement and shade should be checked. The determination of timing on these and other factors may vary due to location, soil type, and turfgrasses in the area. Some form of structured program should be in place to collect information to help in making management decisions.

Monitoring for environmental purposes generally has three goals: 1) establish a baseline of environmental quality; 2) provide data that will establish environmental conditions, thus providing a basis for measuring compliance with environmental regulations; and 3) ensure that IPM is functioning properly and that no health hazards have developed. Environmental monitoring is usually conducted in phases. For example, three phases are associated with a new golf course: pre-construction, construction, and operational phases. Each phase has specific goals and objectives and is integrated with the other phases.

The focus of environmental monitoring is generally on surface water, groundwater, and surficial sediments, but habitat monitoring is increasing. When conducted, habitat monitoring focuses on maintenance of terrestrial and aquatic habitat and, currently, is most often associated with wetlands and forested areas.

A monitoring program must be scientifically based so that it produces defensible data about golf course operations. One can rely on the data to make decisions about compliance with regulations; if non-compliance events are detected, then steps can be taken to correct those situations. Having data that demonstrate regulations is a powerful tool for confirming that a golf course is not having a negative impact on natural resources.

Results of environmental monitoring programs provide feedback to the superintendent and are useful management tools. Results also provide written documentation of the effect of the golf course on the environment.

Audubon Cooperative Sanctuary Program

An additional option, as part of the overall management plan and strategies, is to participate in the Audubon Cooperative Sanctuary Program. The whole approach to the Audubon program is to promote sound land management and conservation of natural resources, incorporating every aspect of the use of BMPs and IPM. Additionally, it encourages the superintendent to take a leadership role in conservation projects, and recognizes golf courses for their efforts. Under this program, everyone should work towards gaining certification in the areas of environmental planning, public involvement, wildlife habitat management, water quality management, and integrated pest management. These are not just critical achievements from a public relations perspective, but they promote and document good stewardship on your golf course.

And Finally . . .

The benefits of a management plan that incorporates all of the components of BMPs and IPM into your golf course management programs are threefold:

- Assures more judicious use of pesticides/fertilizers
- An economic savings
- Positive public relations over environmental concerns and less negative environmental impact.

IPM strategies have been successfully employed at thousands of golf courses around the world. Documentation of these efforts and a plan for conducting the program and evaluating the results is often lacking. Take time today to make this a priority. Remember the "whys" of planning — **credibility, accountability, defensibility.** Have you done everything you can to make your approach to golf course management environmentally responsible, and can you document it?

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The Best Turf Tips of 1995

YOU CAN BANK ON IT!

by DAVID A. OATIS
Director, Northeastern Region, USGA Green Section

SOIL EROSION around bodies of water is a common problem on golf courses. The situation can be greatly exacerbated by golfers' demands to find their golf balls easily, necessitating continual close mowing of bank areas. Traditional methods of remediation include channelization techniques such as the installation of rip-rap, masonry structures, or the like, but these can be both expensive and disruptive to install. It also may be difficult to obtain the necessary permits, and channelization does not always solve the problem. In some cases, it may actually cause increased erosion downstream by altering water currents and increasing water velocity.

Fortunately, I have observed an inexpensive solution at several golf courses that has proven amazingly effective. This is a solution that saves labor and money, and it can be accomplished in an attractive and environmentally sound manner. The answer? **Stop mowing!**

The two best examples of stream bank stabilization through the use of vegetation I have observed are at the Springdale Golf Club in Princeton, New Jersey, and Islington Golf Club in Islington, Canada. Superintendents Charles Dye and Wayne Rath, respectively, were successful in convincing their members to try this simple technique, and the results have been overwhelmingly positive.

Both courses were experiencing serious erosion problems that would have required expensive, large-scale stabilization projects. For Islington Golf Club, the cost easily could have been more than a million dollars, so the golfers were very receptive to this low-cost alternative. Their experiment began in the spring of 1993, after the winter's harsh weather caused severe erosion. The practice of mowing the creek bank with weedeaters was curtailed at that time. Noxious weeds were controlled on a spot basis with herbicides, and the existing vegetation was allowed to grow naturally.

The program met with such success that it was expanded upon the following year. In 1994, approximately 5,000 blue lime grass plants (*Elymus glaucus*) were planted in the areas most prone to erosion. Due to the increased health and density of the vegetation along the stream bank, the practice now is to cut the more vigorously growing areas back to a 1-foot height once or twice a season.

Superintendent Rath estimates that this program has resulted in an annual labor savings of approximately 300 man-hours. Where they once required 10 weedeaters to keep up with the work, they now require only one. Rath also reports that golfer complaints are virtually nonexistent, and erosion problems during the last two seasons have been negligible.

Superintendent Dye tells a similar story. Close mowing of their creek bank halted in the spring of 1993 in several of the lesser-played areas. One newsletter article and several meetings quelled most golfer complaints. The following spring, mowing was curtailed in an important and highly visible area in front of the clubhouse. Dye reports that no measurable erosion has occurred since the program was initiated, and annual labor savings are conservatively estimated at 160 man-hours.

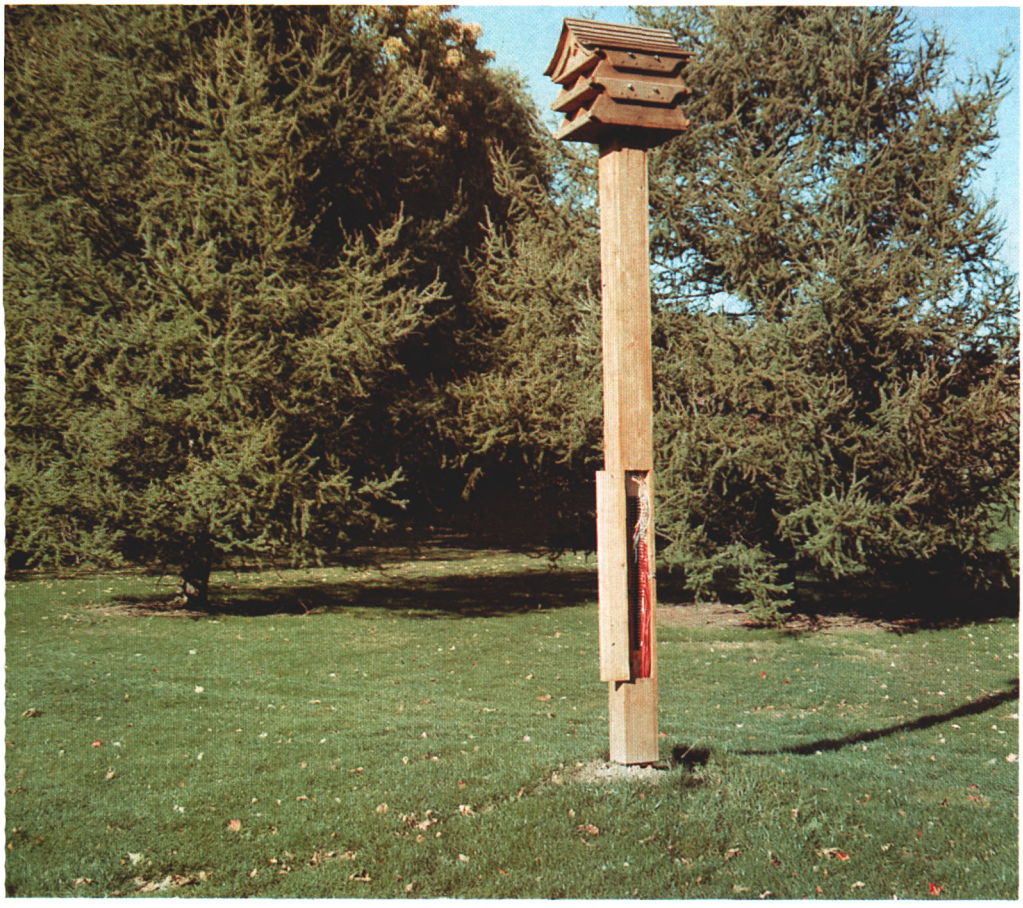
Allowing vegetation to grow helps slow water flow, protects banks from scouring, filters out sediment, and lowers water temperatures. Beneficial habitat is also created. The taller vegetation can provide a lovely naturalizing feature that can improve aesthetics, but there is a downside: The longer vegetation can also trap golf balls, and this is why it can be a very controversial program. The program should not be undertaken without a carefully thought-out publicity campaign. It is critical to inform the golfers what to expect, and to provide them with the rationale behind the idea **before the vegetation begins to grow.** After all, "beauty is in the eye of the beholder," and what may appear as a lovely naturalized stream bank to some will to others undoubtedly look like an unkempt, weedy mess caused by laziness. Slide presentations, newsletter articles, and tasteful signage on the golf course are all good ideas. Be sure to emphasize the positive results and do not be afraid to make concessions in areas where playability is a problem. Allowing for longer vegetation also may alter how a hazard is marked, so be sure to discuss this possibility with a qualified Rules official.

This solution may not be appropriate in every situation on every golf course, but the idea is so simple and effective that it surely deserves consideration. After all, this truly is a solution you can bank on!

Allowing vegetation to grow naturally is an attractive and cost-effective solution to erosion problems.

"FOR THE BIRDS"

by KEITH A. HAPP
Agronomist, Mid-Atlantic Region, USGA Green Section



These purple martin houses serve a dual role in an integrated pest management program. They blend environmental enhancement with economics; natural insect control and more efficient water management capabilities.

HAVE YOU EVER approached your green committee, owner, or financial officer with a proposal about a long-range capital improvement project? You may have spent weeks preparing the necessary information, only to be shot down. Maybe afterwards you even muttered, "This is for the birds; the project is never going to be funded."

How about trying the tactic that Don Simpson, golf course superintendent at North Hills Municipal Golf Course, used when he needed to upgrade the irrigation system? He lives by the philosophy "Never say never." For Don, just saying that a new system was needed, and even presenting supportive documentation, was not enough to ensure that the project could be sold.

The standard irrigation control box (normally made of stainless steel) was a major concern, and ultimately was the hurdle that needed to be negotiated to secure financial approval for the project. There was a perception that the more traditional irrigation field control boxes would visually detract from, and have a negative impact upon, course aesthetics. With the help of an irrigation consultant, it was decided that a radio-controlled irrigation system (OSMAC) would work best at North Hills. The options on how to house these units in the field were carefully considered.

With the help of assistant superintendent Les Utegg (now the superintendent), Don found a way to blend irrigation improvement with integrated pest management. Purple martin houses were used to shelter the new irrigation control system while also providing nest boxes for the aggressive insect-eating birds. This plan has a unique selling strategy that is difficult to turn down. In a short period of time, a prototype was designed and the project was off and running.

Normal irrigation installation procedures were employed, except for the style of the field control boxes. The standard height for a purple martin house (12 feet above ground) was used. To support the house, a cement base was poured and PVC pipe was used to protect the control wires. The support pole for the birdhouse/controller was fashioned from cedar, which resists weather deterioration and blends in with the environment.

A door was positioned to allow easy access for inspection of the wire connections and fuses. Regular maintenance or any future repairs can be easily performed.

The wires extend to the receiver through a one-inch PVC pipe mounted in the attic of the two-floored purple martin house. The PVC sleeve serves a dual purpose of housing the control wires and protecting the residents of the house.

Purple martins are migratory birds, and this had to be considered when the house/controller was designed. Annual maintenance, such as cleaning, must be accomplished. Four mounting screws on each side of the structure fit the bill. The roof and each floor can be removed, examined, and cleaned.

Purple martin houses function best when located in open areas, allowing the birds to sweep and feed. At North Hills, a single location controls up to 36 irrigation stations. Material and construction costs were minimized, and the remote locations of the controller/houses allows turf maintenance activities to take place without alarming or discouraging the purple martin colonies.

Don Simpson has been in the turf management business for 53 years and has witnessed firsthand how golf courses can be community assets. Wildlife can coexist with golfers, and even flourish while players enjoy the outdoors. Upon retirement in 1994, Don handed the reigns of the golf course and new irrigation system to his assistant. In addition, he passed along a valuable lesson, one from which we all can learn. Where there is a will, there is a way. So, "never say never."

DRY-CLEANING

by PAUL VERMEULEN
Agronomist, Mid-Continent Region, USGA Green Section

LIKE MANY courses across the country, The Vintage Club, in Indian Wells, California, has encountered problems using the traditional means of washing equipment. For example, wet clippings that accumulate around a wash area can generate some very unpleasant conversations with golfers who have a keen sense of smell. Another problem is the potential effect on stream ecology caused by the nutrients from decaying clippings that drain into a small stream.

On the mechanical side of things, greased bearings are easily damaged by traditional washing when water penetrates the seals. Given that The Vintage Club is a 36-hole course, the damage done to greased bearings alone was burdening the mechanical staff and escalating the budget for replacement parts.

Another mechanical problem is corrosion and engine damage caused by washing equipment with cold water. This problem can be especially significant for courses that use reclaimed water. Soluble salts in the irrigation supply can literally dissolve the equipment inventory.

To address these problems, Douglas Anderson, superintendent, and Luciano (Chito) Velasquez, maintenance supervisor, retrofitted their wash area with eight dry-cleaning stations. Each station is equipped with an air hose plumbed into a large air compressor normally set at 125 psi. To dry-clean equipment safely, goggles are required to prevent eye injury. To remind the employees of this fact, CAUTION signs were placed on the wall behind the air stations.

To protect the air hoses from damage, they were mounted on automatic-recoil hose reels. Without these reels, the long brass nozzles on the ends of the air hoses would be broken off by employees driving in and out of the dry-cleaning stations. Another safety precaution integrated into the project is a small hole bored through the tip of each brass nozzle. This hole serves as a pressure relief point, should one of the employees hold an air hose against his or her body.

In addition to solving some of their problems, the new dry-cleaning stations have also eliminated the long waiting line in front of the wash area. Before retrofitting, the wash area was equipped with only two water hoses. With the new air stations, the wash area can accommodate as many as eight employees at a time.

Another advantage of dry-cleaning equipment is that clippings underneath the engine shrouds can be removed without damaging the wiring or hot engine components. If you've ever seen the damage caused by pouring cold water on a hot engine day after day, dry-cleaning probably is starting to sound very appealing.

Dry-cleaning equipment at The Vintage Club has not done away with the need to wash equipment with water, but it has greatly reduced the many problems associated with washing equipment with water. After each mower has been blown off, it is rinsed before parking it inside the maintenance building.

Equipment must still be steam cleaned on a regular schedule. As a general rule, Chito schedules steam cleaning every two to three weeks for mowers that are used every day.

When the clippings pile up around the new air stations, they are shoveled into trash cans and hauled over to the special waste recycling dumpster. For quick loading at the end of the day, a skip loader is used to put the clippings in the dumpster.

In regions of the country where Mother Nature makes dry-cleaning outdoors an unreasonable proposition, air stations could probably be moved indoors, if a large building is available. For example, air stations could be retrofitted just inside the doorway so that clippings could be removed before the equipment is parked. Also, knowing that only a few gallons of water will be needed to rinse each mower, it would be feasible to install a drain and water hose next to the air stations.

Dry-cleaning equipment at The Vintage Club has not replaced the need to wash equipment with water; it has just greatly reduced the many problems associated with washing equipment with water. After each mower has been blown off, it is rinsed before parking it inside the maintenance building.

NO HOLES: "Play (Practice) Away, Please"

by ROBERT BRAME
Director, North-Central Region, USGA Green Section

HAVE YOU EVER looked at a practice putting green after a hard day? How about a practice putting green in late August after the last big golf outing for the summer? It's not uncommon to see turf that resembles a war zone. Soil appears through the thin, weak turf surrounding the six, nine, or sometimes 18 holes distributed over the previously uniform green carpet. Take a closer look — ragged and rounded hole edges, and often a dozen or more previous hole locations that were cut either too low (dark green circular depressions) or too high (4¼-inch scalped patches) can be seen. It's not a pretty picture.

With some modifications, putting green flagsticks can be used with or without a hole. Eliminating practice putting green holes would reduce maintenance costs and improve turf quality, while still allowing beneficial practice.

Think about what this same practice putting surface might look like if the holes were not being used. A practice putting green with no holes — what a crazy concept! Or is it?

Golf is a mental game. According to many of the game's great teachers, this is particularly true of putting. If you think you're going to miss the three-foot putt, you probably will, or at least it becomes a lot tougher to knock in. It is interesting that many golf instructors actually discourage practice putting to a hole. The idea behind this philosophy is that you condition your mind either to see the ball going in or missing the hole. These thoughts carry over to the golf course. If you're missing on the practice green, you will likely develop a negative mind-set, and it may get worse on the course. Conversely, if you're knocking them in on the practice green, you will expect to continue on the course.

The suggestion by many golf instructors is to practice putting to a spot, or place a tee in the ground for a target. The theory makes sense. You get the feel of the putting surface without focusing on whether the ball goes in the hole.

Improving your putting game by looking at a spot rather than a hole? An interesting idea, but how about the agronomics? Even if the holes are changed daily on a practice putting green, wear can be very destructive. Worn and bruised turf is more prone to disease activity and weed invasion. This means more chemicals may be needed to counteract the effects of heavy, concentrated wear on the putting surface.

Distributing player wear over a larger area results in healthier turf and a better playing surface. This concept sounds great, but how can wear be monitored and the holes changed often enough to prevent heavy traffic damage? If the practice holes are changed several times on busy days, what will the putting surface look like with numerous transplanted plugs trying to survive and grow in? Agronomically, there would be value in not using holes on the practice green.

Why not simply cut the base off the small flagstick normally used on practice putting greens and sharpen the end? Now the small flagstick may be pushed into the surface at any location, and the need for standard holes is eliminated. The small-diameter holes made by the practice green flagsticks are virtually unnoticed. As wear occurs, players, pro shop personnel, or the maintenance staff can quickly and easily move a flagstick, simply by pulling it up and pushing it in somewhere else. This strategy completely eliminates transplanted plugs from hole changes and the labor time needed to move and repair holes. In addition, directing a player's practice efforts at a target flagstick has the potential of producing a better mental foundation for scoring on the golf course. Most golfers would agree, this is an attractive combination of benefits.

Give it a try. Fill in the holes on your practice putting green, sharpen the practice green flagsticks, and "play (practice) away."

Golf and the Larger Environment

by F. RAY KEYSER, JR.
Chair, Golf Industry Policy Committee, Vermont Golf Association;
Member, USGA Green Section Committee

THE VERMONT GOLF Association, organized in 1902, has had the typical purposes of most state golf associations — holding state golf tournaments, administering a handicap system, educating golfers about the Rules of Golf, and rating courses for member clubs. On August 23, 1990, the Vermont Golf Association broadened its function by establishing the *Golf Industry Committee* to coordinate the multiple golf organizations in the state "in developing programs involving external affairs." I understand this is fairly rare, even unique, among state and regional golf associations. I have been asked to discuss its happening, its organization, and activities. We all applaud and support the efforts on a national basis of the USGA and GCSAA in research and advocacy for the golf industry in the broad field of external affairs. I have been asked to present what we in Vermont have done in the same field at the state level.

If you could drive directly from Massachusetts through Vermont to Quebec at 40 mph, it would take you 4 hours, or from New Hampshire to New York (east to west), it would take you 1 hour at the bottom of the state and 2 hours at the top, all of which is impossible because of the Green Mountains, which split the state from north to south. Vermont has a population of 562,758 (about the size of Rochester, N.Y.), 82 covered bridges, 23 ski areas, and one golf course for every 10,000 people, and something on the order of 10,000 miles of "back roads" in 247 towns. The Operative statistic, however, is that it is within driving distance of approximately 50 million people.

Vermont made its choice early to preserve an uncluttered environment. In the 1950s legislation was enacted which led to the current requirement of a deposit on beverage containers; it has restricted outdoor advertising to the business premises — no billboards — but discreet, uniform state highway signs for business. Vermont always had and has continued to attract a strong environmental community. This led to the control of development with enactment of legislation in the early 1970s, Act 250, requiring a state permit designed to control impacts on the natural environment and governmental services. Application for a permit is to a regional board, with appeal to the State Environmental Board. Both boards are made up of citizens appointed by the Governor, and they function informally, compared to the court system.

F. Ray Keyser, Jr.

Enter Sherman Hollow, Inc., a cross-country ski facility with plans for a development keyed around a Ray Floyd-designed golf course in the town of Huntington, population 1,609, but within commuting distance of Montpelier, the state capital, and Burlington, one of the fastest-growing regions in New England. It was also located off the main road and on a gravel country road. The application by Sherman Hollow for an Act 250 permit was hotly contested by a group of local citizens who called themselves "The Neighbors." But these weren't your usual neighbors. They included, among others, an attorney in the environmental law division of the Vermont Attorney General's office. Sherman Hollow was supported by the town government, a majority of town residents, and the regional chamber of commerce. The District Environmental Commission denied the application and, on appeal, in the late summer of 1988 the State Environmental Board denied the application and refused to grant a permit to build the golf course on the basis that the applicant had not persuaded the board that the use of pesticides would not result in undue water pollution. The board could have come to an opposite conclusion based on testimony from witnesses such as Dr. Stuart Cohen, a Ph.D. in physical organic chemistry and for 11 years in charge of the Ground Water Assessment Program in the U.S. E.P.A.'s Office of Pesticide Programs, and a comprehensive integrated pest management program presented by the applicant.

In its decision, the board was also critical of the regulation of the use of pesticides on golf courses by the state.

That State Environmental Board decision set a precedent, which would dictate the decision in subsequent Act 250 cases, effectively blocking permits for expansion of existing or building of new golf courses in Vermont. New golf facilities were dead in the water, literally and figuratively.

Under Vermont law the Commissioner of Agriculture has the jurisdiction to regulate the use of pesticides. The regulations required certification of applicators (course superintendents) and reporting of pesticide use to the Department of Agriculture. The concept was monitoring of use with application by those who are technically competent. There were no regulations, however, specific to use of pesticides on golf courses.

The applicant felt that the Act 250 process was highly political and that the "Neighbors," including state employees in influential positions, along with environmental groups such as the Ralph Nader-spawned Vermont Public Interest Research Group (VPIRG), appealed to an anti-growth movement and used the Act 250 process as a sword before a receptive tribunal. It is really immaterial whether the findings were a front in order to defeat development. Debate on that issue is meaningless because the decision was on the books and had to be dealt with as the law of the land.

I only comment on the dynamics of the case for one reason. Given the right mix of circumstances, similar blows to the game of golf can be struck by neighbors, municipalities, states, or other authorities, in numerous areas of golf course operations, including permitting, taxation, environmental, or other regulation. The ability of a golfer to strike a shot of a lifetime does not depend on the

The Golf Industry Committee was organized by the Vermont Golf Association in 1990 to coordinate the state's multiple golf organizations. Rutland Country Club, Rutland, Vermont.

golfer alone, but also the environment within which the game exists.

Under the leadership of Michael O'Connor, chairman of the Environmental Committee, and Garry N. Crothers, President, the Vermont Golf Course Superintendents Association (VGCSA), all golf clubs in the state were invited to a meeting on November 28, 1988. Most courses in Vermont had been closed for over a month; however, about half of the courses in Vermont sent representatives, an unusually large turnout.

The meeting addressed two items: the impact of the Sherman Hollow decision on future course construction, and the recent response of the regulators, which had been to establish a committee to draft pesticide regulations for golf courses. Mike O'Connor was on that committee and was extremely concerned at the direction and probable impact of that committee's recommendations.

The chair, and therefore the direction of the pesticides committee, was in the hands of the President of VPIRG, Robyn Cook-Hubner, an adversary in the Sherman Hollow case. The committee had engaged a consultant, Jeff Parsons, whose past work with the Adirondack Park Commission gave the industry great concern. Mike felt like a skunk at a lawn party at the pesticides committee meetings.

Most of the courses attending pledged financial support to a special fund established by the Vermont GCSA to finance an industry response. A second meeting was scheduled for December 19 in order to have time to develop a course of action. That meeting concluded with the appointment of a committee authorized to represent the clubs and urging all clubs not present to contribute financially.

My first involvement was attending these two meetings. I did not remain silent, an occupational hazard of politicians and lawyers, and I was both. Remaining silent may have been a better course to follow as I ended up agreeing to chair the five-member policy committee appointed at the December meeting and charged with the responsibility of determining and implementing a course of action. The committee was purposely selected to be composed of individuals coming from different backgrounds within the industry; a superintendent (Michael O'Connor), a PGA professional (James Remy), president of a club (Ted Price, Mt. Anthony), a Sherman Hollow representative (Peter Wohl), and myself, an attorney with a liberal sprinkling of government and business experience.

The committee met on January 4, 1989, to decide on a strategy to overcome the Sherman Hollow decision and to deal with regulations expected to be proposed by the VPIRG-led pesticides committee. We explored various strategic alternatives, including mounting a massive political campaign to reverse the decision by action in the legislature, trying to reopen the Sherman Hollow case for reconsideration, and opposing any new regulation as unnecessary.

Golf had been a part of Vermont since before 1900 (Dorset Field Club), with many courses dating back over 50 years. There had been no evidence of any water pollution. On the other hand, Vermont has a strong environmental culture. We did not have the money or organization to undertake a massive educational or political campaign, even if such a course of action could be successful, which was doubtful.

Careful analysis of the Sherman Hollow decision led us to the conclusion that one of the main reasons for the decision was that the State Environmental Board viewed the state's regulation of the use of pesticides on golf courses as inadequate to protect the environment. We decided to become a part of the solution and not part of the problem by actively participating in the development of regulations for the use of pesticides on golf courses.

With a direction established, we tried working with the VPIRG-led pesticides committee in development of regulations. Our fears became reality as that committee began developing proposals we could not live with. Our suggestions were going nowhere.

There were two major areas of concern with the proposals being considered by the pesticides committee. The first was a requirement that each course submit a management plan that the Commission of Agriculture had to approve. This meant that an activist Commission could dictate the species of grass, shrubs, and trees; irrigation practices; mowing practices — in short, the vegetative management of a course. The second was a mandatory groundwater monitoring program at every course, estimated by our expert (Stuart Cohen) to cost a minimum of $50,000 to $75,000 annually. That amount would have greatly increased the cost of golf to Vermonters, and done so unnecessarily.

Up to this point we were operating on an ad hoc basis and could not honestly say we represented the industry. To correct this, we asked for and received the support of the Vermont Golf Association with the appointment of its executive secretary (James Bassett) as a member of our committee.

The pesticides committee was not making much progress, nor were we able to engage in any meaningful dialogue with its staff or leadership. We concluded that the industry would have to bypass that committee and independently draft proposed regulations if progress was to be made.

As a first step it was necessary to determine if the Commissioner of Agriculture would consider for adoption regulations drafted by our committee. We presented the idea to the Commissioner, Ronald A. Albee, at a meeting March 29th, stressing that any

proposals would be drafted to protect the public interest in a practical and sensible manner. The bottom line, after a wide-ranging discussion, was that our ideas and draft of proposed regulations would be welcomed.

We left the meeting and went to work. With the backgrounds of the committee members, we were able to define the public interest, have excellent technical input, and draft proposals in a professional manner. The final draft of proposed regulations was approved by the Policy Committee on April 24th and mailed to the Commissioner on April 25th. During the spring and summer we worked with the department in their review of our proposed regulations (Debra Rogler/Phil Benedict). The Commissioner started the process of adoption by advertising the proposed regulations and scheduling a public hearing for November 30, 1989.

The industry supported the Commissioner's proposed regulations at the public hearing by testimony from Russell Barrett (V.P., VGA), James Remy (President, Vermont Chapter of PGA), golf course superintendent Michael O'Connor, and myself. Conrad Smith, an attorney in the Environmental Section of the Attorney General's office, who had also actively opposed the Sherman Hollow development, testified as a "private citizen" and submitted 12 pages of typed testimony in opposition. The legislative counsel for VPIRG (Joan Mulhern) also testified in opposition.

Following the hearing we filed a reply brief to each point raised by attorney Smith and strongly criticized him for failure to disclose his employment by the Attorney General, who also is called on by departments of state government for advice. How can someone represent the state and also oppose official action without recognizing the conflict of interest?

On October 25, 1990, the regulations became law. The purpose of the committee had been completed, but the question was, what lay ahead? The experience had sharpened the committee's awareness of the need to be involved with the implementation of the new regulations, and for the industry to be alert to events affecting golf. The question was how a continuing external affairs function should be organized. We identified the following criteria to be considered:

1. To have a membership from all state golf associations in order to coordinate policy and actions between them;
2. To have access to financing;
3. To minimize bureaucracy and administrative expense.

Those objectives ruled out a new state organization and led us to recommend that the VGA establish a standing committee with membership appointed by each state association. We recommended that it be comprised of three members selected by the VGA, two by the Vermont GCSA, and one each by the PGA and the Vermont State Women's Golf Association (VSWGA). This would provide coordination, eliminate unnecessary bureaucracy, minimize administrative expense, and provide the incentive for funding.

The idea was well received, and on August 23, 1990, the VGA Executive Committee voted to establish the committee. Funding has been provided by the VGA and VSWGA by earmarking up to $1.00 annually from the charges for each golfer on the GHIN system.

Our committee has found a great deal to do without looking very hard.

Following up on the pesticide regulations is a continuing effort. With the state in deficit due to the recession, we picked up one-half the first year's salary of a new employee in the agriculture department hired to implement the regulations. The committee actively monitors and deals with issues raised in the permit process on an ongoing basis.

We contracted with the Associated Industries of Vermont, a state association for manufacturers, for identifying, tracking, and reporting on legislation and regulatory initiatives affecting the golf industry using their computerized system.

In 1991 and 1994 we published *Golf in Vermont*, based on surveys of courses in the state, which has as its objective being a source of public information about golf as a part of Vermont, its play, and its impact economically, environmentally, and socially. It has been distributed not only within the golfing community, but, more important, to legislators, congressmen, U.S. senators, the governor, and departments of state government.

We successfully opposed a move by one city to obtain jurisdiction over the use of pesticides with the intent of banning their use entirely.

We are monitoring and are prepared to assist a member club that has been taken to court for damages and for an injunction prohibiting play due to balls being hit onto an adjoining highway.

We were the major force in legislation passed in 1994 dealing with liquor licenses for clubs.

We are negotiating a water sampling program with the Department of Agriculture to determine the existence of chemicals in wells and surface water on a selected number of courses.

We have assisted in writing the golf portion of the state's recreational plan.

I hope this brief description of our activities will give you a flavor of our external affairs program.

Golf benefits not only the environment, charities, and families, but also the soul. It is an integral part of the American quality of life and has an enormous sleeping political base. I do not believe golf is fully understood in those terms. They are values that we can ill afford to lose.

Vermont ski areas and golf provide beautiful vistas of the landscape and an important economic base for the state. Stratton Mountain Country Club, South Londonderry, Vermont.

The Best Turf Tips of 1995

Contain It, Store It, Recycle It

by STANLEY J. ZONTEK
Director, Mid-Atlantic Region, USGA Green Section

THE EVIDENCE is becoming clear that when pesticides and fertilizers are properly applied to turfgrass, their potential for movement through the soil and into groundwater is minimal. Thatch is showing to be a very effective sponge in absorbing, tieing up, and, ultimately, degrading chemicals that might otherwise migrate into groundwater. This is good news!

Nonetheless, golf course superintendents need to be diligent and careful in all aspects of chemical usage on the golf course. One opportunity for movement of chemical-containing water into groundwater or surface waters occurs when spray tanks are filled, rinsed, cleaned out, and prepared for the next spray. Most often, this task is performed on some type of paved surface near the maintenance area.

As the golf course superintendent at the Farmington Country Club, in Charlottesville, Virginia, Dick Fisher, CGCS, recognized the need to better manage the handling of chemicals in their workplace. Their solution included the following:

1. Relocating stored chemicals and spray equipment away from the employees' workplace by establishing a completely separate chemical storage and handling area;

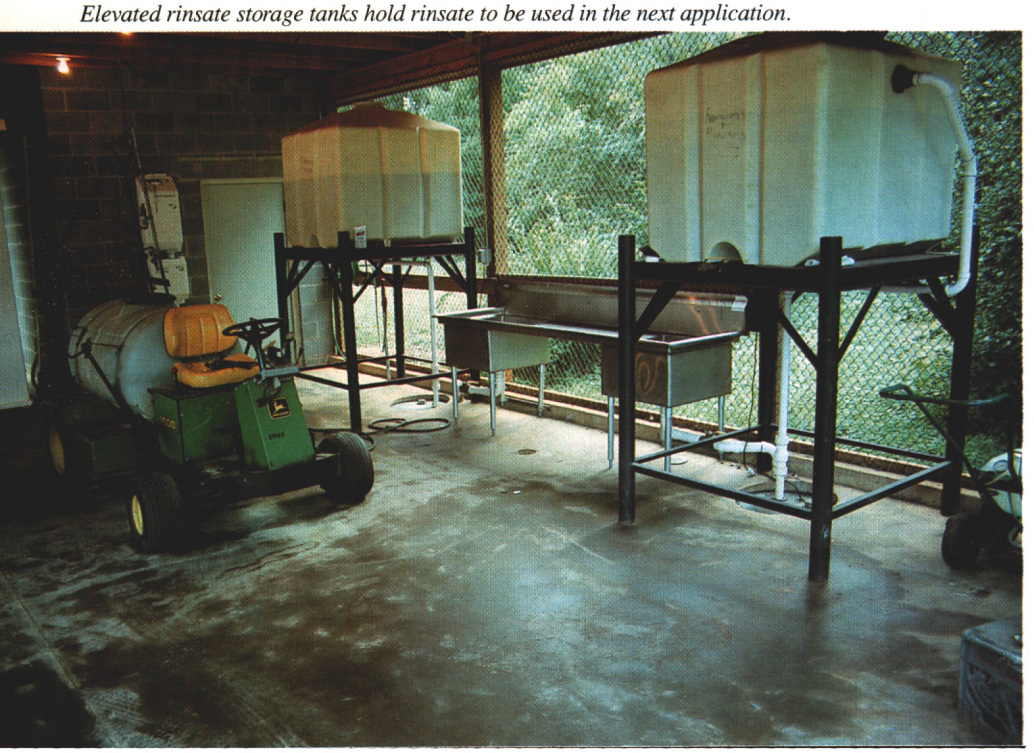
2. Developing a safe area to fill their sprayers and mix the chemicals, and;

3. Collecting, storing, and reusing the water used to rinse and clean the spray equipment.

In essence, they now collect, contain, and recycle all of the water used in their spray program. No water runs off onto the soil or into any body of water. Their new structure is a self-contained chemical storage, handling, and recycling area.

How does it work? The following are the steps they follow in a normal spray application.

Elevated rinsate storage tanks hold rinsate to be used in the next application.



1. Two sprayers, one for greens and another for fairways, are stored in this building.

2. When the need exists for a chemical application, the spray technician fills the spray tank half full of water.

3. The products to be applied are added to the spray tank.

4. Rinseate from previous sprays, which is stored in overhead tanks, is then added to the agitating solution.

5. The spray tank is then topped off with additional water and is ready for use.

After returning from the spray assignment, the technician:

1. Rinses the sprayer and cleans out the tank.

2. This water is funneled through one of two covered floor inlets (one for fungicides and another for herbicides). In this way, the fungicide and herbicide rinseates are reclaimed separately.

3. An automatic floor pump, essentially a sump pump, moves this dilute solution to an overhead storage tank. This rinseate is easily accessible for the next application.

With this system there is no runoff. Nothing leaves the site. While this may not be a perfect system for all golf courses under all circumstances, it works for Farmington Country Club.

What are some of the most-asked questions about this system?

1. Cost.

A. This facility cost $57,000. This included $20,000 for a pre-engineered, self-contained chemical storage structure.

2. Were any problems noted when using the rinseate?

A. Rinseate water is only tankmixed and applied on fairways and roughs. The stored solution is so dilute that no problems have been seen.

3. What happens if or when the overhead rinseate storage tank becomes full?

A. The excess rinseate solution is sprayed in the roughs.

4. Are any future improvements/refinements planned?

A. Yes. A separate area for non-selective herbicides is planned. Winter weed control is important on the bermudagrass fairways at Farmington Country Club and easily facilitated using Roundup. Storing this rinseate separately should minimize accidental turf damage.

5. Any words of advice when considering building such a structure?

A. Just one. If anyone considers such a structure, double-check weight and clearances of the prefabricated chemical storage buildings. You do not want to deal with partially dismantling a wall to make something fit. You might even plan for extra room . . . just to be sure.

In summary, Dick Fisher, the staff, and membership at Farmington Country Club took an intelligent and proactive approach to both removing chemicals from their employees' workplace and reducing the potential environmental impact of using chemicals on their property.

The chemical storage and handling facility at Farmington Country Club provides a dedicated area to handle pesticide applications.

A SUMMER ASSIGNMENT

by JAMES E. SKORULSKI
Agronomist, Northeastern Region, USGA Green Section

THERE ARE 36 GOLF COURSES that have been fully certified in the Audubon Cooperative Sanctuary Program (ACSP). Unfortunately, there are many more golf courses participating in the program that have yet to fulfill the requirements needed to gain certification. Most are familiar with the program's worthy objectives to improve and protect wildlife habitat, increase awareness about environmental issues, and encourage a more active role in golf course conservation practices. It is hoped that this program will help instill a philosophy whereby golfers will be more willing to accept a slight reduction in manicuring for an opportunity to reduce pesticide use. However, nearly 50 percent of the golf courses participating in the program have yet to complete a resource inventory report, which is the basis for the entire program.

Obviously, there are many reasons for this procrastination, and if you are one of those who fall into the inactive category, I am sure your excuses are as legitimate as any others. A lack of time is a frequently used excuse. How does a busy golf course superintendent find the time to meet the objectives and pursue ACSP certification? Charles Passios, CGCS, Golf Course Manager at Hyannisport Club in Hyannis Port, Massachusetts, has found a solution. Charlie utilized a summer placement student, Mark Lucas, of Purdue University, to help Hyannisport Club become the first ACSP certified golf course in New England. Mark, a dual major in both Agronomy and Environmental Sciences at Purdue, realized the potential opportunity and was very willing to take on the project as his placement assignment.

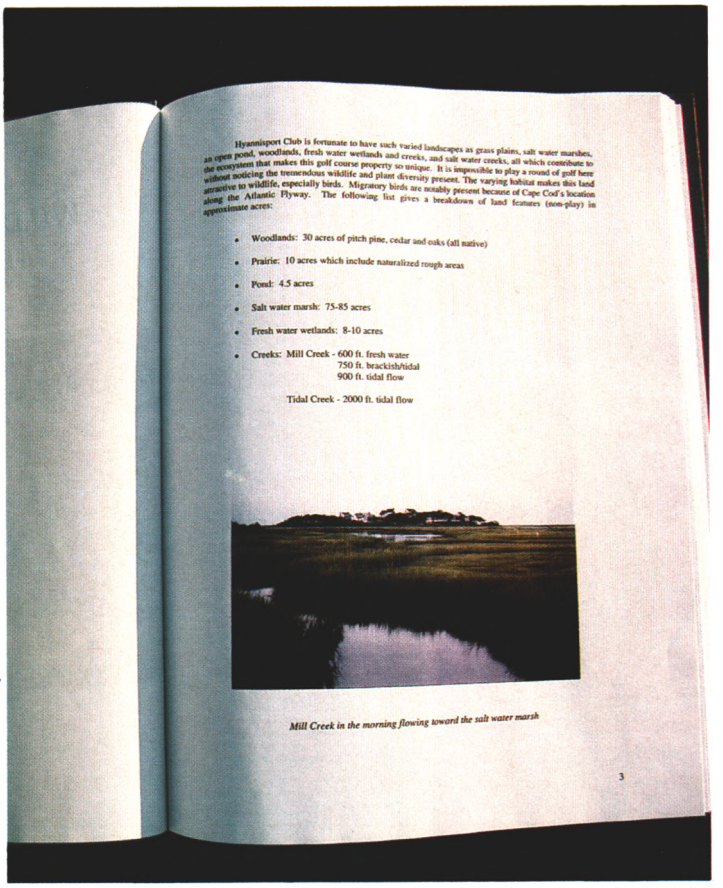
The program was set up so that Mark would complete his regular duties on the golf course each morning and then, with Charlie's guidance, devote the remainder of his time documenting the various habitats found throughout the property and the plant and animal species observed in these areas. Wildlife cover, food, and water enhancement programs completed by the Hyannisport Club, in conjunction with the Audubon Society of New York State, were described, mapped, and photographed on a hole-by-hole basis. The extent of membership and public involvement with the projects was documented, and future goals for wildlife

and habitat management were also listed. Finally, the success of objectives developed for pest management, water conservation, water quality, and facility management were documented, and goals for further improvement in these areas were outlined.

The written information, photographs, and maps were then compiled in a hardcover book and presented to the Audubon Society of New York for certification purposes. The publication provides clear objectives and lists future projects as a guide for the Hyannisport Club to further improve environmental aspects of the golf course operations and the property. The program has provided an excellent educational opportunity and experience for Mark, and at the same time has helped the Hyannisport Club obtain certification with ACSP.

The value of utilizing summer placement students for regular maintenance activities is recognized by superintendents throughout the country. Consider expanding the responsibilities of your placement students through activities associated with the ACSP. The environmental awareness of the students, staff, and the golfers can only be broadened, and at the same time the objectives of the ACSP can be fulfilled. Obviously, there are not many placement students with majors in both agronomy and the environmental sciences. However, the students can still be extremely helpful with developing resource inventory reports, and can become involved with projects concerning golf course pest management, water conservation, and water quality management.

Mark gained experience that will last a lifetime, and it will help him better meet the new challenges that occur as the industry evolves. The opportunity is available for placement students to become involved with the ACSP. Use this opportunity to the benefit of both the students and the golf course.


Hyannisport Club is fortunate to have such varied landscapes as grass plains, salt water marshes, an open pond, woodlands, fresh water wetlands and creeks, and salt water creeks, all which contribute to the ecosystem that makes this golf course property so unique. It is impossible to play a round of golf here without noticing the tremendous wildlife and plant diversity present. The varying habitat makes this land attractive to wildlife, especially birds. Migratory birds are notably present because of Cape Cod's location along the Atlantic Flyway. The following list gives a breakdown of land features (non-play) in approximate acres:

- Woodlands: 30 acres of pitch pine, cedar and oaks (all native)
- Prairie: 10 acres which include naturalized rough areas
- Pond: 4.5 acres
- Salt water marsh: 75-85 acres
- Fresh water wetlands: 8-10 acres
- Creeks: Mill Creek - 600 ft. fresh water
  750 ft. brackish/tidal
  900 ft. tidal flow
  Tidal Creek - 2000 ft. tidal flow

Mill Creek in the morning flowing toward the salt water marsh

3

Information in the project book included drawings and photographs that documented the various wildlife habitats throughout the golf course.

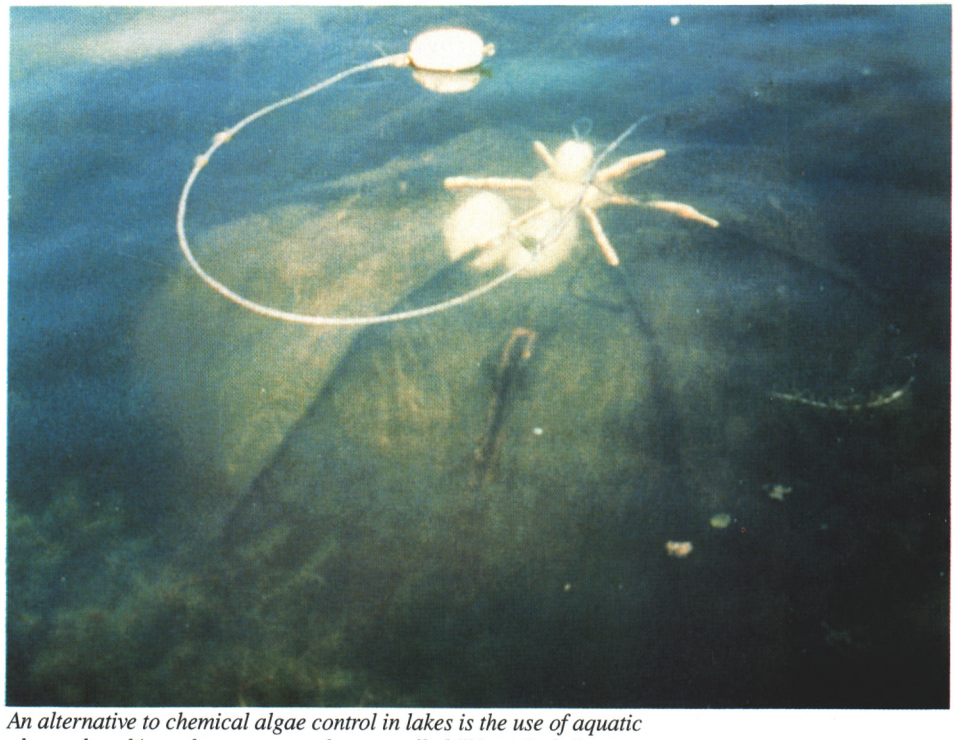
FLOTATION DEVICES

by PATRICK GROSS
Agronomist, Western Region, USGA Green Section

SUPERINTENDENTS CAN BE considered pond scum and often take the blame when golfers can't see their golf ball at the bottom of a pond because the water isn't crystal clear. Algae and other aquatic weeds are not only a nuisance for golfers, but also are problems for superintendents. The main culprit in many of these lakes is filamentous algae. These floating mats make the water visually unattractive and cause serious problems with the performance of the irrigation system. Dave Rosenstrauch, superintendent at the Orinda Country Club, tackled this challenge on his 5½-acre irrigation lake by using a revolutionary *flotation device*.

Several different treatments had been tried in the past to eliminate the algae, including applications of copper sulfate, dyes and shading agents, aeration, and microbial products. None of the methods was totally successful, and they seemed to be treating only the symptoms and not the cause of the problem. What was needed was a way to remove nutrients from the water that were acting as a food source for the algae. Dave decided to try a product called Nutri-Pods, a new method that includes the use of aquatic plants to naturally remove nutrients from the water. This technology was developed by Dave Murray, a limnologist and president of the Limnion Corp. in Bayview, Idaho.

The Nutri-Pods are round underwater greenhouses constructed of aluminum, polypropylene, and fiberglass mesh that contain the aquatic plant coontail (*Ceratophyllum demersum*). The coontail out-competes the algae by removing nutrients from the water, and the Nutri-Pods keep the plants contained and prevent them from growing out of control. The pods are manufactured in different sizes (3 feet and 6 feet in diameter) to accommodate lakes of various depths and sizes. They float in the water and are kept in place by a concrete anchor attached to a rope that runs through a PVC pipe in the middle of the pod. A float at the end of the rope marks the location of each Nutri-Pod. The number of pods needed per lake is largely dependent on the nutrient load and the size of the watershed. Roughly one pod per surface acre is recommended; however, 11 of the 6-foot-diameter Nutri-Pods were used in the lake at Orinda Country Club.



An alternative to chemical algae control in lakes is the use of aquatic plants placed in underwater greenhouses called "Nutri-Pods."

Nutri-Pods require routine maintenance for optimum performance. Dave hired a local landscape contracting firm, Contra Costa Landscape, to install and maintain the Nutri-Pods. Maintenance involves checking the pods on a monthly basis, cleaning the fiberglass mesh, adjusting the depth of the pod, and removing or restocking the coontail as necessary to maintain approximately 25 percent plant matter in the pod.

Althought the Nutri-Pods have not completely eliminated algae growth, Dave is convinced they have made a positive impact and have significantly improved water quality. Monthly water tests have indicated that the Nutri-Pods have reduced the amount of nitrogen and phosphorus by 15 to 20 percent. This same biological technology is also being used in wastewater treatment plants to remove nutrients before the water is delivered to customers, and it shows promise for other applications. So if algae-infested lakes make you feel like abandoning ship, a new *flotation device* may be your lifesaver.

HOW DRY I AM

by ROBERT VAVREK, JR.
Agronomist, North-Central Region, USGA Green Section

WHY IS IT that more putting green turf is lost each season due to overwatering than by underwatering? A common reason is the absence of a well-designed irrigation system for greens and the surrounds. The pattern of irrigation coverage is especially important when a green possesses significant undulations and contours. Such a green is frequently overwatered to minimize the development of localized dry spots on the elevated portions of slopes and knobs. Heavily shaded greens are also likely to receive excess irrigation because the lack of sunlight and air movement limit the evaporation of water from the putting surface and the root zone. Irrigation cycles often cannot be, or simply are not, adjusted for shaded greens and other site-specific requirements.

Excessive irrigation during the peak heat stress of midsummer can contribute to the decline of turf on greens.

It's only natural that many superintendents err on the heavy side when applying irrigation to greens. After all, a sand-based green or a green on a frequent topdressing program should be able to handle any amount of water, right? Furthermore, the adverse effects of overwatering are slower to develop and are less visible than a localized dry spot or a wilted, drought-stressed portion of a green. Golfers can readily distinguish brown turf from green turf, but are much less interested in or aware of black layer or a weak, shallow root system until these conditions affect the appearance or quality of the playing surface.

An extreme, but very effective way to minimize the potential for overwatering heavily shaded greens was used during the 1994 season by Chris Hague, superintendent at Crooked Stick Golf Club, in Carmel, Indiana. His four most heavily shaded greens are also located in pocketed sites that restrict air movement across the putting surface. It should come as no surprise that dew, rain, or irrigation is slow to evaporate from these sites and that the percentage of *Poa annua* is greater here than on greens in full sun. Most superintendents can relate to the concerns associated with these *problem* greens that develop during prolonged periods of hot, humid weather. The frequency and severity of disease, black layer, and the decline of *Poa annua* are only a few of the problems that frequently occur in such sites.

When hot, humid weather arrived at Crooked Stick, the full-circle sprinklers around the greens were removed and replaced with part-circle heads designed to irrigate *only* the surrounds. There was no opportunity to overwater greens using automatic irrigation on these holes. Even the temptation to provide a short five-minute cycle at night was gone. The sprinklers were not replaced until early fall. The employee responsible for hand-mowing the greens each morning was also carefully instructed to apply irrigation by hand-held hose only to droughty portions of the greens, usually collars, slopes, and high spots. The same employee checked the green for symptoms of drought stress several times a day during the late morning and mid-afternoon. If needed, portions of the greens were irrigated or syringed to prevent severe wilting. Needless to say, training the crew to apply as little water as possible is a challenging task, but a task that pays dividends for turf in difficult sites.

The key to success is to apply minimal amounts of irrigation only to droughty portions of the greens. The low areas may not require irrigation for several days during humid weather in shaded sites, even though the midday air temperatures are consistently in the 90s. The need for more irrigation can significantly increase if the weather turns hot/dry instead of hot/humid, and it may be necessary to utilize full-circle irrigation again.

The results last season spoke for themselves. Greens that typically thinned out during midsummer remained dense and firm throughout the peak stress period of July and August. Playing conditions were consistent, with little loss or stress of *Poa annua* observed. Is this *rocket science* or should everyone suspend automatic irrigation on greens during midsummer? Of course not, but the success at Crooked Stick last summer underscores the importance of careful irrigation to minimize stress to greens. Furthermore, the program emphasizes the importance of managing problem sites differently.

The key to a successful hand irrigation program is to apply as little water as possible and apply irrigation only to dry portions of the green.

The Greens Against The Greens

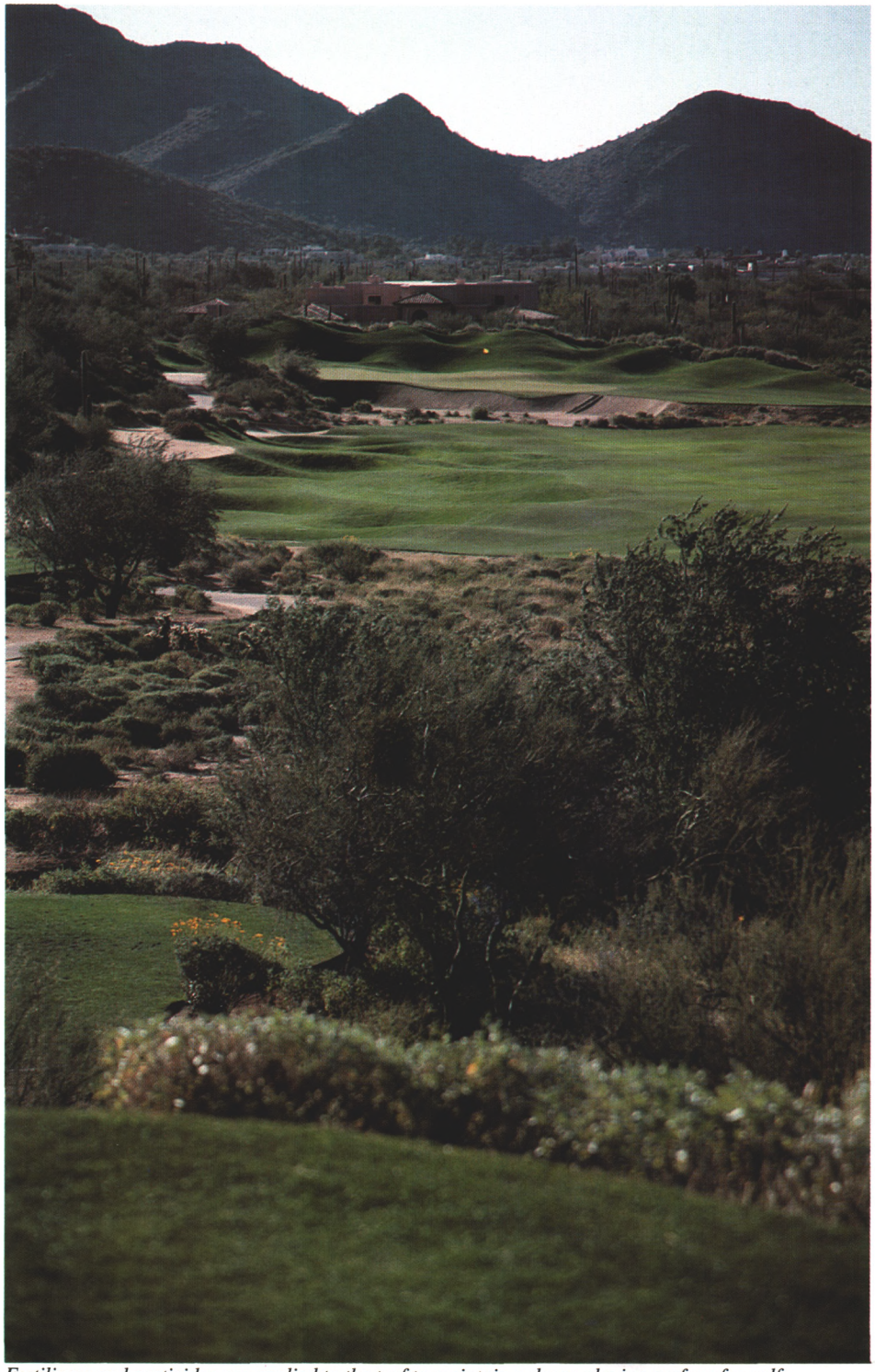
by MICHAEL FUMENTO
Author of *Science Under Siege: Balancing Technology and the Environment*

The opinions expressed in this article are those of the author and do not necessarily represent those of the United States Golf Association.

IN CASE you haven't heard, golf causes cancer. Or, specifically, the pesticides sprayed on golf courses cause cancer. Need proof? One out of four American golfers will contract cancer, and one in five will die of it. That's scary stuff, unless you know that the same one in four American non-golfers will contract cancer, and one in five will die of it. This is what's called the background rate of cancer. It is a realization that everybody dies of something and that in a large enough group one can expect all the various types of death. It is terribly basic. And yet it is terribly misunderstood. And so we hear that pesticides sprayed on golf courses cause cancer because several pro golfers, including Paul Azinger and the late Heather Farr, contracted cancer.

There is a County Councilwoman in Allentown, Pennsylvania, who wants to ban pesticide spraying on golf greens because, according to the local newspaper, "She said an acquaintance of hers suffered a long and painful death from pesticides sprayed on a golf course, and the family of a Palmer Township woman believes her cancer was caused by lawn spray chemicals." The reporter comments that this "could mean some toxic insecticides and herbicides would be replaced by everything from animal traps to fly swatters."

How does this woman know that pesticides killed these people? We're not told. But it's a common way of thinking to say the person played golf, the person died, therefore golf caused the death. It's that simple. I see this pattern all the time. There's a man from St. Petersburg, Florida, who launched a national panic when he told TV talkshow host Larry King that a cellular phone caused his wife's brain cancer. She used the phone, three months later she was symptomatic for cancer, and therefore what else could it have been? That no cancer develops in so short a time frame as three months did not bother this man, nor that the normal background rate for such cancers indicates that some 700 cellular phone users



Fertilizers and pesticides are applied to the turf to maintain a dense playing surface for golf. These products help limit damage caused by weeds, insects, and diseases, but their function in the management program can be misunderstood by the public. Desert Highlands, Arizona.

that year should have died of brain tumors regardless of whether they even turned them on.

Then there was the mother of the Gulf War veteran who claimed that her son died of cancer from nerve gas exposure after a Scud missile exploded nearby. There was no record of any Scud exploding near his unit, there was no evidence of nerve gas deployed near his unit, nobody in his unit suffered any of the typical symptoms of nerve gas exposure, and nerve gas has never been connected to cancer. To top it off, while the type of cancer the man contracted takes an average 20 years to develop, this poor fellow's first symptom was the *day after* his mother said the Scud went off!

It's terribly sad that the St. Petersburg man lost his 33-year-old wife who had just given birth. It's sad that the woman lost her beloved veteran son. But this isn't science they're employing; it's superstition that flies in the face of everything we know about cancer. These people shouldn't be invited to appear on Larry King or testify before Congress, as the veteran's mother did. But this pattern is repeated time and again. Sometimes the culprit is power lines, sometimes computer terminals, sometimes walkie-talkies, sometimes pesticides, sometimes toxic waste dumps, sometimes breast implants, but the pattern is always the same. And, never fear, there is always a crusading activist group that will support such beliefs.

That said, this doesn't mean that pesticides don't cause cancer. So what do the scientists say? They do say that, depending on whom you ask, perhaps 10 pesticides that are sometimes sprayed on greens are carcinogenic in lab animals. When the media or environmental extremists receive this information, they routinely omit the part about the animals. And yet this is vital because human exposures are not equatable with these animal exposures. First, different animals react differently to chemicals. Fully one-third of the time, something that causes cancer in a rat doesn't do so in a mouse, and vice-versa. If there's such a huge difference between two such similar species, what does this say about extrapolating from mice to men?

Perhaps even more important, these animals are given on average 280,000 times the exposure that humans would receive. Yet we know that when it comes to acute poisoning, clearly the dose makes the poison. The iron in just a handful of adult vitamin tablets can kill a baby. A little digitalis is an effective heart medicine; a lot is an effective poison.

There is some evidence that the dose also makes the poison with carcinogens. It appears that when specific organs in the body are hit by so much of a given chemical, it kills off the cells at a high rate, and that in the effort to replace those cells, mistakes are made in the DNA codes. The result: cancer.

So what we really should be looking for is tests of pesticides on humans. And yes, they do exist. There is a growing body of data looking at American farmers who spray pesticides for a living. Now these guys get it on their skin, they accidentally inhale it, it sometimes soaks their clothes. Despite their precautions, many of them receive relatively high exposures. What these studies of farmers have shown is that their incidence of cancer is below average — statistically, significantly below average. Now, for some types of cancer they are above average, and some extremists make much ado about this fact. But consider: if overall the herbicide applicators have less cancer than average, but for some cancers they are above average, doesn't that mean that for some cancers they must be way, way below average? Does that mean that exposure to pesticides is actually protecting them from those cancers? Maybe, but probably not. There's probably some other aspect of their lifestyles that is protecting them. So if that's the case, couldn't it be some other aspects of their lifestyle accounting for the increases?

There has also been a study of golf course superintendents that one green extremist uses to show that 750 such persons had died of cancer. Considering that the study only looked at 750 superintendents, it would have been a disturbingly high number of cancer deaths, to say the least. But actually the number of cancer deaths was 179. This was higher than the 136 that would have been expected among the same number of persons in the general population, but not so high an elevation as to be beyond the realm of chance. In other words, just because you roll a six twice in a row with a die doesn't mean the die is weighted, even though the odds are against such an occurrence.

Another alarming fact you have heard is that among a group of approximately 200 members of the Ladies Professional Golf Association, there have been at least four cases of breast cancer. Scary stuff, unless you know that at current rates, about one in ten American women will contract breast cancer, meaning that ultimately in that group we would expect 20 such tumors.

None of this is to say that golf is without hazard. Golfers seem to make marvelous lightning rods. And then there was the man in Florida who recently was retrieving balls from a pond on a golf course and was bitten on the foot by an alligator. Maybe he was wearing an Izod shirt and the gator took offense.

Environmental extremists don't want a careful evaluation of what good, and possible harm, synthetic chemicals can do; they just want them banned. They fear technology. They blindly trust Mother Nature and as blindly distrust what is made by the hand of man.

Thus, while about half of all synthetic and natural chemicals have proven carcinogenic when fed in massive doses to laboratory animals, environmentalists want to ban all synthetic ones and leave the natural ones alone. Thus, they are now pushing for a blanket ban on all chemicals made of or with chlorine, including most pesticides, but natural chlorines like salt are ignored.

But consider this: If the mortality rates from 1940 applied to 1988, four million Americans would have died in 1988. Instead, 2.2 million died. The difference can be summed up in one word: technology.

Technology has made people live longer and better for two reasons. The first is the direct route, the benefits of the device or chemical itself. The second is simply by raising standards of living. By allowing more work to be done by fewer people, technology has made the average American richer in most respects than the richest king of not long ago. A hundred years ago, the world's richest monarch did not have year-round refrigeration, did not have fresh fruits and vegetables out of season, did not have a means to visit faraway kingdoms in a matter of hours. And when his beloved son and heir caught the measles, he had just the

same high chance of death as anyone in the kingdom.

Who are the people who are trying to blame technology for every evil on the planet, both physical and moral? They are saboteurs, in a very literal sense. *Saboteur* comes from the French word for wooden shoe, a *sabot*. The original saboteurs threw their wooden shoes into machinery to break it, thus hoping to forestall the industrial revolution. The intellectual descendants of the saboteurs and their counterparts from English history, the Luddites, are the technophobes of today, the environmental extremists.

Anytime these saboteurs want, they can go to a Third World country, hitch themselves up to an old water buffalo, and live out their fantasy. But they don't want to go to the Third World; they want to bring the Third World to us.

Along with not understanding the wonders that technology has wrought, these extremists also don't comprehend the allocation of scarce resources, which says that every dollar spent on anything is a dollar less to be spent on anything else. They want to spend money on everything, which is not possible. You cannot reduce risks to zero. What you can do, in your effort to reduce some risks to zero, is spend so much money chasing phantom risks that there isn't any left over for real ones.

In the United States, we are now spending over $150 billion a year in direct compliance with environmental regulations, soon to be 3 percent of our entire gross domestic product. This $150 billion is larger than the national budget of all but a few countries in the world. Yet, there is very little evidence that after the first $50 billion or so we are getting much for our money. Meanwhile, the American government spends only about $10 billion a year on medical research.

Yet another alien concept to some environmental activists is the overemphasis on small or virtually non-existent risks that results in the down-playing of real risks. One of the greatest of these is obesity. For all the talk about parts per quintillion of dioxin, per quadrillion of pesticides, or wafting cigarette smoke, other than perhaps direct cigarette smoking, America's biggest controlable cause of death isn't what someone else is inflicting upon us, but what we inflict upon ourselves. As a nation, we are eating ourselves to death, with some 300,000 lives lost prematurely due to overweight. A recent government report also found that 21 percent of our nation's teens are obese, a huge increase over the 1970s. A separate report found these kids may have already irreparably damaged their hearts and that 30 million U.S. children now stand to die of heart disease.

American teenagers are eating their way into the grave. Safe in the knowledge that their government and self-appointed protectors are reducing levels of dioxin from parts per quintillion to parts per sextillion, they stuff their faces with hotdogs, hamburgers, and potato chips and don't get off the couch except to insert a new video game cartridge into the machine. Yet there is no national campaign against teenage obesity.

So, we obsess over the non-problems and theoretical problems, and we ignore the real ones. We run so fast and so furious from bogeymen that, like scared buffalo, we end up running en masse off the edge of a cliff. We are told so often that this causes cancer and that causes cancer that many people put up the natural defensive reaction that nothing causes cancer. And yet, as I said, cancer is poised to swipe away a fifth of us — not because of something sprayed onto greens, or present in the water supply in parts per quadrillion, or on your fruits and vegetables in parts per quintillion. Rather, aside from genetics, it is caused almost exclusively by that which we intentionally expose ourselves to — cigarette smoke, alcohol, not eating properly. How many people out there, I wonder, are neglecting the real causes of cancer, even while they shudder at the thought of walking onto a golf course?

The next time you hear somebody talk about that cancer-causing agent known as the game of golf, don't go on the defensive, go on the offensive. Tell them they have no right to force their personal, unscientific, anti-scientific beliefs on you. Tell them that you think they are encouraging a fatal distraction by putting emphasis on the wrong areas.

And here's a final thing to point out to them, something I hadn't even thought about until shortly before I wrote this article. Using my Nexis computer database of magazines, newspapers, and newscasts from around the country, I plugged in the words "cancer" and "golf" and told the computer I wanted all references in which those search terms appeared just 25 words apart or less. To my shock, my terminal flashed a message saying that there were more than a thousand such items. I thought, "Could there be that much bad reporting linking golf courses to causing cancer?"

But as I read through a few such stories, I realized what was happening. The vast majority of these references were about golf tournaments set up to raise money to help cancer victims. Along with tennis, there is no other sport more associated with benevolence than golf. That is your legacy. So, the final thing you should do when environmental extremists challenge your sport is to grab your favorite club — 9-iron, putter, or whatever — hold it before them like a king's staff, and declare proudly: "You are wrong! Golf doesn't cause cancer, it cures it!"

Turfgrasses offer many positive environmental influences such as erosion prevention and effective filtering of water contaminants. Combined with out-of-play areas, golf courses also provide excellent wildlife habitat. Roxiticus Golf Club, Mendham, New Jersey.

BLOWING YOUR TOP!

by LARRY GILHULY
Director, Western Region, USGA Green Section

DYNAMITE. The mere mention of the word evokes thoughts of destruction. Even worse is the thought of destroying native habitat that is often home to many different forms of wildlife. Although this destructive material often symbolizes man's movement into natural areas, it can also be used in unique and positive ways to actually develop better nesting areas for various forms of wildlife. Such is the case at The Oregon Golf Club in West Linn, Oregon.

While viewing a program on television, golf course superintendent John Anderson was intrigued by a method used by Pacific Habitat & Fire during the past decade to increase nesting sites in the forests of Oregon. Through the use of explosives, dead tree habitat (primarily on green trees) and snags are created that benefit many different bird species. Large green conifers are nearly always used to accomplish this goal. The tree top takes on a very natural and jagged look. With a splintered top, more moisture can accumulate in the damaged part of the tree, allowing the decay process to begin. Compared to a dead tree, which could blow down as its roots and main trunk decay, the newly created live habitat tree will stand for a much longer period of time.

The treetop blasting methods used today involve, first, boring a circular hole into the tree at the desired blast height. This creates a place for the technician to insert an internal charge. Varying amounts of explosives are used, depending on the size of the tree at the blast point. This system also involves the use of an electric blasting cap to detonate the charge. Experience in doing this type of work is critical. The objective is to use just the right amount of explosives, allowing the top to break free, tip over, and fall away cleanly. Tree diameters at the blast point can be anywhere from 6 to 48 inches. Climbing heights can vary from 20 to 120 feet.

The benefits of creating this type of habitat are wide-reaching. During the tree's declining process, the bark is invaded by bugs and grubs. This provides a food source for many types of woodpeckers that feed on these insects. When the snag is at a certain stage of decay, primary cavity excavators will make holes for use as nest sites to raise

The use of explosives keeps the hazard in play while providing natural habitat.

Explosives result in a natural, jagged top that enhances nesting sites for several species of birds.

their young. All woodpeckers are considered primary cavity excavators. Each spring, woodpeckers abandon old nest sites and excavate new ones as part of their mating rituals. This paves the way for what is referred to as secondary cavity nesters. Since these birds cannot excavate their own holes, they simply take up nest sites abandoned by the primary cavity excavators. Examples of these birds are the tree swallows, nuthatches, pygmy owls, and kestrel falcons.

The Oregon Golf Club is located several hundred feet above the Willamette River, with spectacular views of the Cascade Range. Due to the close proximity of the course to the river, the existence of numerous Douglas firs, and an ongoing commitment to enhance wildlife habitat, Superintendent Anderson decided to try this idea on the golf course.

Two large Douglas firs that had died on the golf course presented a good place to launch the new project. These trees were strategic to the play of the fifth hole, so the decision was made to create natural looking, 30-foot-high snags. The process took approximately two hours for preparation, detonation, and cleanup. The best part is that the cost was minimal when compared to complete tree removal.

A second site was located behind the No. 9 tee, in a forested area within a quarter mile of the Willamette River. The top of a 100-foot Douglas fir was taken down using the same procedure. Since ospreys frequent the area, a platform was constructed with careful attention given to maintaining perching limbs 5 to 6 feet below the platform. Again, the cost was minimal, and, best of all, the tree is within view of the clubhouse for future observation. Hopefully, an osprey pair will utilize the nest site within the next year.

As a final note, The Oregon Golf Club is a fully certified cooperative sanctuary within the Audubon Cooperative Sanctuary Program administered by the Audubon Society of New York State. Superintendent Anderson practices some of the finest IPM programs found in the Pacific Northwest. To his credit, only $1,100 was spent on pesticides during 1994. Although pest pressures are relatively low in this area of the country, reduced pesticide usage should be the goal of all superintendents.

The use of dynamite may seem extreme; however, it has worked very well in Oregon and at The Oregon Golf Club. Perhaps the next time a "tree hugger" takes you to task, the best response may be to simply "blow your top"!

Power Drainage for Healthier Turf

No Slope? No Drainage? No Problem!

by CHUCK GAST
Former Agronomist, State of Florida, USGA Green Section

IF YOU HAVE isolated low areas at your facility where the lack of outfall prevents the use of standard gravitational flow drainage systems, here is a viable solution to your problems.

Thanks to an affordable forced drainage system devised by Walt Oswiany, CGCS, of the Audubon Country Club of Naples, Florida, your problems of not being able to effectively drain low areas on your course are over.

Walt has developed a drainage sytem involving a series of standard french drains, lined and filled with stone, connected to a large sump basin, equipped with a pump, to move excess water up and out of problem drainage areas.

This power drainage system is a welcome addition to Walt Oswiany's overall golf course management operation.

The first step in this process was to install a large sump basin in an out-of-play area utilizing a perforated aluminum pipe measuring 5 feet long by 32 inches in diameter. This basin was placed on concrete block footers to prevent excessive settling. An area approximately 3 feet in radius around this pipe was backfilled with ¾-inch gravel, and a Phillips geotextile fabric liner (#8 NP) was used between the native sandy soil and backfill material to maintain a clean, porous zone around the catch basin.

Lateral drainage lines were then dug to the problem drainage areas. These trenches were also lined with the same geotextile fabric material used around the catch basin, and the trenches were backfilled to within 6 inches of the surface with the ¾-inch gravel material. Note that special attention was given during installation of the fabric to allow enough material to overlay the surface of the rock within the trench. The remainder of the trench was topped off with a coarse sand material to reestablish a smooth, rock-free surface.

The main component of this power drainage system, a Teel brand #3 P5 11 110-volt, ⅓-horsepower sump pump purchased from the Grainger Corporation, was installed within the sump pipe. This pump is equipped with a built-in pressure-sensing switch to provide automatic operation. This particular pump is also equipped with a ½-inch discharge port to effectively move from 2,300 gallons of water per hour at 20 feet of head pressure to as much as 4,450 gallons per hour at only 5 feet of head pressure.

For a power supply, this particular setup, requiring an operational load of only 6 amps, was tied to an adjacent condominium building with an agreement made to pay the condominium association a fee of $100 per year.

At a more remote location on the course, a similar sump pump drainage system was installed in 1993 utilizing a nearby irrigation satellite as the power source. The amperage draw available through the irrigation control system at this site was matched with an appropriately sized pump to complete this arrangement.

As Walt reported, this system has performed flawlessly over the past 18 months. This speaks quite well for this drainage method, which has run virtually non-stop since installation, due to the fact that lack of rainfall throughout the state of Florida in 1994 definitely was not an issue!

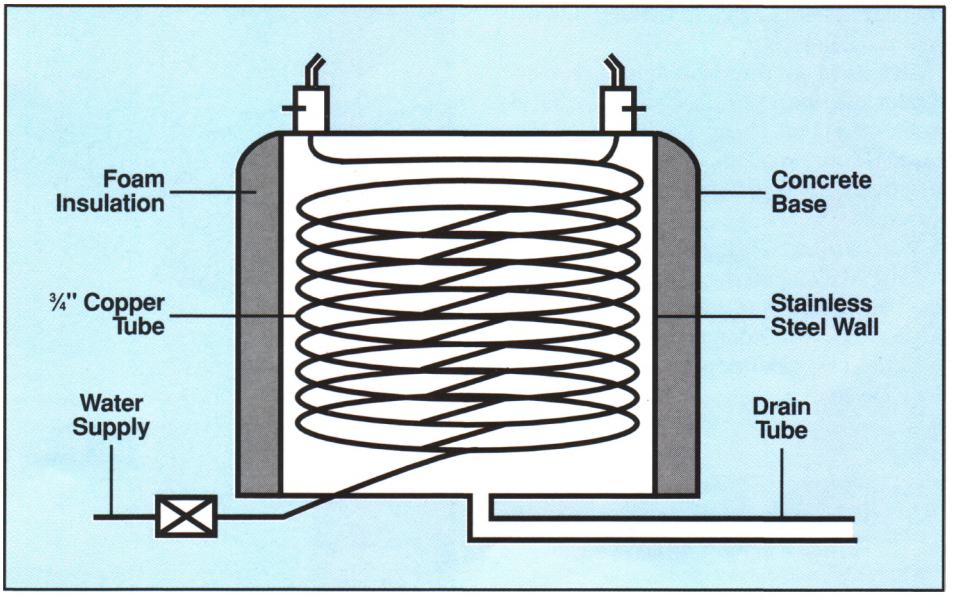
As for cost of installation, a total of about $3,000 per drainage system was spent. This figure includes backhoe rental, geotextile fabric, gravel, sand, perforated sump pipe, and pump.

So, to correct those previously "impossible" drainage problems, try putting this power drainage solution into service. Efficient removal of excess surface water equates to increased potential revenues and better quality turf as the course can be opened for play much sooner following excessive rainfall activity. Furthermore, a reduction in pesticides can also be realized, as overall healthier turf conditions can be produced and maintained on a consistent basis.

Cool, Clear Water (Without Electricity)

by JAMES F. MOORE
Director, Mid-Continent Region, USGA Green Section

THE GREENS are perfect, the fairways immaculate, and the tees pool-table level, but the players are still ready to tar and feather the superintendent. Why? Because there is no cold water on the course! Ask any superintendents and they will quickly confirm that among the most vehement complaints they field during the summer concern the availability and quality of the drinking water on the course (followed closely by the availability of toilet paper). While cold, clear water is usually not much of a problem on those courses fortunate to have 115-volt wiring throughout the property (usually installed at the same time the irrigation system was last replaced), most golfers must rely on the superintendent to



A permanent, clean, and nearly tamper-proof source of cold water — without electricity.

A continuous coil of 1" copper tubing brings water from the supply to the fountains.

As the water travels through the copper coil, it is rapidly cooled by the ice.

provide water jugs and fresh water on a daily basis — and it had better be cold!

Water jugs are a poor solution. Problems can include paper cups blowing into the next county, the strained back of the unfortunate employee who has to lift the filled jug onto the stand, and the weathering of the plastic jugs as they are subjected to the summer heat and sun. And let's not forget the need to check the jugs at least twice on a hot day when the water consumption is up. The most unpalatable problem of all is the unavoidable suspicion shared by all that someone earlier in the day might have done something really gross. This leads to the irresistible urge to remove the lid and check the contents. This is closely followed by the inevitable decision to scoop out a little ice. This could be the reason the water takes on the taste of sweat, grass, and leather golf grips by mid-afternoon.

For many years at Northwood Country Club in Dallas, Texas, they have employed a solution to all of these problems. According to Mark Price, CGCS, superintendent of Northwood, their "fix" is almost maintenance free, ensures clean, uncontaminated water, and requires no electricity. The concept is remarkably simple. Potable water is run through a copper coil surrounded by ice. By the time the water passes through the coil and exits the fountain, it is ice cold.

Northwood uses two variations of this idea. The first is to construct a hollow base that has numerous fountains on the top. The inside is lined with insulating foam that is held in place by stainless steel sheeting. The copper coil is then mounted in a way that allows ice to completely surround the tubing. The opening to the cavity is covered with a metal lid that is easily removed to load the ice. Water from the fountain draws back into the cavity and, along with the water from the melting ice, is removed via a drain tube in the bottom of the structure. Each morning the cavity is filled with ice, which keeps the water cool all day.

A second option is to construct the structure to hold the ice and coil below ground. This makes it easier on the crew since ice does not have to be lifted above the waist to fill the cooling cavity. Obviously, there could be many variations to this simple idea to fit the individual needs of your course.

One thing is certain; your golfers will be much happier on the next hot day of summer.

TURF TWISTERS

FEED THE TURF

Question: I occasionally hear the term *spoon feeding*. What does this refer to? (Indiana)

Answer: *Spoon feeding* refers to applying fertilizers at light rates and more frequent intervals. Normally, it is a strategy used primarily in putting green maintenance. It often involves the use of a complete (N, P, and K) analysis soluble fertilizer. Application rates often are in the range of 1/10th pound of nitrogen per thousand square feet, every seven to ten days. Obviously, this can vary slightly to fit the specific needs of a maintenance program. The idea behind *spoon feeding* is not to push additional growth, but to simply maintain the plants' immediate needs.

AT THE RIGHT RATE, BUT

Question: I hope I never need this information, but what's the rate for activated charcoal applications? (Maryland)

Answer: We recommend a light rate of 5 lbs. of actual material per 1,000 sq. ft. (225 lbs. per acre). Rates could be even higher. We have heard recommended rates as high as 300-600 lbs. actual material per acre. Obviously, the amount of charcoal needed is dependent upon the amount of material you are trying to deactivate. The activation sites are limited so higher rates provide more rapid deactivation of the target material (e.g., a preemerge herbicide). Regardless of the rate, any amount of activated charcoal is very messy and difficult to apply. If activated charcoal applications are warranted, they should be carefully targeted only to the area requiring treatment.

ALWAYS CALIBRATE!

Question: How often should we calibrate our sprayer? (Virginia)

Answer: Each time you plan to spray an area of the course, the sprayer should be calibrated for accuracy. This provides the opportunity to check your sprayer for plugged or defective nozzles prior to treating the turf. New technology is on the horizon. Basically, it involves having a computer mounted on the spray rig that calculates spray volumes and square footage treated. With today's heightened awareness about chemical application, the golf course turf manager has even more responsibility to accurately apply the products necessary for turfgrass management. Do not assume that you can calibrate a sprayer in the spring and it will stay calibrated for the entire season.