

Why Aerify?

It's a perfect, sunny morning and you've just reached the first green in regulation. You feel great and you know you're within birdie range. Then, you see them, those little holes in the green. Arrrgh! They've just aerified the course, and it's going to ruin your round, right?

Well, maybe not. Consider the fact that PGA Tour legend Tom Watson shot a sizzling record 58 at his then-home course, Kansas City Country Club, just days after the greens had been aerified.

Consider also that aerification is merely a short-term disruption that has long-term benefits for the course. When you see them, remember that without those little holes, the greens would eventually die.

Like so many things, the quality of a good putting green is more than skin deep. In fact, the condition of a green has a lot to do with what goes on below the surface. In order to keep grass growing at 3/16-inch you have to have deep, healthy roots. Good roots demand oxygen. In good soil, they get the oxygen from tiny pockets of air trapped between soil and sand particles.

Over time, the traffic from golfers' feet (as well as heavy mowing equipment) tends to compact the soil under the putting green - particularly when the soil contains a lot of clay. When soil becomes compacted, the air pockets on which the roots depend are crushed, and the roots are essentially left gasping for air. Without oxygen, the grass plants will wither and die.

Aerification is a mechanical process that creates more air space in the soil and promotes deeper rooting, thus helping the grass plants stay healthy. In most cases, it's done by removing 1/2-inch cores (those plugs you sometimes see near a green or in fairways). The spaces are then filled with sand "topdressing" that helps the soil retain air space and makes it easier for roots to grow downward.

Other aerification techniques use machines with "tines" or knives that simply poke holes through the soil profile. A newer technique even uses ultra high-pressure water that's injected through the soil profile to create small holes that relieve some compaction but heal quickly.

The bottom line is that aerification is a necessary practice. But before you curse the superintendent for ruining your day, just think of Tom Watson.

The Truth & Consequences of Green Speed

Years ago, there was a man named Edward Stimpson who loved golf and craved to create more fairness in the game. To further his passion, he invented a device intended to ensure that all the greens on a course were of relatively equal speed. The idea was to give superintendents (then greenkeepers) a way to compare the speed of the 4th green with the 13th and take steps to equalize them. This was, no doubt, a sound and noble idea.

But sometimes bad things happen to good ideas.

Today, his simple tool, the Stimpmeter, is often misused to compare the speed of greens from course to course and unfortunately, to establish a benchmark of putting difficulty. Golfers are sometimes heard to say, "Hey, Hickory Hills was 'stimping' 13 last week." This essentially means that the greens were as fast as the linoleum on most kitchen floors.

From a purely competitive standpoint, that's OK. However, this quest for fast greens has serious consequences in terms of cost, environmental quality and the long-term health of the green. In short, speed can kill. Here's why:

A healthy, vigorous green can be maintained at a very short cutting height (as low as 1/8-inch) for short periods of time without serious consequences if it's been prepared properly and weather conditions are acceptable. Courses hosting tournaments often take months (and spend significant extra money) to bring greens up to an ultrafast speed for PGA Tour players. For example, the greens at Augusta National or Oakmont may "stimp" up to 14 when properly prepared and dry.

However, fast greens are extremely fragile. If you compared them with human beings, it would be fair to say that their immune systems can be very weak. They become susceptible to diseases and pests, and therefore may require more chemical treatments. Weather can also quickly destroy the health of an ultrafast green. High temperatures and lack of moisture in the air are deadly to greens that are maintained at very short cutting heights for any length of time.

The risks of maintaining fast greens -- even with the best professional management by superintendents -- were apparent in the summer of 1995 when golf courses across the eastern United States lost greens during an extended period of drought and high temperatures. Many of the world's best-known courses suffered serious damage and were essentially unplayable for

the last half of the year. Many of these had to be reseeded or completely rebuilt at a cost that was high in terms of budget, playability and reputation. The solution to the dilemma of fast greens is twofold. First, the golf industry is sponsoring and promoting research and development of new grasses that are more tolerant of fast speeds under adverse conditions. Organizations such as the USGA and GCSAA are investing millions of dollars in this effort.

On the other side, golfers should understand and accept the limitations of these living systems we call greens. Golfers should also heed the advice of superintendents who manage, nurture and protect these ecosystems. And finally, many golfers must change their attitudes about the competitive aspect of green speeds. They should, in the footsteps of Mr. Stimpson, strive for fairness, not fastness. The bottom line is that aerification is a necessary practice. But before you curse the superintendent for ruining your day, just think of Tom Watson.



The Facts About Golf Course Pesticides

Well-managed golf courses provide substantial ecological and community benefits.

Science is on our side:

1. Independent university research supports the fact that well-managed golf courses do not pose significant risks to environmental quality, wildlife or human health.
2. The modern pesticides and fertilizers used to maintain healthy golf course turf have been thoroughly tested and are considered safe when used according to label directions.
3. A pesticide product today has typically undergone more than 120 studies at a cost of \$50 million before it is registered by the Environmental Protection Agency.
4. Today's golf course superintendents are educated professionals who care about environmental quality.
5. Most of today's superintendents have college degrees and substantial continuing education.
6. Superintendents are the nation's leading practitioners of integrated pest management, a philosophy that reduces the potential environmental risks of pesticide usage.
7. Virtually all golf courses employ at least one state licensed pesticide applicator who is trained in environmentally sound pesticide use.

Are golfers at risk?

- No. There is no scientific evidence that golfers face any chronic health risks from the pesticides used to maintain courses.

Once a liquid pesticide product is applied and the turf is dry or the product has been watered in, there is very little chance of exposure to golfers or others who enter the area. Golfers with possible chemical allergies are always encouraged to contact superintendents to find out what products might be in use.

The entire golf community is committed to being a model environmental industry for the 21st Century. The United States Golf Association is pouring millions of dollars into independent research to study issues such as water quality and wildlife habitat.

GCSAA has made environmental education a major focus of all of its education and information programs.

The nation's golf course architects now design courses that reduce the need for pesticides, water and costly maintenance practices while preserving habitat and environmental quality.

The Allied Associations in Golf have developed a set of Environmental Principles that offer guidance for responsible development, design, maintenance and facility operation for the future.

We are working to correct misconceptions about golf.

Much of the environmental criticism of golf courses seems to be linked to local opposition to community growth. Local "anti-growth" sentiment has often led to unscientific claims about pesticide usage and other highly charged issues such as wetlands and wildlife habitat.

These isolated development disputes have led to public misperception.

Golf Course Pesticides FAQs

Why do golf courses use pesticides?

Pesticides help limit the damage that can be caused by insects, weeds and plant diseases. Insecticides, herbicides and fungicides are used very selectively to protect the health of turf, trees and other living things on the course. Fertilizers provide much-needed nutrition for the course's plant life.

It is very important to note that pesticides and fertilizers are not used primarily for aesthetic reasons. First and foremost, they are tools that help ensure a healthy playing surface for the game. Furthermore, they help protect a valuable and ecologically important piece of land.

Golf courses are tremendous economic assets, as well as vital greenspaces for communities. They employ hundreds of thousands of people, enhance local economies through tax revenues and tourism, and provide many ecological benefits. For example, golf courses help filter air pollutants and create fresh oxygen; they are excellent groundwater recharge sites; and most important, they are critical wildlife sanctuaries in urban and suburban areas.

How does a superintendent decide when to apply a pesticide?

Pest problems on golf courses are often relatively predictable or can be diagnosed as part of an ongoing monitoring program. Once the problem has

been identified, the superintendent considers the available options. These could include cultural practices (such as physically removing weeds, changing irrigation patterns or clearing underbrush around a problem area to allow more air movement) or the use of biological controls or chemical products.

Once the problem is diagnosed and the right treatment has been selected, the superintendent waits for the ideal time to treat the problem in the most effective and environmentally sound manner available. This approach is often called "integrated pest management."

What kinds of products are used?

Most people are surprised to find out that the majority of the pesticide products used by superintendents are identical or closely related to those used by homeowners.

How do we know these products aren't harmful to humans or wildlife?

Pesticide production is one of the most highly regulated industries in the United States. Before a product is registered by the EPA, it must be rigorously tested for potential human health and environmental effects. This process can take up to 10 years and involve more than 120 different tests and studies. Today, manufacturers often invest up to \$50 million in product safety and testing before a new pesticide ever comes to the market.

Are golfers at risk?

No. There is no scientific evidence that golfers face any chronic health risks from the pesticides used to maintain courses. Once a liquid product is applied and the turfgrass is dry or the product has been watered in, there is very little chance of exposure to golfers or others who enter the area. It is worth noting that a small percentage of people may be allergic to a particular product, just as some people are allergic to household cleaners, soaps or perfumes. Golfers with possible chemical allergies are always encouraged to contact superintendents to find out what products might be in use.

If the products aren't dangerous, why do professional applicators wear protective gear?

Applicators work directly with pesticides and are exposed much more often than golfers. Consider the fact that it is safe for a person to have an occasional X-ray, but the technician may actually leave the room to prevent repeated exposure. Pesticide label directions (which carry the weight of law) require that applicators take certain precautions based on the assumption that the same person will be repeatedly exposed to the same product over many years. These precautions may include the use of rubber gloves, goggles, respirators or protective clothing.

Some media stories suggest that pesticides are linked to cancer. What are the facts?

Most of the product testing required by EPA focuses on this question. Before a product is registered, tests are done (usually on laboratory rats) using exposure rates that are considerably higher than any exposure a golfer could ever receive. Although a recent study commissioned by GCSAA to examine cause of death among its members found some higher rates of certain cancers, researchers said no cause-and-effect relationship could be established from the data. They also said lifestyle choices such as smoking, dieting and stress were the most significant factors in the results.

Do properly applied chemicals pose a threat to groundwater, lakes or streams?

No. Studies consistently show that a well-managed golf course can actually improve water quality on and around the facility. Research also shows that when pesticides and fertilizers are used properly, they do not tend to seep into groundwater or run off in surface water. Modern products and practices allow superintendents to manage turfgrass so efficiently that there is little chance of harm to our precious water resources.

What kinds of training and education do superintendents and golf course applicators have?

Golfers are often surprised to find that most superintendents have college degrees in agronomy, horticulture or a related field. Because it's important to keep up-to-date with new information and technologies, the majority also attend continuing education programs offered by universities and associations like GCSAA.

Superintendents are widely considered to be among the best-educated and most judicious users of pesticide products. The vast majority of superintendents are using integrated pest management practices to ensure that both the turf and the environment stay healthy. Applicators are also trained and licensed by their states.

A recent study indicated that nearly 100 percent of GCSAA-member courses had at least one licensed applicator on staff (despite the fact that it isn't necessarily required in some states). This confirms a high degree of compliance and concern about safe and proper usage of chemical tools.

Information provided by the Golf Course Superintendent's Association of America

www.GCSAA.com for more info



Course Best Practices

Help us provide you with a better, more enjoyable round of golf by using these tips during your round.

Repairing Ball Marks

Ball marks, those indentations caused when a ball lands sharply on a soft green, have been ruining good putts since the days of Old Tom Morris. Unrepaired ball marks take two to three weeks to properly heal, leaving behind unsightly, uneven putting surfaces. On the other hand, a repaired ball mark only takes half that time to heal.

The Proper Way to Repair a Ball Mark



- 1** Use a prolonged ball mark repair tool (preferably), knife, key or tee.
- 2** Insert at the edges of the mark—not the middle of the depression.
- 3** Bring the edges together with a gentle twisting motion, but don't lift the center. Try not to tear the grass.
- 4** Smooth the surface with a club or foot. You're done when it's a surface that you would putt over.



Source: Golf Course Superintendents Association of America

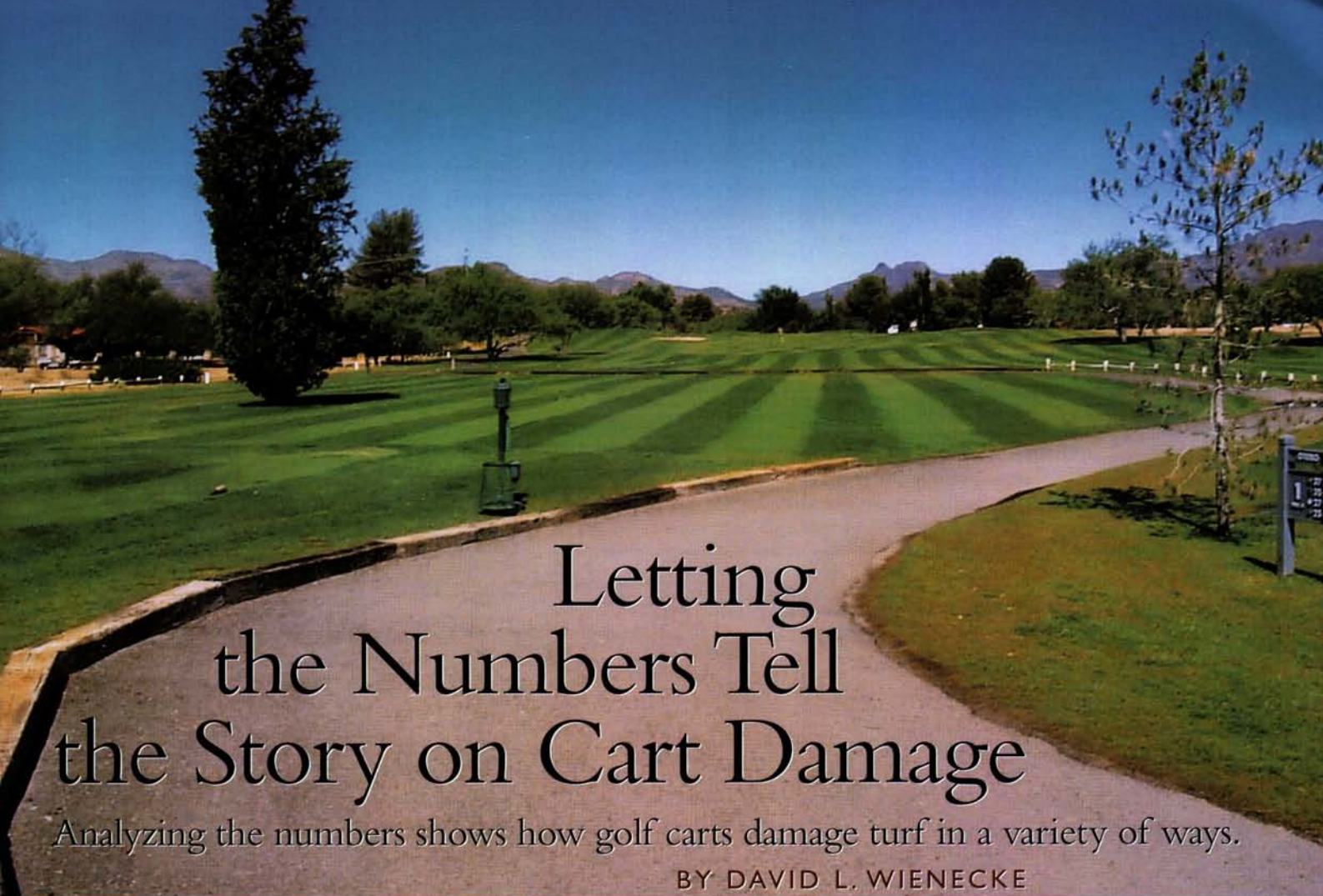
Golf Cart Traffic

"We Have Met the Enemy and They Are Us" from the USGA website

Some of the most intelligent people in the world play golf, yet when these same people drive golf carts, intelligence often is conspicuous by its absence. Simply put: golfers sometimes commit incredibly foolish acts of thoughtlessness when they are behind the wheel of a golf cart. Generally they are concentrating on their game, trying to locate their golf ball, or talking to other golfers when operating golf carts. Little thought is given to how their carts should be operated. Since it is not like driving an automobile, where the threat of personal danger tends to keep one's thoughts more focused on driving, many golfers don't think much about obeying golf course traffic rules.



If the course is wet, or damp take note not to drive through it as this damages the turf greatly. Also, if you witness "wear patterns" please drive in a different direction as not to compound the problem. Turf grass is even more delicate in the Winter months and takes longer to recover. Staying away from green and tee slopes will help the turf to be less compacted thus giving you a better chip or short shot.



Letting the Numbers Tell the Story on Cart Damage

Analyzing the numbers shows how golf carts damage turf in a variety of ways.

BY DAVID L. WIENECKE

Play golf and ride in a golf cart. It is almost a given these days. But the traffic jam caused by golf carts is getting out of control and is taking an increasing toll on turf. Now golfers are asking, “Why can’t I drive my own golf cart on the golf course? It seems to me that one golf cart per person will cause less damage compared to two golfers per cart.”

While it is easy to count the money generated by golf cart rentals, it is not so easy to account for the damage and additional maintenance required to compensate for unrestricted cart use. There have been several good research studies in recent years documenting the impact of golf carts on turf wear, and this article will examine these effects by letting the numbers tell the story.

CART DAMAGE DEFINED

Several studies have analyzed the turf damage caused by golf carts and other turf vehicles. The impacts can be broken down into two broad categories:

- Turf injury — The wear damage caused by vehicles is influenced by the speed of travel and

the amount of stopping, starting, and turning. The tread design of tires also affects wear damage. Wear symptoms include leaf tissue matting and a subsequent exposure of underlying thatch. With additional traffic, leaf blades are bruised. Ruptured cells eventually give turf a dark, water-soaked appearance. Wilt sets in as water is lost from the leaves, eventually causing a loss of chlorophyll and cell death.

- Soil compaction — The soil compaction caused by carts reduces the shoot growth rate and the recuperative potential of turfgrass. Compaction reduces air and water porosity within the soil as well as water movement through the soil profile. Soil compaction can impact turf growth for several weeks or months, resulting in the total loss of turf cover and chronic problems with poor drainage and the invasion of weeds that prefer compacted soil conditions.

There are other variables, such as soil type and moisture levels, that further impact wear stress. Research by Carrow and Johnson noted that turfgrass growing on sandy soils and some clay soils is more prone to wear injury. Soil compaction is

A well-designed cart path that is easy for golfers to follow with routing and curbs for traffic deflection will reduce turf damage significantly.

greatest when traffic is imposed over excessively wet soils. Any factor reducing turf growth rate, such as soil compaction, high external salt levels, and frozen soils causes a further increase in wear damage compared to a vigorously growing turf.

COMPACTION

All forms of traffic cause some degree of compaction. This is typically an indirect problem

Figure 1
18-Hole Traffic Impact Area*

Calculations of areas impacted by walking, pull carts, and riding carts show the significant area of turf potentially damaged by carts when compared to walking golfers. One golfer per cart impacts approximately the same area as two golfers per cart. Two carts with one golfer in each cart potentially will impact twice the area compared to two golfers in one cart.

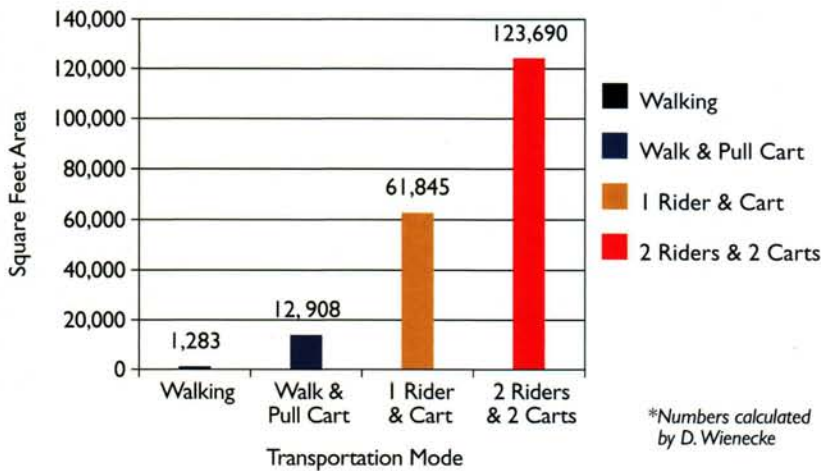
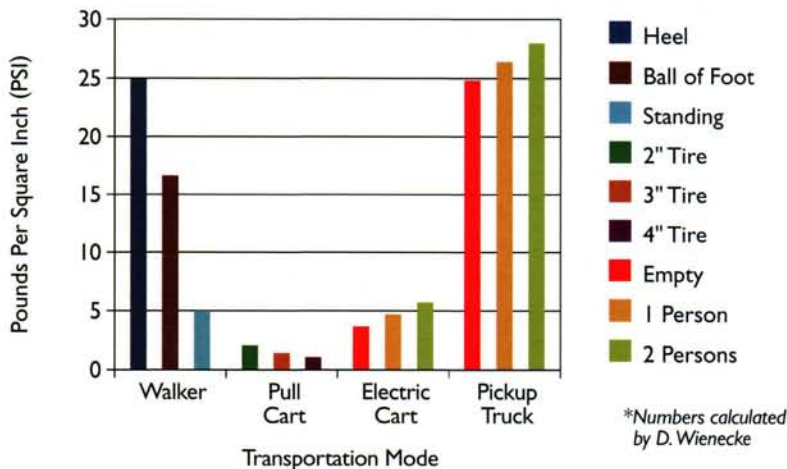


Figure 2
Compression Pressure (PSI)*

Calculations of actual compression pressure show pressure on the heel of the foot while walking is equal to pressure from a four-wheel pickup with one rider. Turf area impacted must also be considered with compression pressure to get a true picture of the cause of vehicle turf damage.



commonly resulting in a reduction in turf vigor. The forces that contribute to compaction include the weight of the golfer or golf cart spread over the turf surface. The following example illustrates the amount of pressure exerted on the turf from various sources:

- 200-pound golfer heel of foot (walking) = 25 pounds per square inch (psi)
- 200-pound golfer ball of foot (walking) = 16.6 psi
- 200-pound golfer full foot (standing) = 10 psi
- 200-pound golfer both feet (standing) = 5 psi
- Pull cart (17 pounds) 2"-wide tires = 2.1 psi (two tires)
- Pull cart (17 pounds) 3"-wide tires = 1.4 psi (two tires)
- Pull cart (17 pounds) 4"-wide tires = 1.1 psi (two tires)
- Electric golf cart (empty, 950 pounds) with four 8"-wide tires = 3.7 psi
- Electric golf cart with one person and gear (1,200 pounds) = 4.7 psi
- Electric golf cart with two people and gear (1,450 pounds) = 5.7 psi
- Maintenance pickup truck (3,000 pounds) = 25 psi (four tires)

Based on compression pressure, we would expect to see walking golfers causing the most damage. In fact, the majority of wear damage observed in the field is caused by four-wheeled motorized golf carts. Why is this true? Read on!

AREA IMPACTED — WHERE THE RUBBER MEETS THE ROAD

The damage caused by various modes of transportation can be estimated by measuring the contact area of shoes or tires and multiplying this over the total area covered during a round of golf. The following example illustrates the average area impacted while playing a 6,200-yard golf course:

- Walking golfer with golf bag = 1,283 sq. ft.
- Walking golfer using a pull cart with 3"-wide wheels = 12,908 sq. ft.
- Golfer riding a golf cart = 61,845 sq. ft.
- Two golfers each using a golf cart = 123,690 sq. ft.

Looking at the numbers, it is easy to understand why four-wheel golf carts impact (and compact) the golf course so dramatically.

LESSONS LEARNED

The preceding examples paint a clearer picture of why golf carts cause significant damage to golf

courses. By analyzing the numbers, we can learn the following lessons:

- All vehicles cause turf damage. This includes motorized golf carts, pull carts, and maintenance vehicles. Some of the damage may not be visible for days or even weeks as a result of the effects of soil compaction.
- Walking the golf course and carrying your clubs impacts the golf course far less than pull or motorized carts based on the total amount of area impacted.
- Pull carts impact the golf course less than motorized carts, but all carts impact the golf course more than walking. This is due to the smaller area contacted by foot traffic and the wheels of the pull cart.
- Vehicle traffic has the greatest impact on wear and soil compaction due to the amount of area covered and the increased damage caused by repeated traffic over a concentrated area. Damage is further increased with a greater number of turns, a higher speed of travel, and the number of traffic passes over a given area. Based on the research results, the main focus for minimizing the damage caused by golf carts should be on spreading traffic over a wider area or restricting golf carts to paths.
- There is some evidence to suggest that the newer designs of golf carts can reduce the overall

impact on turf injury due to wider tires and smoother tread design.

IDEAS FOR SPREADING CART WEAR AND REDUCING TURF DAMAGE FROM VEHICLES

To reduce the inevitable damage caused by golf carts, it is important for courses to establish policies for cart use. While each course is different, the following suggestions can help with the development of practical policies to reduce the damaging effects of golf carts:

- Encourage golfers to spread cart traffic over a wider area and avoid turning and driving over the same areas repeatedly.
- Vary the entry and exit points along the cart paths each day to spread traffic and wear more evenly.
- All vehicles should be kept at least 30 feet from the edges of tees and greens to avoid damaging sensitive turf areas.
- Carts should never be taken across excessively wet areas.
- The use of carts should be suspended or restricted following periods of heavy rainfall or under persistently wet conditions.
- Golfers should always share a cart.
- Encourage golfers to use the 90-Degree Rule by exiting the path and driving to the first ball,



Wet turf is more susceptible to cart damage. Excluding vehicles from excessively wet areas using signs and barriers will protect the turf until the moisture is reduced via drainage or drying.



Signs coupled with marshal enforcement and golfer education work well for keeping carts on paths. Install signs frequently throughout the course to remind golfers when they need to stay on paths.

then to the next ball, and then returning to the path.

- Restrict carts to the path on all par-3 holes.
- Propose a “walkers-only day” one time per week when no golf carts are allowed on the course.
- Consider closing one additional hole to cart traffic on each nine on a weekly rotation. This allows the turf to recover from damage and gives the maintenance staff time for extra aeration and other procedures to stimulate turf recovery.

Most of the damage caused by golf carts can be minimized when drivers use common sense and observe proper course etiquette. Each person driving a cart must be aware of the damage that vehicles cause and take steps to reduce that damage in order to preserve the condition of the course for all golfers.

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DAVE WIENECKE is an agronomist in the Southwest Region of the USGA Green Section, where he shares practical advice on reducing traffic damage and other turf management issues at courses in Arizona, California, and Nevada.