



No 16 fairway at Seawane under salt water.

"We did have damage the previous year from tropical storm Irene, which I believe was worse on the turf because of the time of the year but I did not lose any equipment then," says Stanya.

Seawane floods on a regular basis as the high-tide full-moon phase compromises the course's bulkheads. "The water in our canals and bay is more brackish than the pure Atlantic current water, so when we flood it isn't as severe," Brian Benedict says. "When we took Irene in 2011 it was about a 35-acre flood but we didn't lose power, so we were able to dilute the salt water with our irrigation water right away. When Sandy hit we lost power for eight days and were unable to dilute the salt toxicity, which has created the issues we face now."

Seawane's salt base saturation levels were substantial, to say the least. Normal acceptable levels should be three percent and lower, Brian Benedict says, and "we are testing out at 16 to 24 percent, depending on where you test." He worries about long-term issues. "I am really worried about when the weather changes and we get hot. How is the grass going to react when the soil temps get to 70-plus degrees and up? Is it going to bake out? Our gypsum applications continue and we are seeding greens on a bi-weekly basis trying to get 007 and Seaside II Bentgrass to establish in them."

Recovery has been assisted by influxes of insurance money, Tim Benedict says. "Only recently has the money started flowing, which has definitely delayed our recovery process," he says. "The clubhouse was the first facility to be restored. We must be able to do business and host parties. The rest of the buildings are still coming along. We are still re-wiring buildings and fixing walls. It is a long road. I have a new assistant and that should help things improve a bit.

"On top of everything else, my home was also hit with the flood waters. My family was displaced for five weeks while we got repairs organized," he adds. "Everything is back to normal now but that was a true life test."

One that Long Island golf course superintendents, managers and owners, and members hope they never have to face again. **GCI**

*John Torsiello is a Torrington, Conn.-based writer and frequent GCI contributor.*

by Richard Skelly

## DOWN, BUT NOT OUT

After a throttling by Superstorm Sandy, Garden State golf courses recoup and regroup.

**S**uper Storm Sandy, which struck New Jersey Oct 28-29, delivered an unprecedented \$39 billion in damage to shore-area residences, businesses, beaches and boardwalks, but its effects were also widely felt a good ways inland from Monmouth, Ocean and Atlantic counties, and as far north as parts of Long Island and Connecticut.

Hundreds of golf courses throughout The Garden State suffered severe damage in this late-season hurricane. Most club managers and superintendents prepared for a rain event and instead got some of the most extreme winds the New York metro area has seen in 50 years, winds that carried over with just as much intensity to the rest of the storm-hit areas.

April 29 marked six months out from Super Storm Sandy, a two-day and night event that effectively shut down New York City's transit system, the New Jersey Turnpike and the Garden State Parkway, two major highways.

As well prepared as most superintendents around the state were, Lance Rogers, superintendent of greens at Colonia Country Club in Woodbridge, N.J., and president of the New Jersey Golf Course Superintendents' Association, says, "The storm was substantial, and up until yesterday, I was still cleaning up debris in the woods at Colonia."

"I thought we suffered pretty bad damage, but in reality, we lost far fewer trees than most other courses in New Jersey," Rogers remembers.

Colonia Country Club lost 28 big trees larger than 36 inches in circumference, and since they were fallen trees, not leaning into others, Rogers and his crew handled all of the work themselves.

"The storm ended late Monday night, but we couldn't get in to work on Tuesday, so we started Wednesday morning. Even with



10-hour days, it took a solid week to get the trees that had fallen into play cut up and then it took another two weeks to clean up the debris and then three weeks to chip all the stuff.”

Rogers says the average number he heard from other supers in most of the state “was more like 160 trees down for each golf course.”

The eye of Superstorm Sandy came in over Brigantine, home for many years to the Links at Brigantine, a place where PGA pros used to go in the 1930's and 40's to practice for the British Open. Known for its near-constant breezes, Brigantine is also home to a massive migratory bird sanctuary and preserve.

Nathan Robbins, general manager at the Links at Brigantine, said the 18-hole golf course suffered more from water damage than from wind.

“The eye of the storm literally crossed 17th Street in Brigantine, so in some ways it was a blessing,” Robbins says.

“If you look at damage to places twenty miles north of us, they really had sustained winds. Our damage was limited to flooding,



A view of the sky from the 11th tee at TCP Jasna Polana following Superstorm Sandy.

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Right: Damage to the 7th green at TPC Jasna Polana following the destruction of Superstorm Sandy. Far right: Debris cleanup at TPC Jasna Polana.

and we were fortunate not to have any water in our clubhouse or cart barn. But there were areas of the course under three and four feet of water, and that forced us to close for three weeks after the storm.”

Links at Brigantine was back up and running by Thanksgiving.

The Links at Brigantine’s 9th and 18th greens were the only ones underwater for any length of time, “but we had an 18-foot powerboat that was in the left rough of our second hole for a time, and the walking bridge on the third hole ended up in the left rough of the second hole.” Robbins says the walking bridge must weigh at least a ton, and the force of the incoming water moved it more than 100 yards.

“We didn’t have any fast moving current so it was more a matter of making sure we did everything we could to make sure the effects of salt water were limited,” Robbins says. Absecon Bay is about 50 yards from the 1st tee at the Links, and the 15th hole sports a peninsula green, which also got submerged, but for much less time than the 9th and 18th greens.

The Links at Brigantine re-opened to those who enjoy winter golf Thanksgiving week.

“One of the biggest challenges has been combating the perception that this whole area was closed down and damaged beyond repair. There was no damage to Atlantic City casinos and no damage to the boardwalk there. Other area golf courses might have had a tree or two come down, but for the most part, they were back open within a week,” Robbins says.

Matthew Morrow, the superintendent at Manasquan River Golf Club in Brielle, a private club nestled along the river of the same name and less than two miles from the ocean, says he, the GM and members at the course used Super Storm Sandy as a learning experience and found out ways to improve on infrastructure and drainage on the property.

“Hopefully this is a once-in-a-lifetime event. The good part about the whole experience was we learned a lot about the golf course and how we can improve drainage and create a better tree management program,” Morrow says, adding Manasquan River lost about 100 trees.

“We had a 25-foot and a 38-foot boat that both ended up on the golf course,” Morrow says. Needless to say, both boat owners im-

mediately came forward on Tuesday, Oct. 30th to make arrangements with their insurance companies to have their vessels removed from the 12th and 17th holes.

Morrow said he and his crew did as much as they could in-house but left big or overly dangerous jobs to a tree company in Pennsylvania that he’d worked with in the past.

“Losing power was pretty a much a foregone conclusion in my mind and knowing the golf course is so close to river and we were going to flood, we got all our pumps ready and our equipment fueled up and generators were all primed and ready to go,” he says. Manasquan River leads to the Manasquan Inlet which leads out to the ocean, visible on clear days from the course’s 7th, 10th and 11th holes.

One thing Morrow and other seaside superintendents may not have considered was the effects of salt-laden blown air and the damage that can do to trees and grasses.

“Salt blown air actually damaged trees several miles inland, including some of ours,” he said, “we were prepared for flooding and wind damage, but then to have a secondary issue with trees that were saturated with salt air and subsequently falling down, the needles

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“Even with ten hour days, it took a solid week to get the trees that had fallen into play cut up and then it took another two weeks to clean up the debris and then three weeks to chip all the stuff.”

– Lance Rogers, *Colonia Country Club in Woodbridge, N.J.*

falling off of them and turning brown and off color, was a whole other problem.”

Manasquan River lost power on Monday, Oct. 29 and it wasn't restored until Friday, Nov. 9th. “We had the ability to pump gas even though we didn't have electricity and so we were able to remove an immense amount of debris that needed clean up and we worked on that until we got power back on,” Morrow says.

At the TPC Jasna Polana Golf Club in the estate section of Princeton Township, more than 100 trees fell on the property. Fortunately, very few of them fell on fairways or roughs directly on the 18-hole tract designed by Gary Player. Tim Connolly started at TPC Jasna Polana in the spring of 2012. In general at the Tournament Players Club network of courses, maintenance is a top priority, and budgets for maintenance are very different than many other private courses.

“We were relatively lucky,” Connolly says, “it was more a wind event and less a flooding event. We only had three inches of rain but we did have 144 trees down on the property.”

“Of those, however, only a small percentage were in a place that would affect play.”

“The club has a good insurance policy, and most of the work was performed by outside tree experts, especially more of the high-risk work, because I didn't want my staff involved in that,” he says.

Over the winter, he estimated he and his crew spent about 800 hours doing storm repair damage, and of that was large branches and fallen trees in high visibility areas off the fairways and roughs.

“I think we were lucky in another way; we do have woodlands on the property but the aesthetic of the property hasn't really changed that much, we didn't lose a single tee or a single putting green,” he said, noting that power was out for four days in Princeton Township. “The week the storm was approaching, we needle-tined the greens, as a corrective measure, so that if we did have a large rain event, we'd be prepared.”

The club itself was closed until Saturday, Connolly says, “but we moved greens on Saturday morning, and considering all the debris that was around, that was a huge accomplishment.”


A meeting of the superintendents association was slated for just two weeks after

Superstorm Sandy hit. The meeting took place at Hominy Hill Golf Course in Monmouth County in mid-November. “We had our annual meeting and the National Golf Course Superintendents' Association offered assistance to New Jersey supers who may have needed it,” Rogers says. “Aside from that, the New Jersey chapter of the association offered assistance to superintendents personally, if there was dire need, people made themselves available to help other superintendents.”

The mid-November annual meeting was lightly attended, no doubt a reflection of how overwhelmed many superintendents were in dealing with post-Sandy cleanup. “It was a small turnout that day in mid-November, because people had other concerns. We had an assistants meeting ten days later at Jasna Polana, and I don't know what the turnout was, but it was also very low,” Rogers says.

“Most courses have insurance against bad weather events, but my understanding is a lot of the insurance companies have been slow in responding,” he says. **GCI**

*Richard Skelly is a Spotswood, N.J.-based writer and frequent GCI contributor.*



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BY: TOM REED AND PATRICK MCCULLOUGH, GRADUATE ASSISTANT AND ASSISTANT PROFESSOR, UNIVERSITY OF GEORGIA

## A New Tool For *Poa Annua* Control in Turf

*Poa annua* (annual bluegrass) is a problematic winter annual weed that reduces turf aesthetics and functionality. Annual bluegrass has a bunch-type growth habit, light green color and abundant seedhead production. Additionally, *Poa annua* has poor stress tolerances and decline of populations in late spring reduces turf quality (Beard 1970; Lush 1989).

Postemergence herbicides are used in late winter or spring to control *Poa annua*, but populations resistant to specific chemistries may limit potential for successful control. Herbicide resistance in annual bluegrass populations may result from repeated use of the same herbicide or mode of action in consecutive years. Sulfonylureas inhibit acetolactate synthase (ALS), an enzyme in the biosynthesis of the branched-chain amino acids (LaRossa and Schloss 1984). Products like flazasulfuron (Katana), foramsulfuron (Revolver), and trifloxysulfuron

(Monument) are popular sulfonylureas used for postemergence annual bluegrass control in warm-season turfgrasses, but significant resistance issues have been reported in turf and other

crops (McElroy et al. 2013). Triazines inhibit photosynthesis by binding to D-1 proteins that transfer electrons from photosynthesis and form highly reactive free radicals (Devine et

al. 1993). Free radicals oxidize and destroy membranes and pigments, resulting in cell death in susceptible species. Extensive use of triazines has led to prevalent annual bluegrass resistance







in turfgrass in Georgia and other states. Glyphosate is a nonselective herbicide that inhibits 5-enolpyruvylshikimate-3-phosphate (EPSP) synthase that produces EPSP in the shikimic acid pathway (Amrhein 1980). Glyphosate is used for controlling annual bluegrass in dormant Bermudagrass, but overuse has also resulted in the spread of resistant populations throughout the southern U.S. Turfgrass managers should have an appreciation for the fundamentals of resistance management by utilizing herbicides with different modes of action in spray programs.

Flumioxazin is the active ingredient in SureGuard, a product labeled in 2011 for use in dormant bermudagrass. Flumioxazin has been extensively used in ornamentals and row crops including cotton and peanuts for annual weed control. Flumioxazin is a chlorophyll synthesis inhibitor similar to carfentrazone, oxadiazon, and sulfentrazone. In susceptible plants these herbicides inhibit the enzyme protoporphyrinogen oxidase (Protox). The inhibition of Protox leads to a toxic level accumulation of protoporphyrinogen IX that reacts with oxygen and light to form singlet oxygen resulting in rapid lipid peroxidation, membrane destruction, and eventual cell death. Protox inhibitors are not systemic herbicides, but are mainly used for annual weed control in turf.

Unlike other Protox inhibitors, flumioxazin provides post-emergence annual bluegrass control in dormant bermudagrass. In Georgia, flumioxazin applications are generally most effective in November and December, prior to annual bluegrass tillering. Applications at spring timings may also control *Poa annua* with residual control for summer annual weeds, including crabgrass and goosegrass (McCullough et al. 2012).

Currently, flumioxazin use is limited to dormant Bermudagrass since applications may cause injury to actively growing turf (Umeda 2012). Preliminary experiments at the University of Georgia show

Left: Flumioxazin (kept at 20 C) before and after 28 days of treatment. Above: Flumioxazin (kept at 10 C) before and after 28 days of treatment.

flumioxazin efficacy increases when temperatures are warmer in spring compared to winter timings. Flumioxazin also appears to be root absorbed and irrigation could maximize efficacy of applications. Our current research at the University of Georgia is evaluating the effectiveness of flumioxazin with adjuvants and tank-mixtures with other herbicides on mature annual bluegrass. We are also evaluating residual control of crabgrass and goosegrass following applications for postemergence annual bluegrass control and tolerance of five warm-season turfgrasses.

Overall, flumioxazin has potential as a new tool for annual blue-

# Real Science



'Tifway' Bermudagrass untreated (left) and flumioxazin applied 2/1/13 at 0.375 lb ai a<sup>-1</sup> or 0.42 kg ai ha<sup>-1</sup>, six weeks after treatment (3/14/13) (right) Shows *Poa* control on dormant Bermudagrass (green is annual bluegrass)

grass control in turf. Flumioxazin may provide a new mode of action for postemergence annual bluegrass control in turf, but end-users must understand that applications are limited to dormant Bermudagrass at this time and there are limitations on efficacy during winter months. For best results, read and follow label directions before use of any herbicide. **GCI**

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