



Good Night, Irene!

A stand of five green buttonwood trees in the right rough of the second hole on The Falls County Club immediately after the eye of Hurricane Irene passed just north of Lake Worth. A small sample of 130 trees lost at The Falls C.C. Photo by Steve Pearson.



The same stand of buttonwood trees one year before Hurricane Irene. Photo by Steve Pearson.

Storm Was Weak... But it Dumped 15 Inches of Water

BY W. CRAIG WEYANDT

The Yacht & Country Club of Stuart

I had no idea that Hurricane Irene would impact the Treasure Coast... or the east coast of Florida, for that matter. When I went to sleep on Friday night the last thing that I remember was that Irene was going up the west coast and possibly going to move just west of Lake Okeechobee.

That meant lots of rain for me but not much else. There was a lot of wind and rain but with Irene being only a category 1 hurricane, I thought that there was no real concern. As everybody said afterward, 'It came so fast that I didn't really

have time to prepare.' That was especially true for me.

I woke up on Saturday morning just after 3 and had to let the dog out. He has a way of sticking his big black cold nose in my face that gets me right out of bed. We went out in the front yard like we would any other morning but something was weird this time. I couldn't figure it out.

Then it hit me... there is no wind! When I went to bed, the wind had been howling and rain coming down in buckets. It couldn't be over that fast. The storm was huge. It must be. It couldn't be. I'm in the EYE!

I ran back inside and turned on the television. I was lucky. We never lost power. I turned on the TV and WOW! I couldn't believe what I saw. The leading edge of the eye had just passed over and

we were inside. Just like they always said, no wind and no rain.

Heck, I could even see the stars. I woke the wife to show her and was surprised to find that she was not quite as impressed as I was. I told her I was going into work. She said, "You're nuts!" I said what has to be one of the most stupid things I have ever said, "Honey the eye is the safest time to be out, I better go in now." She didn't buy it but I went into work anyway.

I got there by 3:30 a.m. only to see two huge ficus (3-foot diameter) blown over in the entrance. The guard shack was

barely lit and I could hear the generator running. The guard said he was glad to see me: we need fuel and there is no power! I had a hand pump but it was still in the box and I was not in the mood to read instructions. I remember that a fuel station had power just down the road and got some cans and filled everything up.

Not much I could do as I drove around for the first time. There was no way to get on the course. The rain gauge was filled to the top at 6 inches (got to remember to get a bigger gauge). It's probably 4:30 a.m. and still not a lick of wind, but I knew it wouldn't be too long before the wind started again.

What do you do at this point?

I drove around to see the damage and was amazed at all the water and trees blown over. After all, it had been raining since Thursday (the last time that I cut the greens).

A golf course maintenance employee had come in to work by 5:30 a.m. and the guard turned him away. Lucky for me he was persistent and came over to the fence by maintenance where I could see him. I immediately told the guards to let him in to help me clear some roads where trees had fallen and get pumps started to help with all the water.

By now it is light, the wind is starting to pick up and the general manager is in. Actually, the storm was so bad the night before that he couldn't go home. He grabbed the club's camera and gave me a call to come pick him up. The damage was beyond words. Over 65 tees down just on the golf course and I would say just as many in the property owners' yards.

The real story was water, water, water. We will never know the exact total of the rain but in three days I had already measured over 15 inches. (The three-month total for August, September and October was over 41 inches).

The streets have been cleared, drains checked and opened and power was coming back on in some areas. It was time to go home and get some rest.

Sunday came early and the water was still there. The most important thing for me was to get the greens mowed. I had

To: Mr. Kaplan, Board of Governors

From: W. Craig Weyandt, GCS

Date: October 18, 1999

Re: Hurricane Irene

The purpose of this memo is to bring understanding of the current condition of the golf course and some of the future challenges of the Grounds and Greens Department.

Drainage - In three days, the Yacht & Country Club received over 11 inches of rain. The exact amount cannot be determined because the gauge was overflowing when I arrived at work on Saturday morning. The three-day total adds up to 149,347,000 gallons of water that the CCA had to deal with. Even on the dry holes like No. 11, 16, and 17 there is standing water two days after the rain has stopped.

Some of the problems are getting access to the debris, mowing, and standing up trees that can be saved. The rain accompanied by cart and mower traffic increases the compaction of the soil and turf under these wet conditions. Some areas of the course where water will sit for days can develop scald. Scald is the condition that exists when a turfgrass plant collapses and turns brown under standing water, high temperature, and intense light.

Bunkers - This is the third hurricane (Floyd, Harvey, and Irene) to impact the Treasure Coast area this year. Rain and wind have to be the worst things for bunkers. During Floyd we did not receive that much rain but the wind was fierce and physically removed the sand from the bunkers. Harvey and Floyd hit us with both barrels (wind and rain).

Both wind and rain damage can be obvious. Wind by physically moving the sand but rain has more lasting damage. First the rain washes the sand off the face of the bunkers then in some cases the bunkers are covered with a layer of silt. This silt can change the physical characteristics of the sand (color and texture). In order for the bunkers to play consistently, each bunker will have to be evaluated and necessary action taken. What this adds up to is labor and lots of it.

Trees - No one can miss the amount of tree damage that has taken place with Irene. As a matter of fact this is the most damage the course has sustained in my eight years of employment with the CCA. Sunday morning was the first opportunity that I had to ride the entire golf course and take a count on fallen or damaged trees that would have to be removed. The number even surprised me at 63. This includes the front entrance where three large ficus trees are blown over. One ficus on the north end of the wall will be removed and the two at the front entrance will try to be saved.

Labor - I have come up with a new formula for Hurricanes and the damage they create.

(Hurricane x golf course = Labor). I should say labor to the second power because not only will I have to clean up all the damage created by the storm but I will have to keep up with the daily work as well. The maintenance staff is already behind because of the irrigation project done in-house over the summer.

Now is the time that we normally reserve for grooming the golf course and this clean-up process will delay things even more. We all know of the labor shortage problems and the need for a quality trained staff. Rest assured, nothing will be spared in cleaning up of the course and getting it groomed for the season.



Flooded low lying areas like this on the 7th hole of the Y&CC of Stuart make it impossible to get around the whole course to begin clean up and repairs. Photo by Craig Weyandt.

not mowed the greens since Thursday and things were getting a little too tall. I used three people to clear debris in front of the mower. One little stick left on the green and it would have a scar that could last over a month.

Second came clearing the cart paths. I knew as soon as the sun came out that everyone would want to see the carnage. The one thing you can't move fast enough is the water. People will drive around the puddles not thinking that the turf's wet too. So use ropes, signs, whatever means possible to let them know that things are still wet.

A great help in moving the water was a "mow" pump from Stuart's Pelican Pumps. If you do not have one, they are a must. It looks like a jacked-up flymower but this time the impeller moves water through a 2-inch hose. If you have some place to move the water to... the mow pump will move it. This did not prevent all the scalding of some of the turfgrass but it definitely helped reduce it.

Monday Oct. 18, and overseeding day for me. I had no choice but to go for it. I knew the course would be closed for another day or two and I had better take advantage of it because the last thing anyone will want to hear is that the course is closing again. It was great watering the

seed automatically. Normally syringing the seed takes two or three people and now the computer did it.

As a matter of fact, while the course was closed we did all we could to take advantage of it. We painted tee markers, signs, etc while there was no one around. The first days of the week were spent helping tree services clear the major debris while the last part of the week was spent in the bunkers.

Without even thinking about it we had a plan to deal with the cleanup. Clear the debris, mow what you can, bunkers were last, and thank God we had a blower. I don't know what we would have done without it. The blower took fairways that looked terrible and 2 hours later you would have never known that a hurricane had come through just days before.

The downed trees were not removed all at once. I met with a tree service and developed a plan of what had to be removed and what would be first. Some areas were not accessible because of standing water but always the priority remained of getting the golf course playable. There were so many small trees and palms down that we had to buy a banding tool and make dozens of tree stakes.

The tree company gave me each Monday after the storm to continue clean-up and it took four weeks to finish. This may sound like a long time but the priorities were kept and maybe seeing a down tree in the rough is not such a bad thing.

It is a great reminder to those who did not get to see or feel the storm. There are many things that I would do differently if this ever happens again but one thing I will do the same is communicate.

On Sunday night I sat down and typed out the current status of the golf course for the general manager and board of



The rough on the Y&CC of Stuart's 6th hole under three feet of water. Photo by Craig Weyandt.



This live oak between the 3rd and 4th hole on the Y&CC of Stuart was used for screening errant shots. What kind of price tag do you put on this loss? Photo by Craig Weyandt.

directors. This memo explained how much rain we had received, how many trees were down, and the basic plan of attack for dealing with the problem. So communication was good but next time I will take more pictures.

When it was all over, the course had been closed for nine days after the hurricane and there are a few less trees but the overseeding came up great, and overall we feel lucky that things were not worse.

Flooding Usually Worse Than Wind for Golf Courses

BY JAMES B BEARD, PH.D.

The hurricane season in the Atlantic Ocean has brought major flooding problems to eastern North America. The high winds associated with hurricanes typically result in the downing and uprooting of trees.

This may result in the need for extensive debris removal from turf areas where tree limbs and various materials torn from buildings and other constructed facilities are strewn.

This wood, metal, and similar debris should be removed as soon as possible in order to avoid interference with mowing operations and potential turf injury by light exclusion.

Soil Deposition

The dimension of hurricanes that can create the most injury to turfgrasses is the very intense rainfall and resultant flooding of turf areas. Recent intense rains on the east coast of the United States ranged from 10 inches (25 cm) to as high as 25 inches (63.5 cm) in less than one day.

The lateral water flow from slopes onto lower areas of the floodwaters results in the deposition of soil, including clay, silt, and salt. Salt deposited on the grass leaves should be washed off as soon as possible to prevent physiological desiccation and death of the turfgrass plants.

The deposition of clay and/or silt creates a fine-textured layer that is prone to compaction and can become relatively impermeable to downward soil water infiltration for years to come. Thus the removal of this soil deposition as soon as possible is very important, especially from high-sand root zones on putting

greens and tees. The thin layer of soil remaining after mechanical removal of thicker layers should be washed off to the extent possible using water that is pressurized and directed through large-volume hoses.

Submersion Injury

Flooding that persists for an extended period of time can cause the death of certain turfgrasses. Complete submersion under water can result in soil oxygen depletion within a matter of hours. This may result in death of the root hairs and subsequent yellowing of the turfgrass plants due to a nitrogen or iron deficiency.

Ultimately, death of the turfgrass plant may occur by one of several mechanisms, including (a) a build-up of certain toxic compounds, such as ferrous and sulfide ions formed by reduction of anaerobic soil conditions, (b) the accumulation of toxic organic compounds, such as methane or carbon dioxide produced by the decomposition of soil organic matter, and (c) the accumulation of toxic by-products within the plant tissue under anaerobic conditions.

The relative degree of injury to turf-

grass from submergence varies depending on the (a) turfgrass species, (b) submergence duration, (c) submergence depth, (d) water temperature, and (e) light intensity.

Submersion at high water temperatures of 86°F (30°C) can result in death of the fine leaf fescues (*Festuca spp*) in one day, whereas creeping bentgrasses (*Agrostis stolonifera*) may survive more than 60 days submergence at low water temperatures of 50°F (10°C).

Accordingly, it is important to use submersion-tolerant turfgrass species on sites that are subject to frequent flooding.

The extent of injury from submergence increases with increases in the depth of water coverage. Grasses with leaves extending above the water surface are able to survive much longer than if totally submerged. Also, grasses under stagnant or standing water are more likely to be killed than when under flowing water.

However, one of the most important factors in the degree of injury that occurs during flooding is the actual water temperature. The extent of death increases dramatically as the water temperature increases from 50°F (10°C) to 80°F (27°C).

Thus, submersion early in the year at cooler water temperatures is less likely to cause turfgrass injury than submersion later in the summer when water temperatures are high, and especially when also exposed to cloud-free, full-radiant sunlight levels.

Injury Assessment

Once the debris is collected and any soil deposition removed as completely as possible, the next step is to assess the extent of damage to the turfgrass, which may appear as a totally brown canopy. Individual plants of the desired turfgrass species from numerous locations under flooding should be lifted out and examined carefully.

Cut a horizontal cross section through the grass crowns and the nodes on lateral stems to determine if they are white, firm, and healthy, or brown, mushy, and dead. This will be an indicator of the

amount of turfgrass recovery that can be anticipated.

Numerous multiple samplings are critical to get a representative assessment. Then the decision must be made whether replanting of critical turf areas will be required to repair the damage. Removal of any dead turf plant material and thatch from the surface is important to avoid a future organic layer problem.

If soil deposition has occurred, fairly intense core cultivation will aid in disrupting the clay or silt layer that has developed. The usual establishment procedures can then be followed.

Credit: Turfax, Sept-Oct 1999; Vol.7, No. 5

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Editor's Note: Dr. Beard's article is presented as a cautionary warning of the unseen and possible long term effects from the flooding associated with this very active tropical season. Rainfall amounts exceeding 40 inches have been recorded during the 1999 hurricane season from July to October. Many portions of peninsular Florida experienced effects from Hurricanes Floyd, Harvey and Irene. Golfers and owners should be prepared for tentative turf conditions until enough time and good weather can help heal the turf damage. Weakened bermudagrass now covered with overseeding may still be weak in the spring during transition.

Golf Not the Only Agribusiness to Feel Irene's Wrath

Early damage estimates are in, and Hurricane Irene packed an estimated \$400 million punch, devastating South Florida's fall crops.

Florida Commissioner of Agriculture Bob Crawford has requested the governor's assistance in seeking an agri-

culture disaster declaration from USDA Secretary Dan Glickman.

Preliminary reports indicate that Dade County alone may have suffered losses of more than \$230 million in vegetable, tropical fruit and nursery crops.

In Palm Beach, Broward, Martin, St. Lucie and Indian River counties, preliminary surveys put losses at an estimated \$170 million.

Hurricane Irene dumped 15-20 inches of rain and had winds in excess of 80 mph when it tore across South Florida in mid-October.

Surveys are ongoing in Monroe, Collier, Hendry, Glades, Okeechobee, Osceola and Brevard counties.

Commissioner Crawford estimated that over 650,000 acres under production had been impacted by the storm. Crop losses ranging as high as 85 percent on more than 30,000 acres of tropical fruits and winter vegetables in a six-county area have been reported. In Dade County vegetable losses are estimated between 95-98 percent.

Nursery stock losses in the impacted area amount to an estimated \$215 million. In the Indian River citrus growing area, early loss estimates range from 15-20 percent on 225,000 acres.

"South Florida farmers supply the nation with more than 50 percent of its winter vegetables," Crawford wrote to Governor Bush. "It is imperative that all efforts be made to assist the hard-hit farmers in re-establishing this important production as quickly as possible."

Commissioner Crawford is asking for a declaration of an agricultural disaster for the six hard-hit and contiguous counties to authorize all financial assistance available under federal programs.

Editor's note: I share this information about our brothers and sisters in agriculture not to minimize the recovery time, effort and damage to the hundreds of golf courses in South Florida, but to reiterate Craig Weyandt's sentiments, "It could have been worse!"

Credit: Florida Fertilizer and Agrichemical Association's November 1999 newsletter