



No. 2 at White Tail Golf Course after a minor flood. During more significant floods, No. 2 would be completely inaccessible, with only the flagstick being above water. Photos by Maggie Brandon

Worst-case scenario

Maintaining a course in the flood plain means always being ready for disaster.

Michael Brandon

The beautiful Bitterroot River runs fast and furious during the unpredictable western Montana spring. The river makes its way steadily between the low, dark Sapphire Mountains to the east and the towering majestic Bitterroots to the west.

An unseasonably warm spring accompanied by an above-average winter snow pack in the surrounding mountains and several days of a steady warm rain, make conditions favorable for certain disaster. Under these circumstances, the Bitterroot River will most assuredly rise above its ancient banks and flood the Bitterroot Valley, including White Tail Golf Course.

Unique location, unique course

White Tail GC, constructed in 1932, is a quaint nine-hole facility located approximately 2 miles north of the first settlement established in Montana, the small town of Stevensville. One of the first courses in Montana, White Tail has the distinction of being the only golf course in the nation to be entirely surrounded by a national wildlife refuge.

The Lee Metcalf National Wildlife Refuge, named after the U.S. senator, was established in 1963 and provides a natural habitat for a wide variety of migratory birds and a diverse population of wildlife such as brown bear, moose, bald eagles and blue



The operation of a golf course in the floodway presents numerous challenges.



Above left: Michael Brandon, Class A superintendent at White Tail Golf Course. **Above:** A weir that divides the Bitterroot River and Middle Burnt Fork Creek. The weir is no longer functional and water spills over it during severe floods.

herons. The golf course and the refuge, though independent entities, work together to maintain the pristine quality of this environmentally sensitive area. Both facilities lie directly in the heart of the 100-year flood plain.

The refuge is significant to the course because of the hydrological impact it has on the direction and speed in which water comes and goes on and off the golf course during high water. Changes in the soil profile due to underground water movement, erosion of the river channel banks or pond sediment buildup can dictate the rise and path of groundwater during a flood. The duration and amount of rainfall paired with the ambient air temperature at the snow level are also important contributing factors that impact the rise of waters. The path by which the groundwater recedes after a flood is also dictated by soil profile, river bank erosion and changes in pond sediment configuration.

Golf in the flood plain

The operation of a golf course in the floodway presents numerous challenges, all of which, although manageable, pose a serious inconvenience and place special demands on our maintenance practices.

First of all, when high water is imminent it's important to prepare for the worst-case scenario. This preparedness includes immediately getting all equipment, golf cars, fertilizer and pesticides to high ground.

It's extremely important when transferring pesticides, even this relatively short distance, to remain in compliance with EPA guidelines. Our high ground is an area about 12 feet

above the lowest point on the golf course on an approximately 12,000-square-foot mounded septic drain field in the southeast corner of the property. This area of high ground is still in the flood plain, but is considered the flood fringe. If a flood were significant enough to reach this 12-foot level it would be catastrophic, not only to the golf course but to the entire Bitterroot Valley. The ramifications of a flood of this magnitude would truly be of biblical proportions.

Once we have moved everything we can to high ground, the next step is to protect and fortify the clubhouse. The clubhouse was substantially damaged during a 1997 flood. It was decided then that a flood wall to protect the clubhouse would be a smart addition to the facility. Constructed that same year, the flood wall is a concrete barrier 3 feet high and 8 inches thick that surrounds the entire clubhouse, except for the four openings left for traffic.

To close those openings when a flood is imminent we must slide four heavy-duty wooden slats into grooves in the concrete wall. For further fortification the slats must then be braced with several 75-pound sandbags. Two ½-horsepower sump pumps are secured into 3-foot-deep sump drains built into the east and west corners of the flood wall.

Next, we must shut down power to the irrigation pumps, satellite controllers, shop and cart barn. The electricity to the clubhouse remains on to power the electric sump pumps. While the crew is busy securing the golf course, volunteers work the phones and do the best they can to inform all private golf car owners of the impending flood. Most car owners already are aware of the situation and have removed their cars



Middle Burnt Fork Creek lies dangerously close to White Tail Golf Course. In the background, No. 7 fairway is visible.

and other personal property from the cart barn.

Now, having done everything in our power to secure the facility and having allowed sufficient time for the golf car owners to secure their property, we vacate the area, lock the gates and anxiously watch and wait.

Flood of 2000

I have experienced three floods (2000, 2003 and 2005) in my nine-year tenure as the superintendent of White Tail GC, two of which (2000 and 2005) were significant.

In the spring of 2000, weather conditions were ideal and the waters of the Bitterroot River began to rise. It had been an unusually warm week in early May, with temperatures in the low 70s and a light drizzle that had persisted for days. The average temperature this time of year is generally in the mid-50s.

The golf course typically doesn't handle any significant rainfall well, largely because of its water table level. There is simply nowhere for the water to go. On the northeast end of the No. 2 fairway, the water table can be reached with one turn of a shovel. The importance of drainage on a golf course cannot be overstated, but in the case of WTGC, the golf course *is* the drainage.

Long before flood warnings were issued I began to notice water levels rising in several of the usual low spots. During a substantial rain there's always some standing water on the

course. These casual puddles are annoying and aesthetically unsightly, but the course's membership and I have learned that little to nothing can be done about this.

Within two days these areas had become relevant hazards and completely unplayable. They spread across the golf course, creating a bustling bird bath for the local duck and goose populations. The course was still open at this point and doing a relatively brisk business for a dismal, rainy day. The crew roped off all of the most severely wet areas, and we had to reroute golf car traffic, but other than that it was business as usual. Of course, that was about to change quickly.

Flood warnings were issued for some areas along the Bitterroot the following day, and people living along the river were beginning to take precautions to protect their property. Although the river would not crest for several more days, White Tail GC had already become "White Tail Lake." The course was now officially closed and our worst-case scenario program was implemented.

Damage control

I closely monitored the steady rise of the water as it began to flow from the southwest corner of the course to the northeast corner, running across the entrance road and into the refuge. Oddly enough, as the day wore on, the water began running both to and from the refuge at the same time in different locations along the entrance road. What this strange

phenomenon indicated to me was that the refuge was simply beginning to fill up.

By the following morning, the water had become a 150-yard-wide river, coursing its way along the path of least resistance. The water was deep enough in places to partially submerge four greens. Fortunately, these are push-up greens and therefore higher than the rest of the generally flat topography.

As severely flooded as the course was at this time, I was still able to negotiate my way around each morning and mow as much of the greens as possible. I was hoping that the submerged portion of the greens would not be under water so long as to cause any lasting damage or grow too long to be difficult to get back to putting height. Grass will continue to grow quite well under water for many days before it begins to starve.

Two of my control satellites were also nearly submerged, but with no power on the golf course I was sure the controllers would eventually dry out and operate without any significant problems. Water was approximately 18 inches deep at the flood wall and freely flowing through the maintenance facility and the cart barn at about the same depth. The irrigation pond on the southwest corner of the course was no longer discernable. It had now become one with "White Tail River," and I was certain that the 200 or so rainbow trout that I had stocked the previous year had made their escape into the refuge and parts downstream. Muskrats, marmots, gophers and

all manner of indigenous underground-dwelling rodents were headed for high ground. The ducks and geese had also vacated the area in search of calmer waters.

While I was making my way around the course attempting to keep the greens mowed as best I could, I noticed that the footbridge that spans Middle Burnt Fork Creek to No. 7 tee was tipping at a precarious angle and being pummeled by the incessant torrent. I feared we would lose the bridge completely before the water finally crested. Middle Burnt Fork Creek runs parallel to the Bitterroot River between the refuge and the golf course. Of course, now it was indiscernible from the river.

Road to recovery

After five days of the river running through the golf course at full force, the Bitterroot River finally crested. As the murky flow began to slow down, so did the tons of debris it brought along with it. Whole trees, several 50-gallon drums, a few railroad ties and tons of brush were dragged onto the property, becoming entangled with everything in their path.

As the waters continued to slow, I began to realize the amount of hard work it would entail to get the facility back up and running. My crew had been laid off for the last several days, and I hoped they were all well rested because they were going to need all their strength to tackle this gargantuan task.

The rain had finally ceased, and although the river had begun to recede and the water on the golf course had stopped

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flowing, I knew it would be many days before the water table would drop enough to allow us to dispose of the excess water and address the long grass in the fairways and rough. While waiting for the water table to drop, we removed from the course trees, brush and all matter of debris, including several animal carcasses. The trees and brush were placed on our burn pile, which was again accessible. The railroad ties had come from the No. 7 tee — these were salvaged and eventually replaced. The animal carcasses — a coyote and several marmots — were placed randomly on the refuge property to become fodder for the resident wild scavengers.

After three days of clearing the property of debris, the course was relatively clean except for an unacceptable amount of excess water. The golf course had now been out of business for approximately 10 days, so I believed it was necessary to call a brief meeting with the board of directors to alleviate any anxiety they had about the loss of revenue. I assured them that everything humanly possible was being done to get the golf course back on track.

As the water table continued to drop, the vegetation in the refuge and on the golf course began to appear and the smell of rotting flora was rife. As Middle Burnt Fork Creek continued its steady withdrawal back to the confines of its banks, we were finally allowed to closely survey the damage the high waters had done to our footbridge.

The 1,500-pound concrete footing that had once anchored the bridge now lay uselessly 10 yards downstream in the middle of the creek, giving testament to the sheer power of water and erosion. The bridge, amazingly, was still clinging precariously to the eastern footing, pointing downstream along the muddy bank. Its structural integrity had been utterly compromised. It was obvious that it would not be a matter of salvage, but an issue of removal and replacement.

As the water continued to abate and slowly infiltrate into the soil profile, we were finally able to bring out our two portable gas-powered pumps and begin the task of pumping the tepid, stagnant water off the course. These 1/2-horsepower pumps, along with several hundred feet of 3-inch hose, were strategically placed in areas where the remaining water was the deepest. The water at this time was approximately 2 feet deep at the lowest points on the golf course.

The crew worked diligently for hours, keeping the screens on the uptake end of the pumps free of debris and the engines filled with gas. As the water steadily recessed, the hoses and pumps had to be moved to the newest lowest areas. This process was repeated for three long days, with the crew putting in enough overtime to last them a whole season, until at last the foul water was reduced to a begrudging but acceptable level.

Inevitable change

As the outside crew was busy getting the course back in playable condition, the inside crew was called back to get the clubhouse surrounds and cart barn back in shape. A layer of black clay silt an inch deep covered the concrete floor of the cart barn. This messy, odorous layer had to be shoveled and hosed out. The clubhouse, thanks to the structural soundness of the flood wall, remained dry.

The grass in both the fairways and rough had continued to

grow while under water. Fortunately there was little permanent damage to the Kentucky bluegrass or to the various varieties of fescue. During a normal season the fairways would be cut to the height of 0.5 inch and the rough cut to a height of 2 inches. The average height of the post-flood grass was approximately 6 inches.

Nonetheless, the golf course reopened 15 days after it had closed. The membership and local clientele were patient with our endeavors to get the grass back to a playable height. This was a relatively painless process, primarily because our John Deere belly mower allowed the crew to bring down the excessive height in rather large increments without damaging the grass plants. A good deal of raking was required during this effort and was performed primarily by the gracious members and local volunteers. The areas of the bentgrass greens that were submerged escaped without any significant damage or the need for any incremental height reduction.

With every flood that occurs in the Bitterroot Valley, the river carves its way closer and closer to White Tail GC. At its nearest point, the river rolls a mere 60 feet away, with just a sliver of the Lee Metcalf Refuge and the Middle Burnt Fork Creek standing between the two. Though usually uninvited and unwanted, change is inevitable, and it is not a prophetic statement to say that WTGC in its current incarnation will change dramatically in the near future.

The Lee Metcalf Refuge has already observed the effects of erosion as the Bitterroot River gnaws at the crumbling banks of the land. This is life in the flood plain. The golf course recovered from the flood of 2000 and went on to have a banner year, as did the refuge.

So as we go on about our merry way, playing golf, caring for and maintaining the course, visiting the natural habitats on the refuge and enjoying the beautiful vistas that the Bitterroot Valley has to offer, it's never far from my thoughts that Mother Nature may have her own agenda for White Tail Golf Course.

GCM

Michael Brandon, a 14-year member of GCSAA, is the Class A superintendent at White Tail Golf Course in Stevensville, Mont.

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