



Gasoline-powered pumps and a variety of squeegees were used to wash silt accumulations from the golf greens. Washing revealed almost two inches of growth on the few greens that survived several weeks of submersion.

THE FLOOD OF 1997

Spring flooding is a common occurrence at Fargo Country Club, but record winter snows melted into a spring that won't soon be forgotten.

by **CRAIG J. VIGEN, CGCS**

THE RED RIVER serves as the border between North Dakota and northwest Minnesota. It originates in Wahpeton, North Dakota, and flows north into Canada, where the river terminates at Lake Winnipeg, just north of Winnipeg, Manitoba. This large, slow-moving river drains a great deal of agricultural land and is particularly susceptible to spring flooding because of the ice jams that develop as the river flows north into Canada.

Fargo Country Club was founded in 1898 and has been at its present location since 1919. Seven fairways border the Red River, and the annual confrontation between the golf course and the river flooding each spring

comes as no surprise to the golfer or the maintenance staff. No one, however, could have anticipated the severity and duration of the flooding that occurred in 1997.

During October of 1996, Mother Nature set the stage for the historic Flood of '97. The Red River Valley received a late October rain that left behind five inches of precipitation and lakes of ice on the golf course. Shortly thereafter, Old Man Winter blanketed the region with snow. For the next five months, eastern North Dakota was punished with 13 winter storms and a record 119 inches of snow. A spring flood was unavoidable, but a 500-year flood was unimaginable. During late

March the community was optimistic because the weather was warm during the day and cold during the night — perfect conditions to moderate spring snow melts.

Unfortunately, winter had one more surprise; a late winter storm developed during the first week of April. The storm produced two inches of rain and several inches of snow. Fortunately for the community of Fargo, the weather remained cold after the storm, which slowed the melt and provided more time for the community to prepare for a flood of historic proportions. On April 17, 1997, the Red River of the North crested at 39.5 feet — 22.5 feet above flood stage. This mark surpassed

the 100-year flood of 39.10 recorded in 1897.

The golf course maintenance staff was called in during mid-March to prepare for the imminent flood. Snowmobiles were used by the crew to locate and remove irrigation controllers in this area, covered by snow up to six feet deep. Spring flooding is not unusual, but the crew usually has time to remove green covers before rising water reaches the putting surfaces. This spring, as much as three feet of heavy snow had to be removed from greens before the covers could be removed. Three covers were solidly frozen to the turf and remained on the greens until they were swept away by the river. The maintenance staff recovered the lost blankets during the restoration and cleanup of the rough areas. The swift currents draped the blankets in and around trees. They were knotted and shredded — essentially destroyed.

The next line of defense for the maintenance staff was to protect two out-buildings: a concession stand and a restroom. Sandbag dikes four feet high were placed around each building. The staff prepared the dikes according to current crest predictions. Engineers discovered that the river gauge, which provided river level information, was faulty and was underestimating water levels. The depth of water surrounding the buildings prevented the staff from elevating the dikes in response to the updated water-level predictions.

The two buildings became casualties of the great flood. Although the clubhouse and the pro shop were not yet threatened by flooding, it was necessary to build a three-foot-high dike east of the clubhouse to maintain an access route from the front nine to the back nine. By April 12, all the preparations were complete and the staff focused its energies towards helping neighbors along the golf course save their homes. On April 13, the river crested for the first time at 37.6 feet and reached the second and final crest of 39.5 feet on April 17.

When the Red River was at its peak, it drowned the golf course with anywhere from several inches to more than 23 feet of water. The flood affected 19 fairways, 16 greens, and 16 tees. The river slowly began to recede on April 21 and finally reached the confines of the riverbank in early June.

Spring floods are usually no more than an inconvenience, and the cleanup affects an already short golfing season for a few weeks. The damage to

existing turfgrass is usually minimal, and, in fact, the floodwater often stimulates turf growth. The late winter flood of '97, however, brought with it a new experience in coping with high water.

A combination of unfrozen soil, swift currents, and an extended period of submersion caused damage never experienced in two decades of flood cleanup at the Fargo Country Club. The river eroded holes in greens, tees, and fairways. Large wells were created around mature trees. Cart paths were washed out and the debris spread throughout the rough. Neat ribbons of

Approximately 35 acres of low-lying fairways and roughs that were submerged for up to six weeks did not survive. Six fairways required complete renovation, while several others needed partial seeding.

Spring flooding and the ensuing cleanup are nothing new for the staff at the Fargo Country Club. Assistant Superintendents George Vogt and Bill Broekemeier are seasoned veterans of many floods. They have a combined 27 years of maintenance experience at the golf course. Each played an integral part in coordinating the cleanup efforts as the maintenance staff began the



Thick layers of silt and other debris contaminated the bunkers throughout the golf course. In many areas, swift currents washed the sand completely from the bunkers. Complete renovation was necessary on several holes.

sand extended outward from bunkers where the river washed out the sand, exposing the drain tile. Eight bunkers required complete renovation, including new drainage, and 13 additional bunkers needed silt removal and clean sand.

Up to two inches of turf growth occurred on the greens receiving relatively light deposits of silt during the several-week period that the course was under water. The greens with much thicker silt deposits remained dormant. One theory for this difference is that the fast-moving water was heavily oxygenated and stimulated turf growth, even under water. The initial mowing height on the affected greens was $\frac{3}{8}$ " and the mowing height was stepped down to .140" over a four-week period.

arduous task of washing silt deposits from greens and tees.

Silt depths on the greens and tees varied from traces to several inches. The staff utilized several gas-powered pumps and fire-hose nozzles for washing. The pumps were often transported to the greens and tees by using an inner tube or boat. As the receding water exposed part of a green or tee, the staff washed away the silt before it had a chance to firm up, which would increase the difficulty of completely removing the silt layer. Allowing even light layers of silt to remain on the putting surface usually affects the turf quality later in summer.

Silt deposits were impossible to remove from level fairways using the conventional washing equipment.

Dried silt was broken up with harrows, and then power brooms or landscape blades were used to windrow the material to the roughs, where it was collected.

After the water receded and exposed the fairway, it was apparent that the turfgrass topgrowth was dead. The question was, "Could there still be live crowns and rhizomes in the turf mat?" It was decided to cut seed into the existing thatch/mat layer with the hope that some turf recovery from the old sod would occur. To prepare a seedbed, a Terra-type pull-behind aerifier, equipped with slicing knives, was used over the sites targeted for renovation. This unit also was frequently used during the grown-in period to maintain good air and water exchange in the root zone.

A Kentucky bluegrass, perennial ryegrass, and fine fescue blend was cut in to a depth of $\frac{1}{4}$ " with an overseeder. The target seeding rate was 300 pounds per acre. Two seeding patterns were utilized — seeding several passes parallel to the fairway and seeding in three different directions. Seeding in multiple directions provided the fastest rate of establishment. The fairway seeding was completed by June 1. The fairways were treated with Subdue to prevent seedling damping-off as hot and humid weather set in. Although most of the turf in the fairways was dead, the existing mat of thatch helped prevent washouts during the heavy rain that occurred during establishment.

With the fairway work complete, the staff began the tedious task of plugging and topdressing damaged greens.



As the floodwaters receded, the several inches of silt deposited on the fairways resulted in acres of dead turf.

Several greens were aerified and overseeded. Live cores of turf were placed in the open aerifier holes where only localized injury remained.

The golf course opened in stages throughout the spring and early summer. By mid-May, seven holes were open for play on the front nine. The front nine was completely open with one par five playing as a par three on Memorial Day. On July 13, holes 10 through 17 were opened. The 18th hole could not be opened until late August, and even at that time golfers were allowed to lift and clean the ball from the thin and bare areas of turf.

The maintenance staff has already logged more than 4,300 hours on the restoration of the golf course. The task,

however, is not yet complete, and a number of localized areas are still being repaired. To date, the cost of the restoration of the golf course alone has topped more than \$56,000, not to mention the loss of 11 weeks of golf and more than a \$34,000 loss in associated revenues.

After the initial seeding, the region received timely rainfall for the next six weeks, which accelerated the grow-in. If you believe in Guardian Angels, ours must have been an avid golfer.

As a golf course superintendent, CRAIG WIGEN, CGCS, has addressed spring flooding problems at Fargo Country Club for 21 years.



In places where silt deposits were thin enough, mechanical brushing was sufficient for removal.