

# HOW HURRICANE SEASON AND WINDS AFFECT LAKES...AND AN OMINOUS PREDICTION

By W. R. "Ron" Cauthan, PE

This past summer, a representative of the South Florida Water Management District (SWFWMD) made a presentation at a meeting of the Highlands County Board of County Commissioners on the effects of the 2004 hurricane season on Lake Istokpoga in Highlands County.

As Hurricanes Francis and Jeanne entered the east coast of Florida at Fort Pierce, the winds were blowing from north to south across Highlands County and Lake Istokpoga. The normal water level for Lake Istokpoga is around elevation 39 feet. County Road 623 runs around the lake on the south side. The low point on C.R. 623 is approximately 42 feet. As the County was obviously aware, due to repairs that had to be made to the road, SWFWMD reported that the water from the lake had been blown one-quarter mile over the shoreline on the south side and overtopped C.R. 623.

Also at this meeting, a report was given on the storms' effects on Lake Okeechobee. In addition to the storms stirring up bottom sediments, which is proving to be a serious water quality issue, it was reported that the lake's north shoreline receded one-quarter mile as the water was pooled against the Herbert Hoover Dike on the south side. This is the exact scenario which occurred in the 1920's when thousands were killed in Clewiston and Moore Haven and resulted in the construction of the dike around the lake by the Army Corps of Engineers.

While the effects of wind on Florida lakes might be surprising, it is hardly a surprise that New Orleans was recently decimated by flooding from Lake Pontchartrain. Only two years ago, in June 2003, Civil Engineering Magazine published an article with an ominous warning, entitled "The Creeping Storm." Excerpts from the article are presented below. For further information, or a copy of the article in its entirety, please contact Ron Cauthan or visit this website: <http://www.pubs.asce.org/ceonline/ceonline03/0603feat.html>.

*In the late summer of 1965, a disorganized storm system formed over the warm, tropical waters of the mid Atlantic. Soon the storm grew into a high-powered cyclone—a twisting mass of wind and water that would torment the Gulf Coast in the coming days. The National Hurricane Center gave it a hauntingly innocuous name: Hurricane Betsy.*

*Storm prediction was still in its infancy then and researchers could not get a read on Betsy's erratic path. She zigzagged north from Puerto Rico and first seemed to be heading straight toward the Carolinas. At the last moment, however, Betsy swerved toward the Bahamas, then again toward Florida, finally veering west of the peninsula and straight toward Louisiana.*

*On September 9 Betsy hit the southern tip of the state. Almost every building in the small coastal town of Grand Isle was quickly destroyed. With 150 mph (240 km/h) winds, Betsy barreled up the Barataria Basin toward New Orleans. Lake Pontchartrain—which is just north of the city and is connected to the Gulf of Mexico—swelled with raging waters. Easterly winds pounded the high waters, in some areas easily topping the levees meant to protect the city. In streets in the eastern part of town water reached the eaves of houses.*

*Betsy finally calmed near Little Rock, Arkansas. She had dropped only 4 in. (100 mm) of rain on New Orleans and had claimed 81 lives and caused more than \$1 billion in damage. Unlike any storm before it, Betsy made clear that the city was all too vulnerable to hurricanes. Cradled in a wide southern meander of the Mississippi River just north of the Gulf of Mexico, New Orleans is surrounded by Lake Pontchartrain to the north, Lake Borgne to the east, and lakes Cataouatche and Salvador to the south. This ring of freshwater is also surrounded by hundreds of square miles of wetlands and the Gulf of Mexico. To make matters worse, most of the city is below sea level.*

*Soon after the damage from Betsy was assessed, Congress made a historic decision to appropriate federal funds to build a system of levees to protect the city from a similar storm in the future. Its cultural significance aside, New Orleans was fast becoming the most important port in the nation—feeding commodities up the Mississippi to all of the Midwest and serving as an important base for the burgeoning oil and gas industry. Congress was not about to let it wash away.*

*Today New Orleans rests within a bowl formed by 16 ft (4.9 m) tall levees, locks, floodgates, and seawalls, the edge of the bowl extending for hundreds of miles. It is bisected from west to east by the Mississippi River, which is also contained within massive engineered embankments. Water flows through and all around the city while its residents go about their daily routines. A system of levees forming a ring around the northern half of the city to protect it from surging waters in Lake Pontchartrain is set to be completed within the next decade. Construction of a similar system around the southern half of the city will probably take several years longer than that.*

*But almost 40 years after beginning these projects, the U.S. Army Corps of Engineers is in the midst of reassessing them on the basis of an ominous question: Are the protective barriers high enough?*

*The design of the original levees, which dates to the 1960s, was based on rudimentary storm modeling that, it is now realized, might underestimate the threat of a potential hurricane. Even if the modeling was adequate, however, the levees were designed to withstand only forces associated with a fast-moving hurricane that, according to the National Weather Service's Saffir-Simpson scale, would be placed in category 3. If a lingering category 3 storm—or a stronger storm, say, category 4 or 5—were to hit the city, much of New Orleans could find itself under more than 20 ft (6 m) of water.*

*Some experts worry that even a less severe storm could flood the city. In the 40 years since the design criteria were established for New Orleans's hurricane protection levees, southeastern Louisiana's coastline has been subsiding—settling in on top of itself—even as the natural height of the sea rises. A century ago any hurricane heading toward New Orleans would have had to traverse a 50 mi (80 km) buffer of marshland. Today that marsh area is only half as broad and the hurricane would be striking a city that itself sinks lower every day.*

Today, we know the protective barriers weren't high enough to stave off the storm surges caused by Hurricane Katrina—just one of the many issues facing New Orleans.

Source: 'The Creeping Storm', *Civil Engineering Magazine*, June 2003, Vol 73.

*Ron Cauthan is a Principal/Senior Project Manager for Chastain-Skillman's Civil Engineering Department in Sebring. His work focuses on private and municipal roadway and drainage projects. Ron received a Bachelor of Civil Engineering Degree from The Citadel in 1975. He can be reached at (863) 382-4160 or [rcauthan@chastainskillman.com](mailto:rcauthan@chastainskillman.com).*

© 2005 Chastain-Skillman, Inc. This article is taken from the 4th quarter 2005 issue of *Consultant's Update*, a publication of Chastain-Skillman, Inc.