POSSIBLE ENVIRONMENTAL IMPACTS ON LAKE PONTCHARTRAIN BY THE OPENING OF THE BONNET CARRE' SPILLWAY BASED ON HISTORICAL DATA

Historic Mississippi River levels in the spring of 2011 required the U.S. Army Corps of Engineers to open the Bonnet Carre' Spillway on May 9 to protect lives and properties located in the southern end of the Mississippi River Basin. Openings of this magnitude were also required in 1997 and 2008.

Past post-spillway opening observations, and data on the temporary and long–term environmental and ecosystem effects, strongly suggest the 2011 opening will closely mimic past experiences. This fact sheet summarizes the possible effects to the Lake based on that information.

Construction of the Bonnet Carre' Spillway began in 1929 and was completed in 1936. It is located approximately 25 river miles upstream of the City of New Orleans, and consists of a massive concrete weir structure with a 7,623-acre floodway bound by guide levees stretching from the Mississippi River to Lake Pontchartrain.

Effects of increased nutrient levels of nitrogen and phosphorus on proliferations of algae and increase in primary productivity

After the April 2008 opening of the Spillway, floating blue-green algae was present from Port Louis, west of Madisonville, eastward along the Northshore to Bayou Lacombe beginning in June. Most of the algal blooms occurred near shore, extending out as much as a quarter of a mile, in northern areas of the Lake. Although it covered much of the water surface, in most instances the blooms only extended a few inches into the water column. In some cases, especially in impounded areas, pools of dark water formed as the algae began to die.

Cyanobacteria (*Anabaena sp.*) bloom, during the 2008 Bonnet Carré Spillway opening, in the open waters of Lake Pontchartrain.

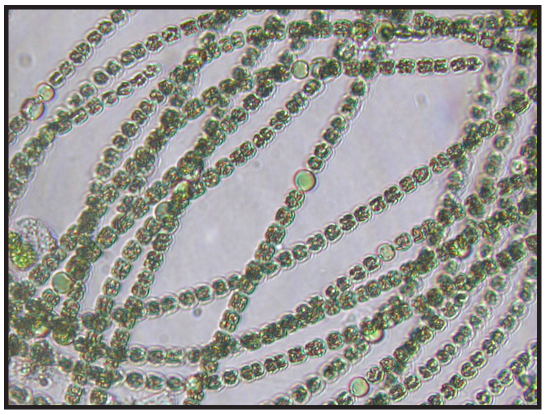
Blue-green algae (*Anabaena sp*.) are always present in the Lake. Populations of these species typically spike as temperatures warm and when calm weather facilitates clear water. Algae also move toward the surface when the water is calm, forming thick floating accumulations. The wind can concentrate floating algae and determine the direction of its movement. Submerged aquatic vegetation (SAV) beds can trap and concentrate algae near the shore.

At some point in this process the algae will begin to die. When that occurs, decomposition removes dissolved oxygen (DO) from Lake waters, causing unpleasant odors from the gases released - such as hydrogen sulfide. This decrease in DO reduces habitat in the Lake and the value of existing grass beds (SAV) as wildlife habitat. Low DO can kill invertebrates – such as clams and worms – that serve as fish food. These invertebrates cannot move away from foul water and become stressed or die. Fish generally move away from low oxygen areas. Fish are killed if trapped by low oxygen waters in coves, marinas or other enclosed areas. In 2008, some of these impounded areas had extremely low DO concentrations of 0.05 to 0.09 mg/l and fish kills were observed.

Large and thick accumulations of blue-green algae can also accumulate in some areas as the result of winds pushing surface colonies. In 2008, southerly winds pushed surface algae toward the Northshore and up into rivers and streams causing similar issues and detriments in lower parts of the Lake's tributaries.

One species of blue-green algae documented as being present in 2008 was cyanobacteria, *Anabaena flos-aquae*. This species is capable of producing neurotoxins that may cause skin irritations or be deadly to animals. It also may cause nausea in humans when ingested, inhaled or comes in direct contact with exposed body parts.

(*Toxic Cyanobacteria Blooms; A Field/Laboratory Guide,* by Dr. M.A. Crayton and the Center for Disease Control http://www.cdc.gov/hab/cyanobacteria/about.htm.)



Collections of *Anabaena* from Causeway Crossover 2 at 1 meter on May 27, 2008, by D. Demcheck, USGS

Fortunately, these alga blooms and associated environmental damages are temporary. Much of the excess nutrients that enter the Lake are eventually flushed or blown out of the system. Ironically, the same process that sets up these temporary negative consequences (Spillway opening) can also trigger physical and biological processes that begin to reverse the detrimental effects. For example, turbidity from silts and clays introduced into the Lake by the Mississippi River during the Spillway opening are often re-suspended, and this helps to shut down algae blooms by inhibiting sunlight penetration.

In time, blue-green algae growth returns to normal levels as the excess dies and decomposes, allowing other beneficial species of phytoplankton (microscopic plants and algae at the bottom of the complex aquatic food web) to thrive. Nutrients introduced into the Lake by the Spillway opening are recycled, oxygen levels return to normal and the whole system – in in the long-run – can benefit by all the increased primary productivity. Data from the Louisiana Department of Wildlife and Fisheries (LDWF) indicate in years following the 2008 Spillway opening, and in years following earlier openings, populations of shrimp, crabs and certain species of fish thrived from the increased food availability.

Short-term effects on SAVs

In 2008, the area around Sunset Point in Mandeville – where *Ruppia* was abundant – experienced an accumulation of blue-green algae along the shore. Excess nutrients and algae will end up in marsh and swamp habitats that connect to shore areas. *Ruppia* plants, heavy with algal accumulations, were dislodged and uprooted by wave action resulting in wrack along shorelines. Additionally, strong waves will re-suspend silts and clays, increasing turbidity blocking the light needed for *Ruppia* and algae growth.

Websites Highlighting the 2011 Bonnet Carré Spillway Opening:

USGS
http://deltas.usgs.gov/spillway/SpillwayIntro.aspx

Army Corps of Engineers
http://www.mvn.usace.army.mil/bcarre/missriver.asp

Lake Pontchartrain Basin Foundation
http://www.saveourlake.org/bonnet-carre.php

MODIS – NASA Satellite Imagery
http://rapidfire.sci.gsfc.nasa.gov/subsets/?subset=USA7

Be advised:

- *Anabaena flos-aquae* can be toxic and should be avoided.
- Swimming in the algae bloom should be avoided.
- Direct contact by inhalation, swallowing or exposed body parts could result in stomach and intestinal illness in humans. (*Toxic Cyanobacteria Blooms; A Field/Laboratory Guide*, by Dr. M.A. Crayton and the Center for Disease Control http://www.cdc.gov/hab/cyanobacteria/about.htm)
- Pets, such as dogs, should also be kept away from waters containing algae blooms, as similar illnesses can occur.
- To avoid possible risks, fish that appear to be stressed from intense algae accumulations should not be harvested.

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