Resiliency of the Bohemia Spillway and the Evolution of Mardi Gras Pass, Southeast Louisiana

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to
Southeast Louisiana Flood Protection Authority - East

Thursday, March 15, 2012
Bohemia Spillway created in 1926 to reduce flood risk to New Orleans.
Mississippi River flood protection and “back” Levees

Breton Sound

Bayou Lamoque

Bohemia Spillway

Mississippi River
1. Discharge reduction on the River
2. Sum of Q along natural levee transect
3. Local Channel Flow patterns
4. Hydrodynamic Modeling
Bohemia Spillway May 11, 2011: Sheet flow of water on the marsh side of the natural levee flowing through across an open field and empties into an oil and gas canal (Cox Bay Field), picture Dr. John Lopez
Mississippi River flood protection and “back” levees

Bohemia Spillway Area

Breton Sound

Bayou Lamoque
Legend

Elevation (ft)

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<th>Elevation (ft)</th>
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<td>High: 38.5</td>
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<td>Low: -6</td>
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Elevation labels for Martinez points in brown.
Elevation labels for (uncorrected) McCarthy transect points in blue.
Elevation labels for CRMS stations in green.
Background image is 2002 LIDAR DEM.
7-9-2010 O&G canal at Harris Bayou
O&G canal Potash Field
Canal re-claimed by marsh accretion

Back Levee Canal (pre-1932)

2005 CIR
Indications of Bohemia Resiliency

- Firm and healthy marsh – Widespread

- No “interior marsh loss” or “indirect” Oil and gas canal loss

- No loss due to mineral extraction (2 fields)

  More likely attributable to the River’s connection:

- Recovery of trapper canals

- Infilling and Recovery of some oil and gas canals and old back levee canal

- Localized land growth (USGS data) and common bank accretion along canals

- Functional Historic Hydrology – Harris Bayou, Overbank flow, Mardi Gras Pass
Total Spillway estimated to be 30,000 to 50,000 cfs at peak stage

Developing breach across the road as the river fell, 5,000 to 7,000 cfs estimated in July

High water surveys (LPBF & UNO) May 17 through June 7, 2011

Post-High Surveys July 10, 17, and 24, 2011 with lower water but active breach

Pre-High water LPBF survey March 3, 2011
May 1, 2008

River bar with a Black willow forest

Diversion Canal

Diversion Structure (inoperable)
**Normal condition**, i.e. ~300 cfs discharges through metal culverts below the road through Bohemia

**Present condition** (July 17, 2011), i.e. 5000 to 7000 cfs discharges through new bypass canal cut by recent high water overtopping the road through Bohemia
PIC 3 July 10, 2011 breach in road just south (down river) of Diversion Canal, 130 feet wide, maximum water depth 20 feet, but 24 feet below road surface. Estimate of discharge 5000 to 7000 cfs
PIC 8 July 17, 2011 eroding forested river bar from breach near river at Diversion Canal
PIC 7 July 17, 2011 eroding forested river bar from breach near river at Diversion Canal
PIC 10 July 17, 2011  overflowing forested river bar near breach at Diversion Canal

Water depth 0.5 to 2.0 feet July 17, 2011

Eroding channel cuts into the forested bar 7-10 feet deep

Mississippi River
7-24-2011 Bohemia Spillway on east side of river bar near the breach at the diversion canal: Waterfalls are developed due to overtopping of the bar but at a lower rate so that water levels have fallen on the marsh side of the bar.
2 to 10 feet deeper

24 feet deeper

5 to 10 feet deeper

2 to 10 feet deeper

Legend

Road Blowout Observations
- May 21, 2011
- June 10, 2011

Water Depth (ft)
- 5 - 7
- 8 - 9
- 10 - 11
- 12 - 13
- 14 - 15
- 16 - 17
- 18 - 19

Approximate Flow Channel

Road Blowout:
May 21, 2011
Width = 50 ft
Roadtop to water surface = ~ 2 ft

June 6, 2011
Width = 130 ft
Roadtop to water surface = 4.5 ft

Lake Pontchartrain Basin Foundation
Save Our Coast
Save Our Lake
Mardi Gras Pass Bohemia Spillway marsh side of bar

Feb 21, 2012
Mardi Gras Day
Mardi Gras Pass Bohemia Spillway at Miss. River

Photo by Nathan Arthur

Feb 21, 2012 Mardi Gras Day
Mardi Gras Pass Bohemia Spillway at Miss. River

Photo by Nathan Arthur
Mardi Gras Pass Bohemia Spillway

Feb 21, 2012

Water depth 7-8 feet

2.0 feet deep

Pointe a la Hache stage 5.0 ft
Mardi Gras Pass Bohemia Spillway

Feb 24, 2012

Pointe a la Hache stage: 4.3 ft

Water depth 7 ft
Est. bottom elevation -3 to -5 ft

1.5 feet deep
Mardi Gras Pass Bohemia Spillway

Feb 24, 2012

School of pogy fish migrating and feeding in channel
Mardi Gras Pass March 10, 2012

Pointe à la Hache 2.48 ft

32 ft

5 ft water depth or -2.5 ft elevation

Survey water level 2.6 feet NAVD 1988
Headward Erosion
December 5, 2011 To
March 10, 2012
Mardi Gras Pass estimate
Low water 100 to 300 cfs
Mardi Gras Pass
High water estimate
5,000 to 10,000 cfs
Where is the water going?
Mardi Gras Pass
Lower Breton Diversion
50,000 cfs Draft SMP $220 M

Bohemia Mississippi River Reintroduction
BS-15 10,000 cfs CWPPRA PPL 17 $10-20

Mardi Gras Pass
Pending Permit to repair the road and close off Mardi Gras Pass

Lower Breton Diversion 50,000 cfs Draft SMP $220 M

Sundown/Eland Potash Oil and Gas Field Facility
Emerging Riverine Ecology in Mardi Gras Pass: Pogy & other fish, River otter, Beaver, Heron, Deer, etc.
Mardi Gras Pass is raw.
Mardi Gras Pass is dynamic.
Mardi Gras Pass is an Opportunity.