PART 2

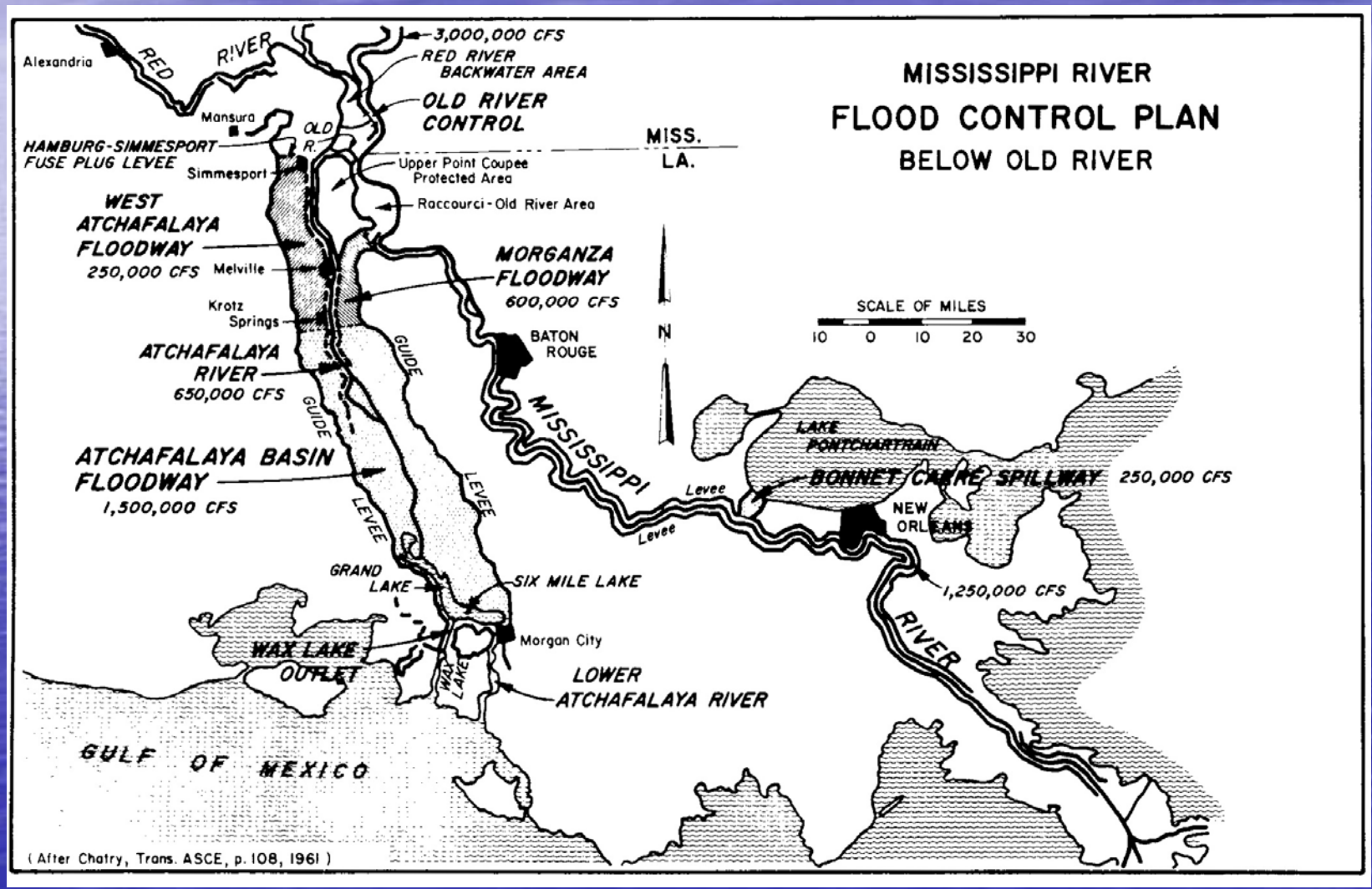
THE MISSISSIPPI RIVER AND TRIBUTARIES PROJECT

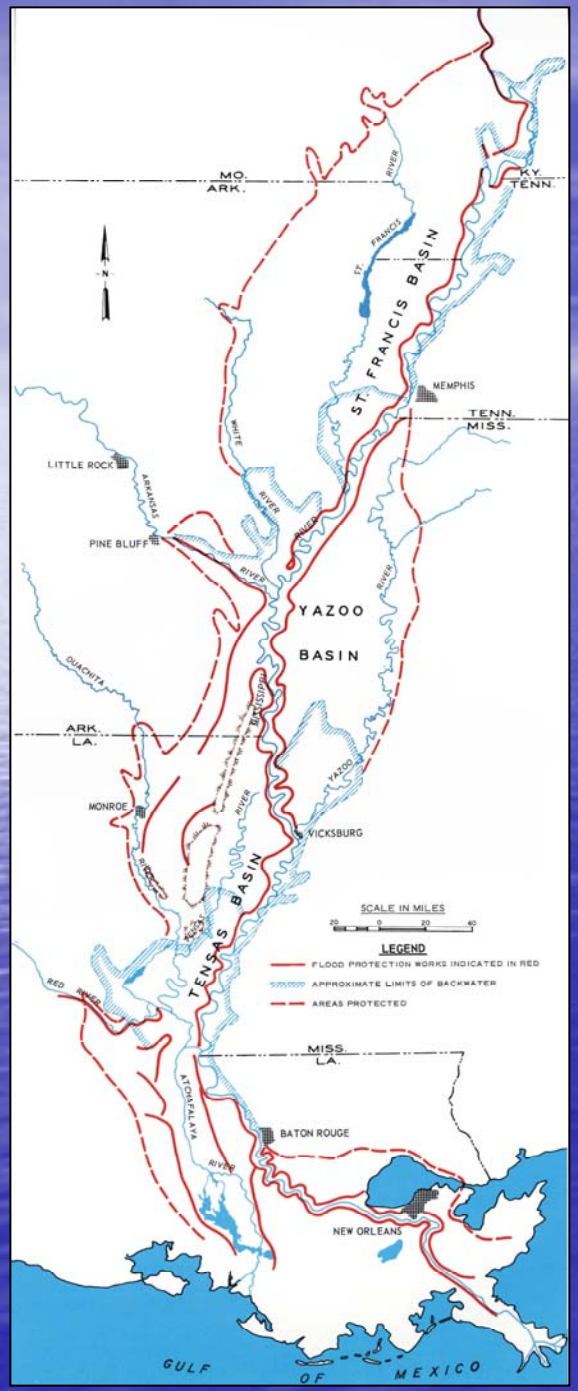
1928-1973

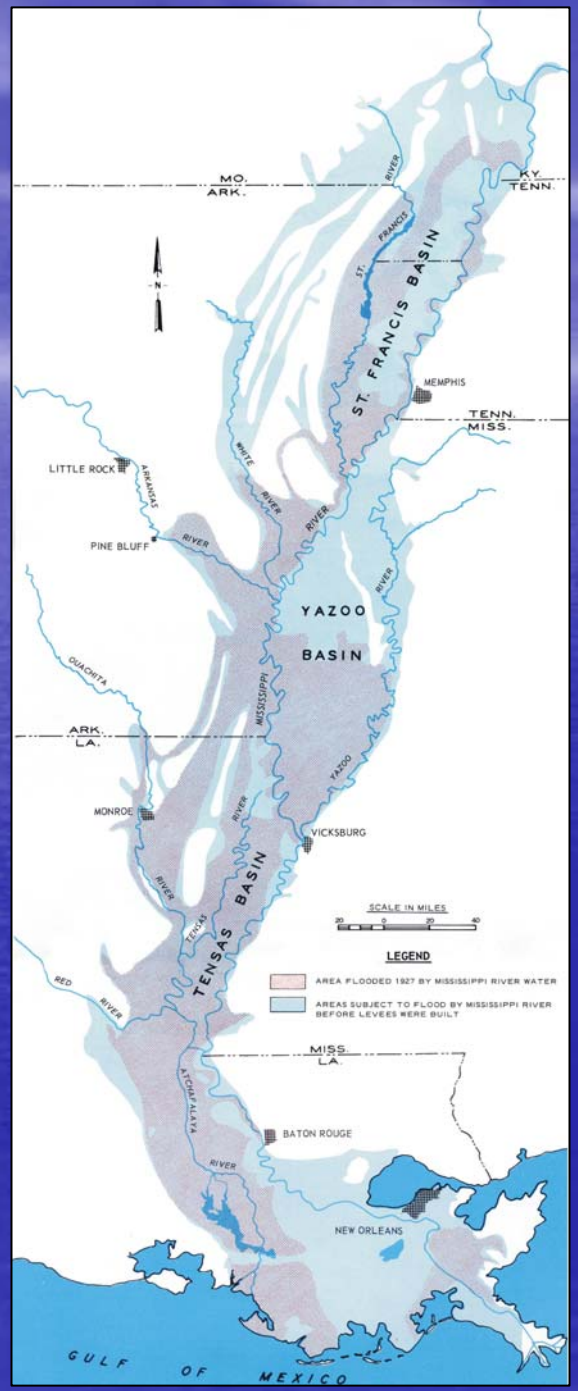
FLOODS IN LOWER MISSISSIPPI RIVER VALLEY

- Major floods have occurred in: 1718, 1735, 1770, 1782, 1785, 1971, 1796, 1799, 1809, 1811, 1813, 1815, 1816, 1823, 1824, 1828, 1844, 1849, 1850, 1851, 1858, 1859, 1882, 1892, 1893, 1903, 1907, 1908, 1912, 1913, 1916, 1920, 1922, 1923, 1927, 1929, 1932, 1936, 1937, 1945, 1950, 1957, 1958, 1973, 1974, 1975, 1979, 1983, 1984, 1993, and 1997.

The Corps' Mississippi River and Tributaries Project -1928

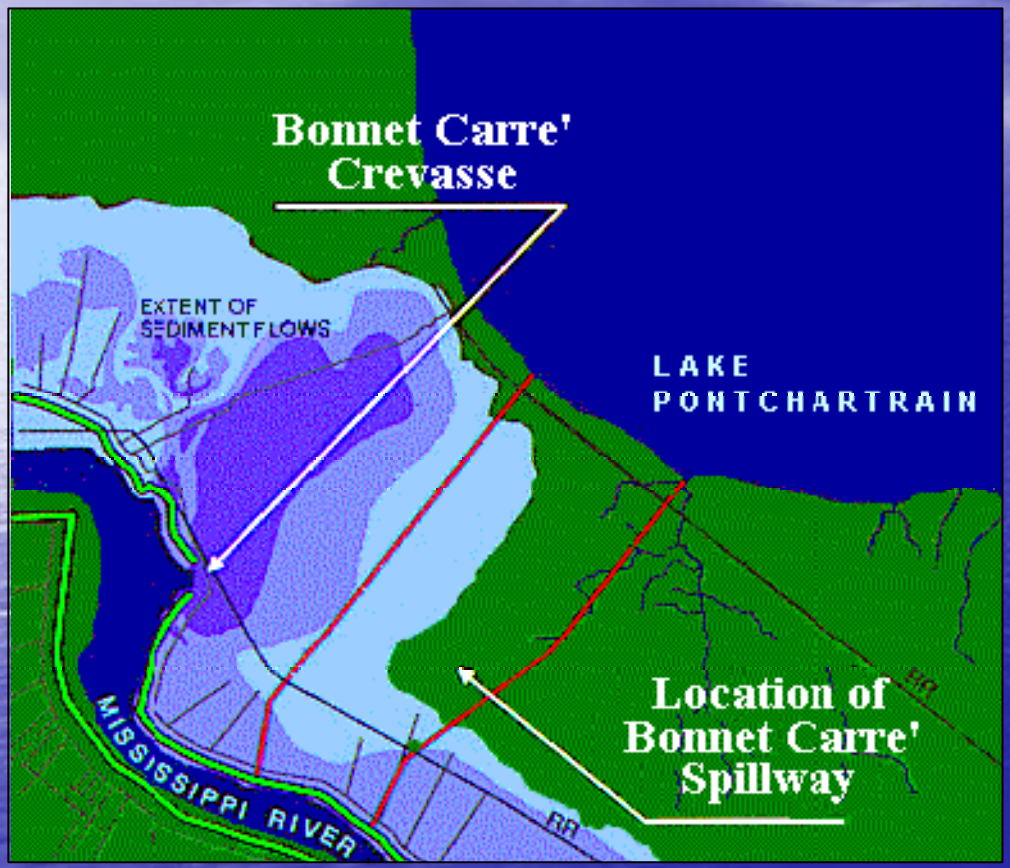






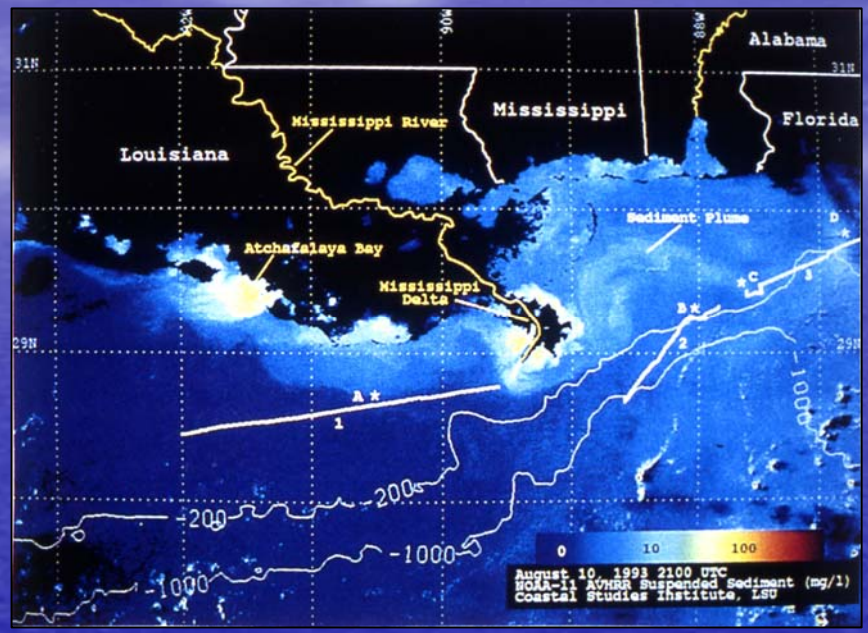
The Army Corps of Engineers began the MR&T flood control program in 1928. It took until 1960 to get all of the pieces constructed and in-place, at a cost of $8 billion. It almost failed catastrophically at the Old River Diversion Bypass structure in 1973.

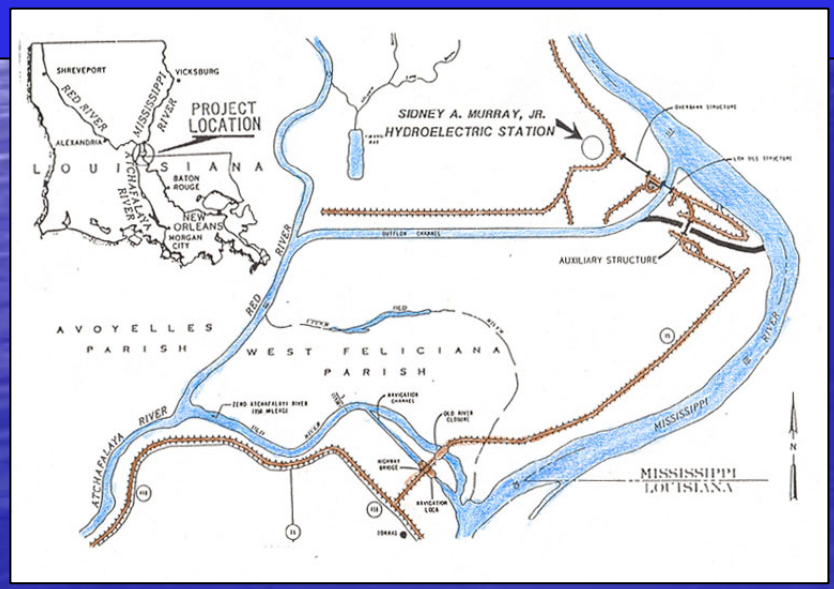
Bonnet Carre Spillway Bypass



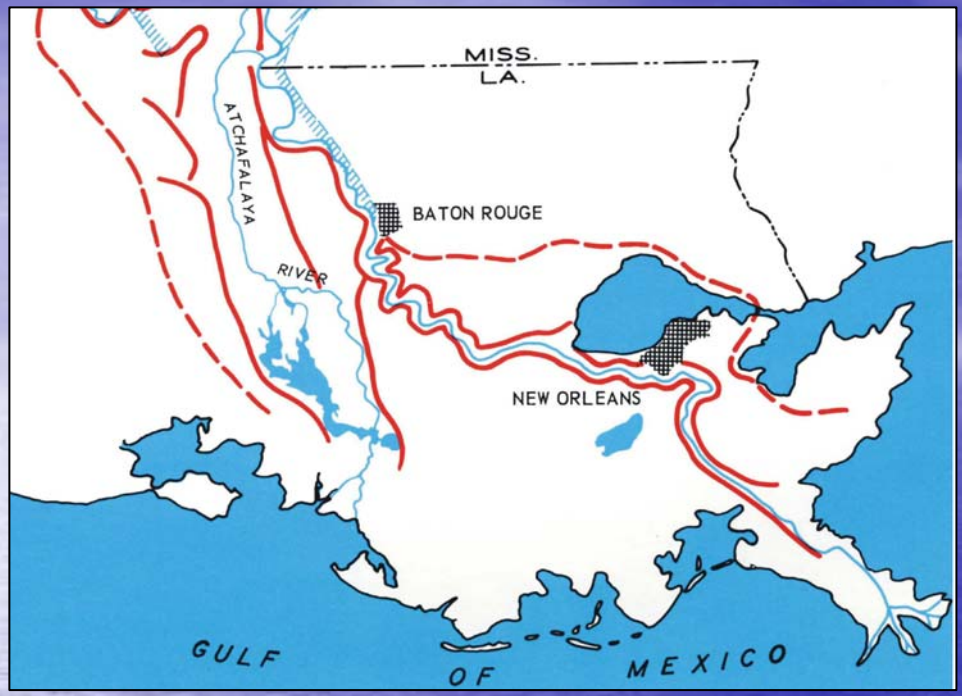
Intended to protect New Orleans from a Mississippi River flood

Atchafalaya River Bypass





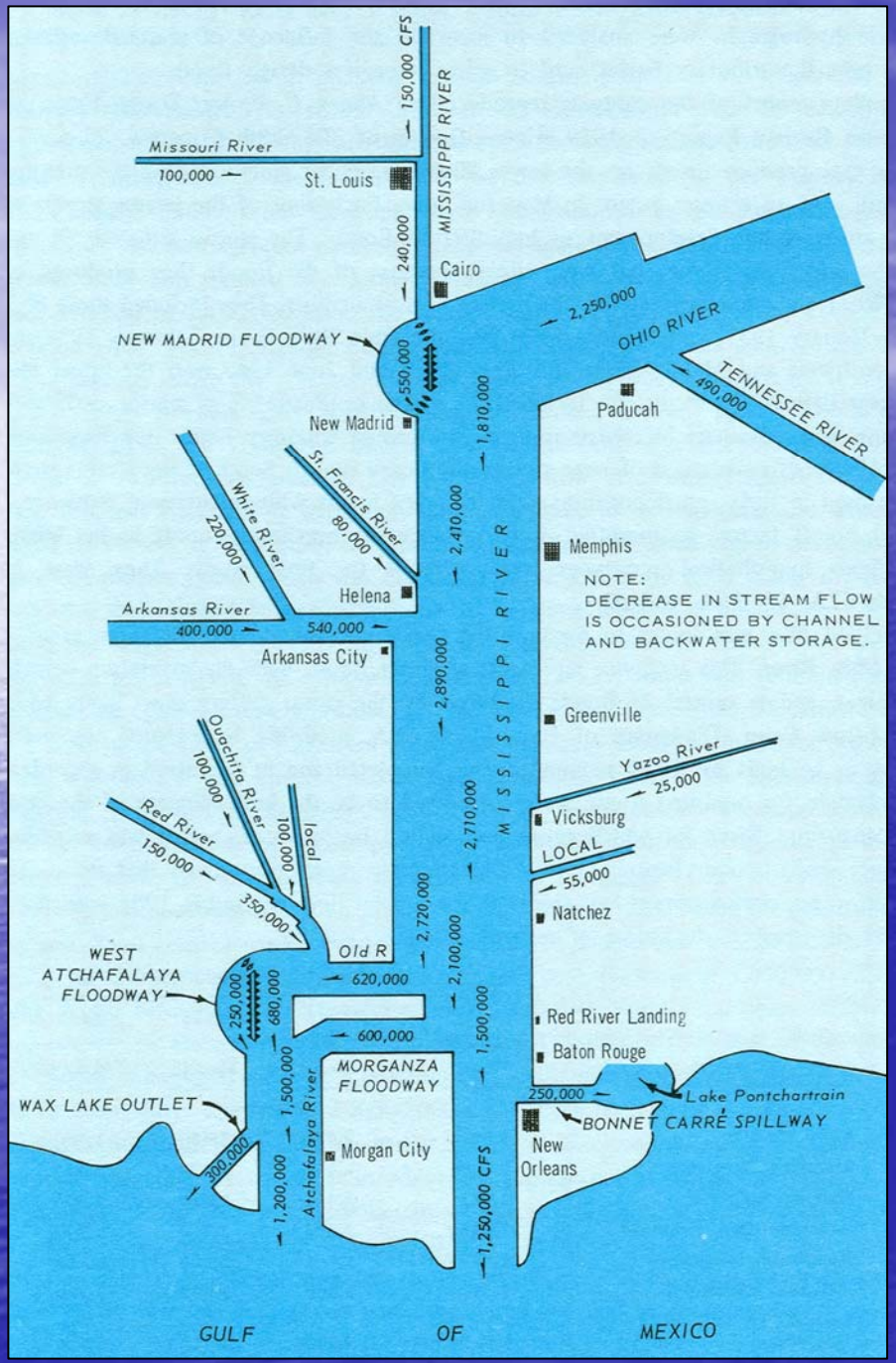
The largest bypass on the River is the Atchafalaya Bypass at Old River, which is only half the distance to the Gulf of Mexico.

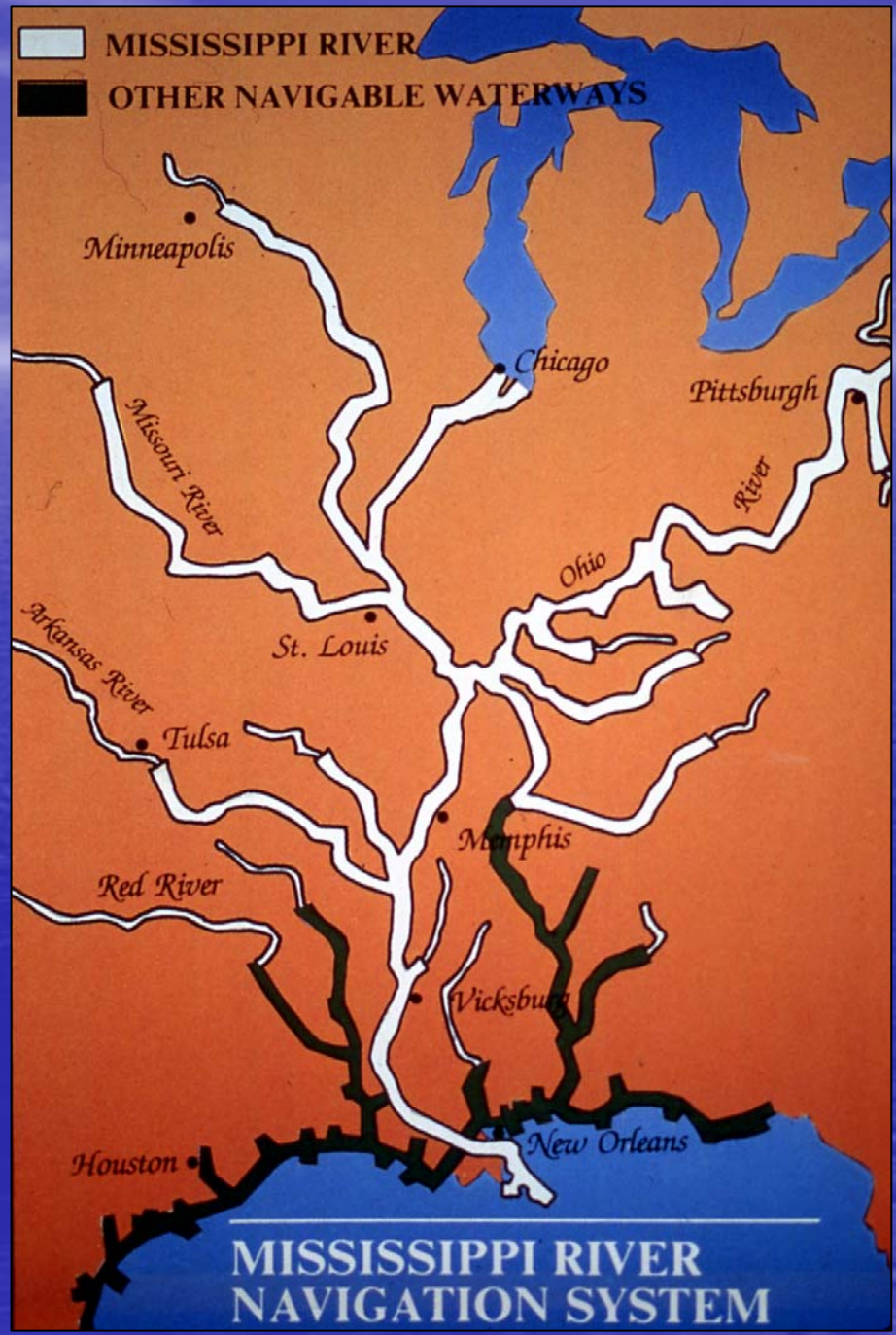


Atchafalaya River

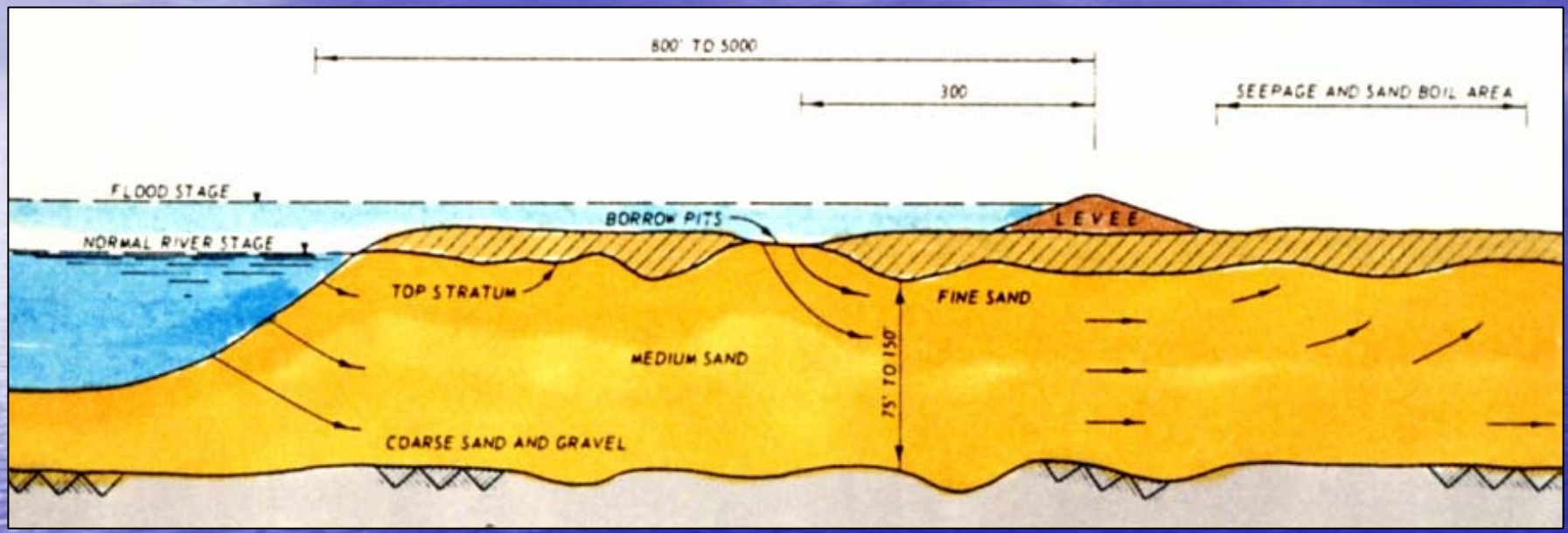
The Atchafalaya River is both steeper than the Mississippi (3:1 ratio in bed slope) and shorter (225 kilometers to the Gulf of Mexico from the Red River entrance versus 480 kilometers for the Mississippi).

- Under natural conditions, the Mississippi River would probably have switched its course to the Gulf of Mexico via the Atchafalaya distributary between 1965 and 1975, if not for the levees.
- The Atchafalaya now drains about 30% of the combined flows of the Mississippi and Red rivers to the Gulf of Mexico.


Missouri River
100,000
St. Louis
150,000 CFS
MISSISSIPPI RIVER
240,000
Cairo
2,250,000
OHIO RIVER
NEW MADRID FLOODWAY
550,000
TENNESSEE RIVER
490,000
Paducah
New Madrid
1,810,000
White River
220,000
St. Francis River
80,000
2,410,000
Memphis
NOTE:
DECREASE IN STREAM FLOW
IS OCCASIONED BY CHANNEL
AND BACKWATER STORAGE.
Helena
Arkansas River
400,000
540,000
Arkansas City
2,890,000
Greenville
Ouachita River
100,000
Red River
150,000
100,000
local
Yazoo River
25,000
Vicksburg
LOCAL
55,000
2,710,000
Natchez
350,000
2,720,000
Old R
620,000
WEST
ATCHAFALAYA
FLOODWAY
250,000
680,000
2,100,000
Red River Landing
600,000
Baton Rouge
MORGANZA
FLOODWAY
1,500,000
250,000
Lake Pontchartrain
BONNET CARRÉ SPILLWAY
WAX LAKE OUTLET
1,500,000
Atchafalaya River
New
Orleans
300,000
Morgan City
1,200,000
1,250,000 CFS
GULF
OF
MEXICO

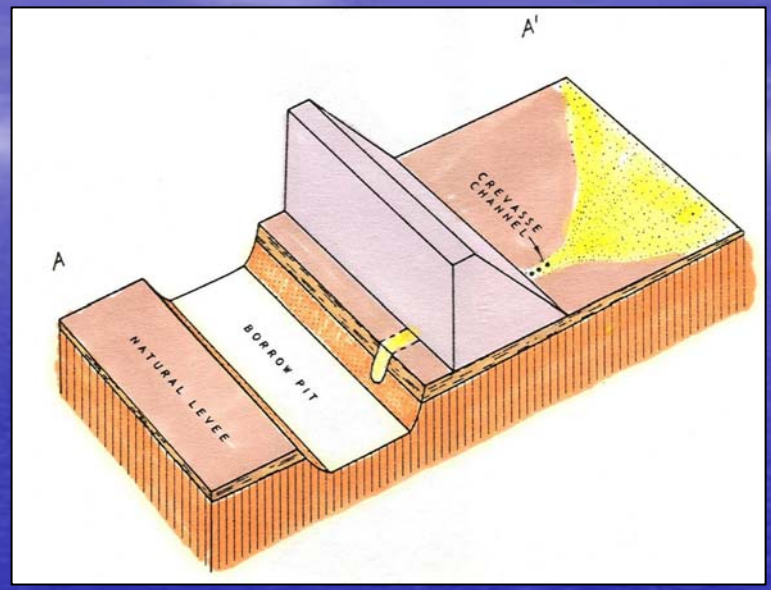

MISSISSIPPI RIVER
OTHER NAVIGABLE WATERWAYS
Minneapolis
Chicago
Pittsburgh
Missouri River
Ohio River
Arkansas River
St. Louis
Tulsa
Memphis
Red River
Vicksburg
Houston
New Orleans
MISSISSIPPI RIVER
NAVIGATION SYSTEM

Model levee design



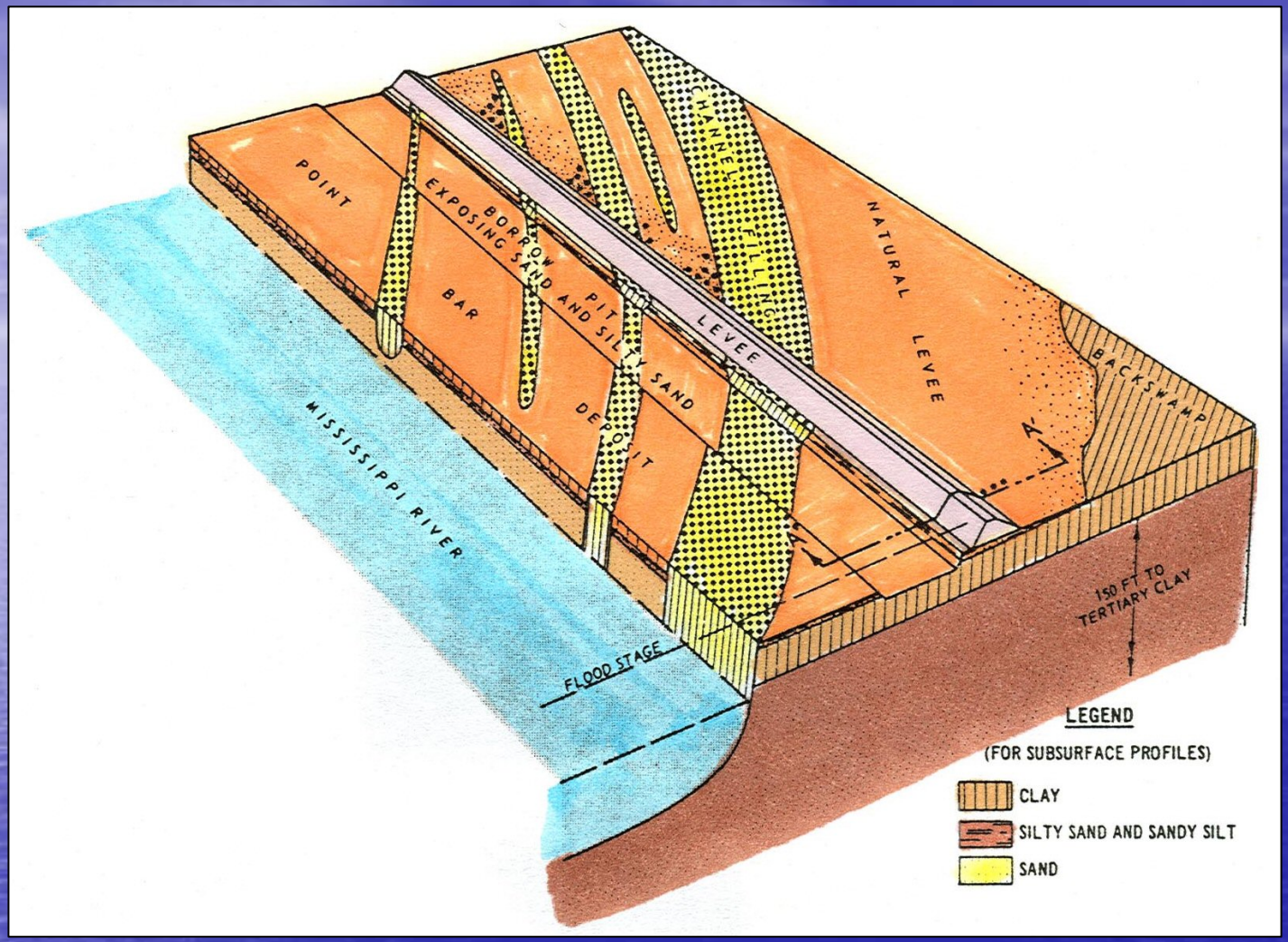
- **The theory of levees proposed to confine the river's mass in its main flow channel, encouraging scour during high flow.**

Natural crevasses beneath levees

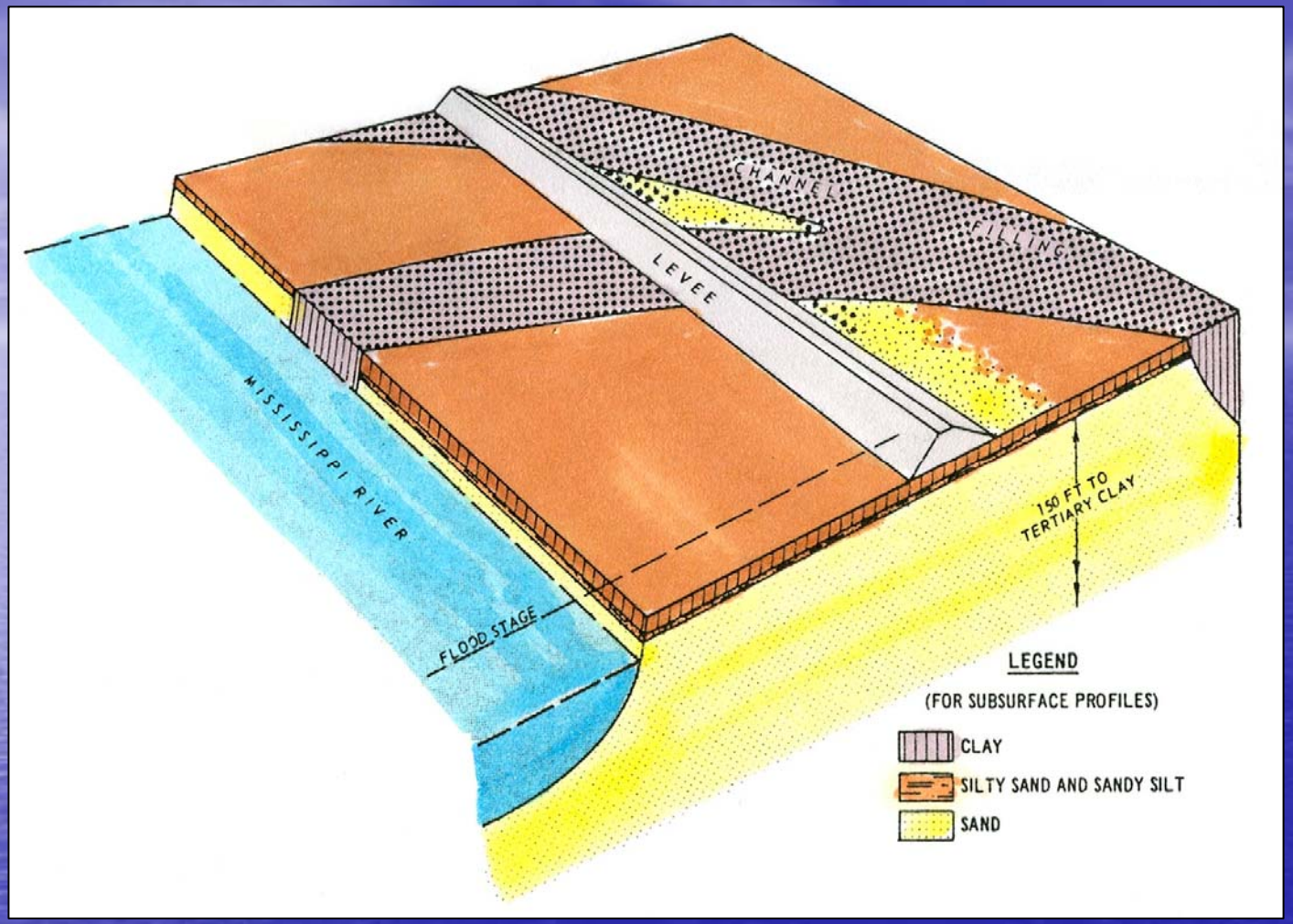


Crevasses are sand filled distributary channels that form at high flow, and lie beneath earthen levees like ticking time bombs, waiting to explode.

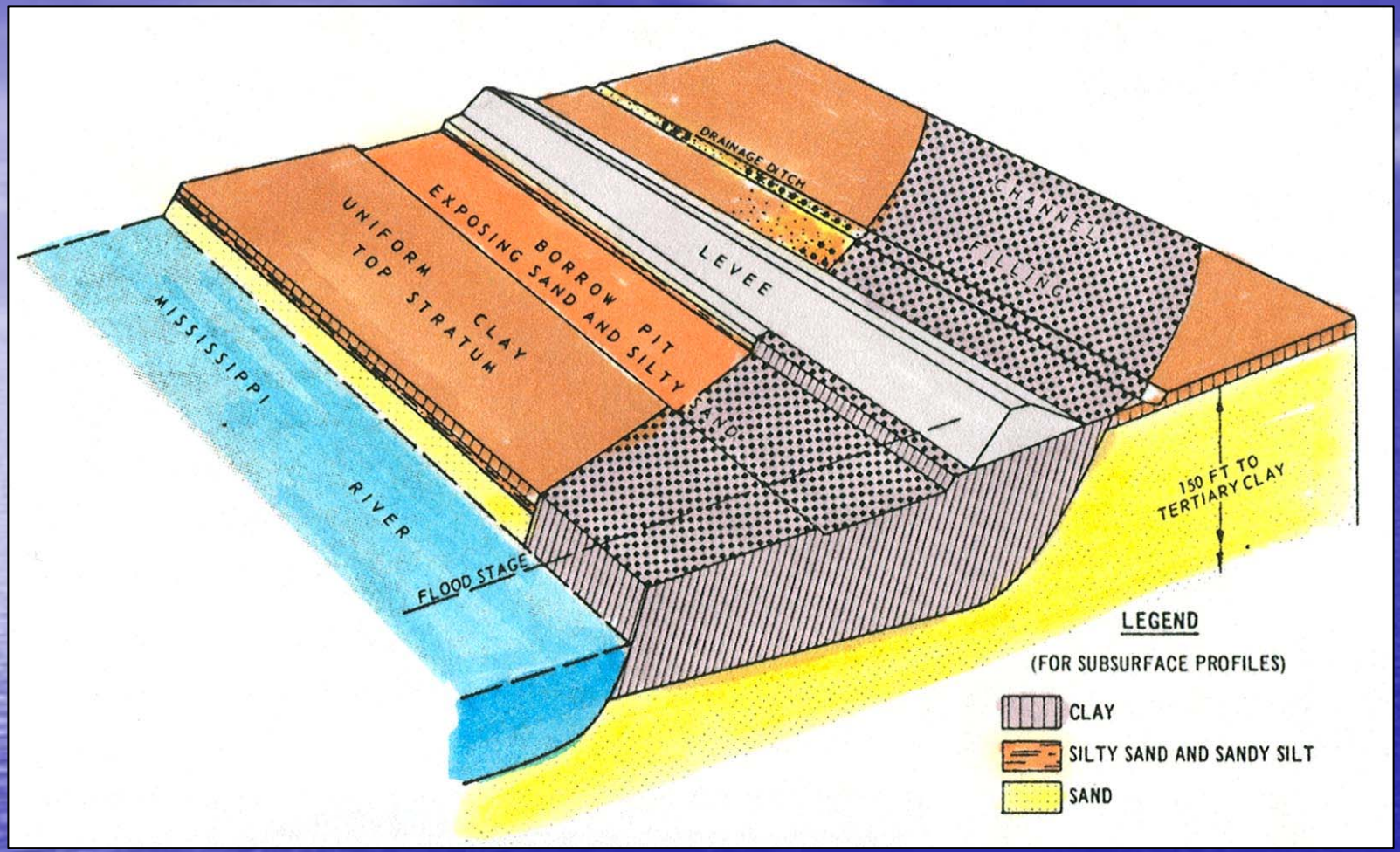
Seepage crevasse exposed at the east levee of the IHNC breach after Hurricanes Katrina and Rita



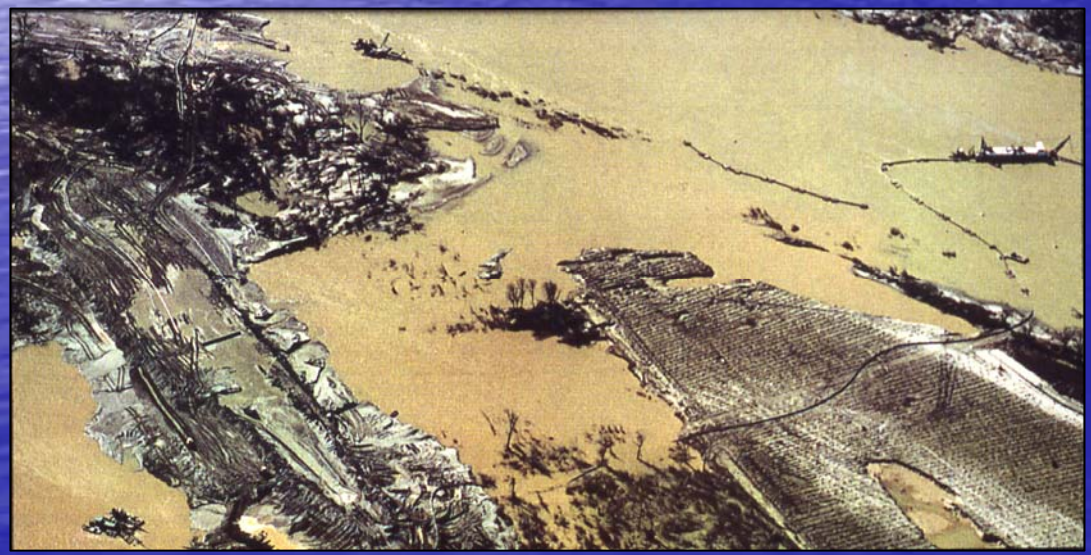
- **Permeability contrasts** caused by clay filled oxbows create treacherous and contrasting foundation conditions beneath levees.



- **The worst combination of foundation conditions is the ‘gore point’ formed between two infilled oxbows, as shown here.**

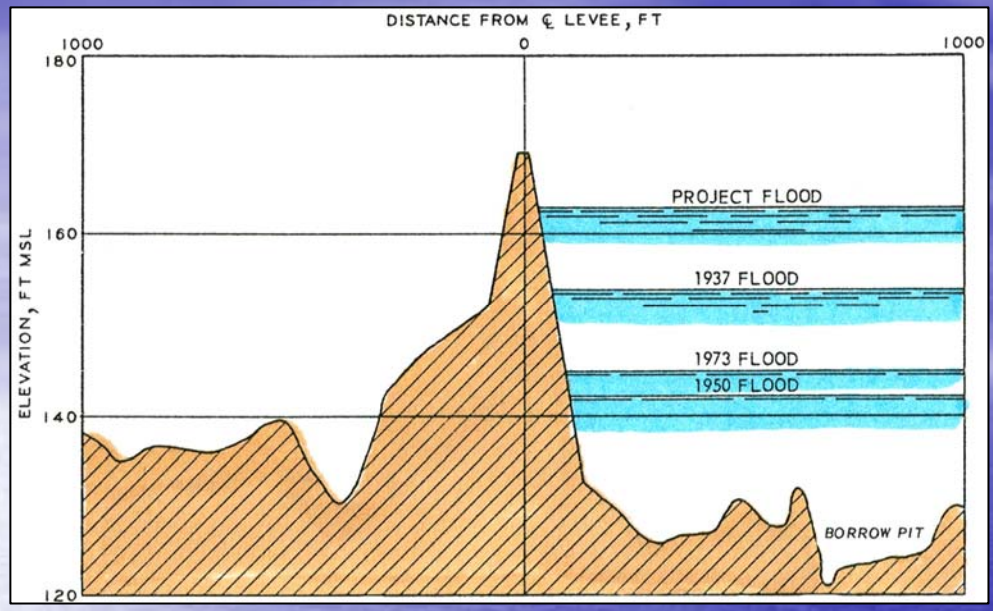


- **Clay filled oxbows consolidate under the load imposed by the earthen levees, causing these levees to settle and sink. Differential settlement is a major obstacle in maintaining levees.**



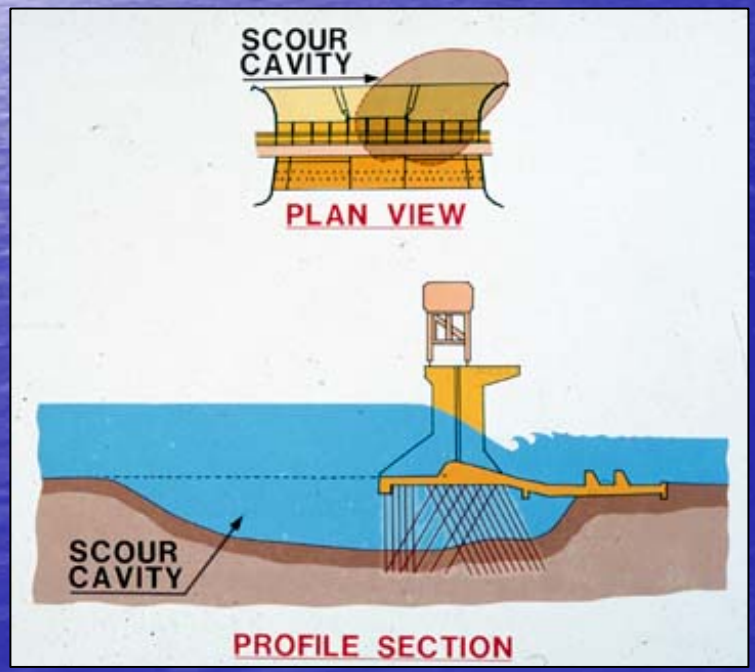
Levee Failures

- Levees tend to fail during sustained high flow events because of underseepage problems, toe scour, and overtopping



The Big Test came in 1973

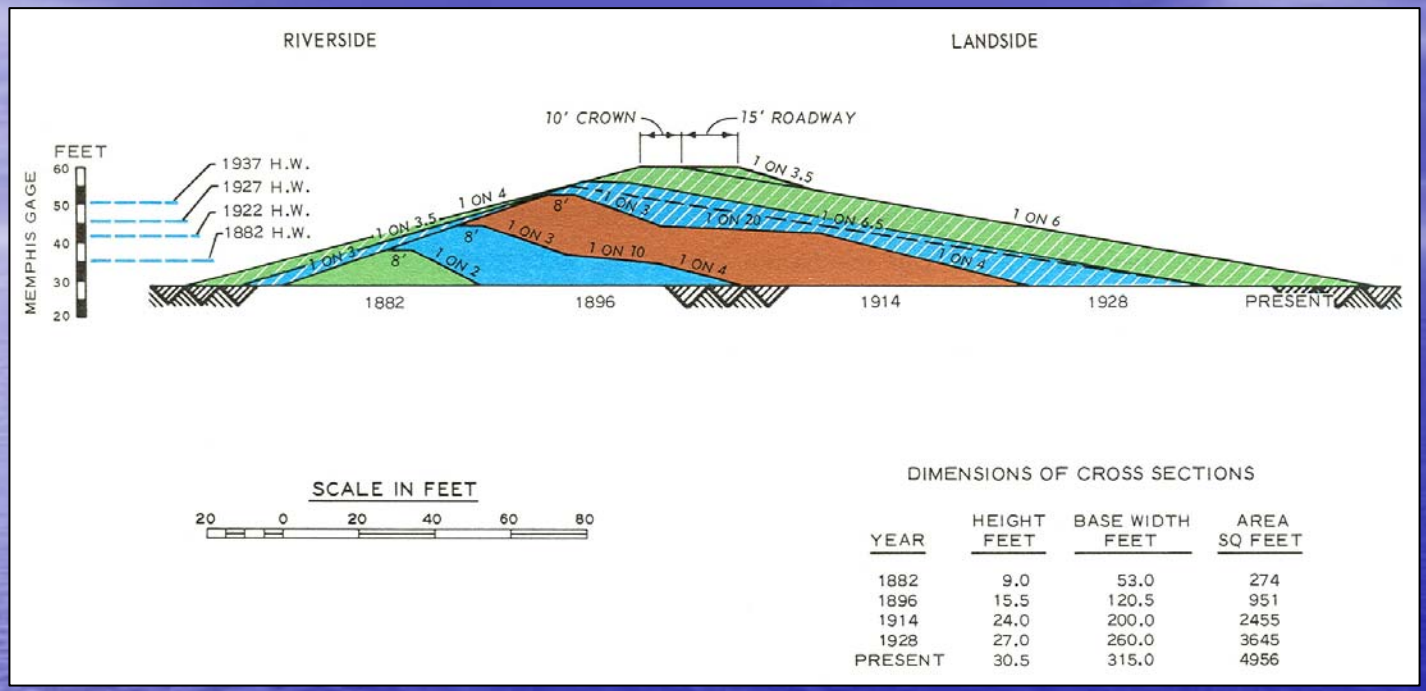
- The Corps of Engineers came perilously close to losing the Old River Diversion structure connecting to the Atchafalaya Bypass during the 1973 flood. Its capacity was doubled afterward.



Collapsed Wing Wall on Old River Diversion Structure

- Scour cavities developed on both sides of the Low Sill Diversion Structure during the Flood of 1973.
- If these scour holes had conjoined, the structure would have failed, and a new Mississippi River channel would have been carved down the Atchafalaya River to the Gulf of Mexico.

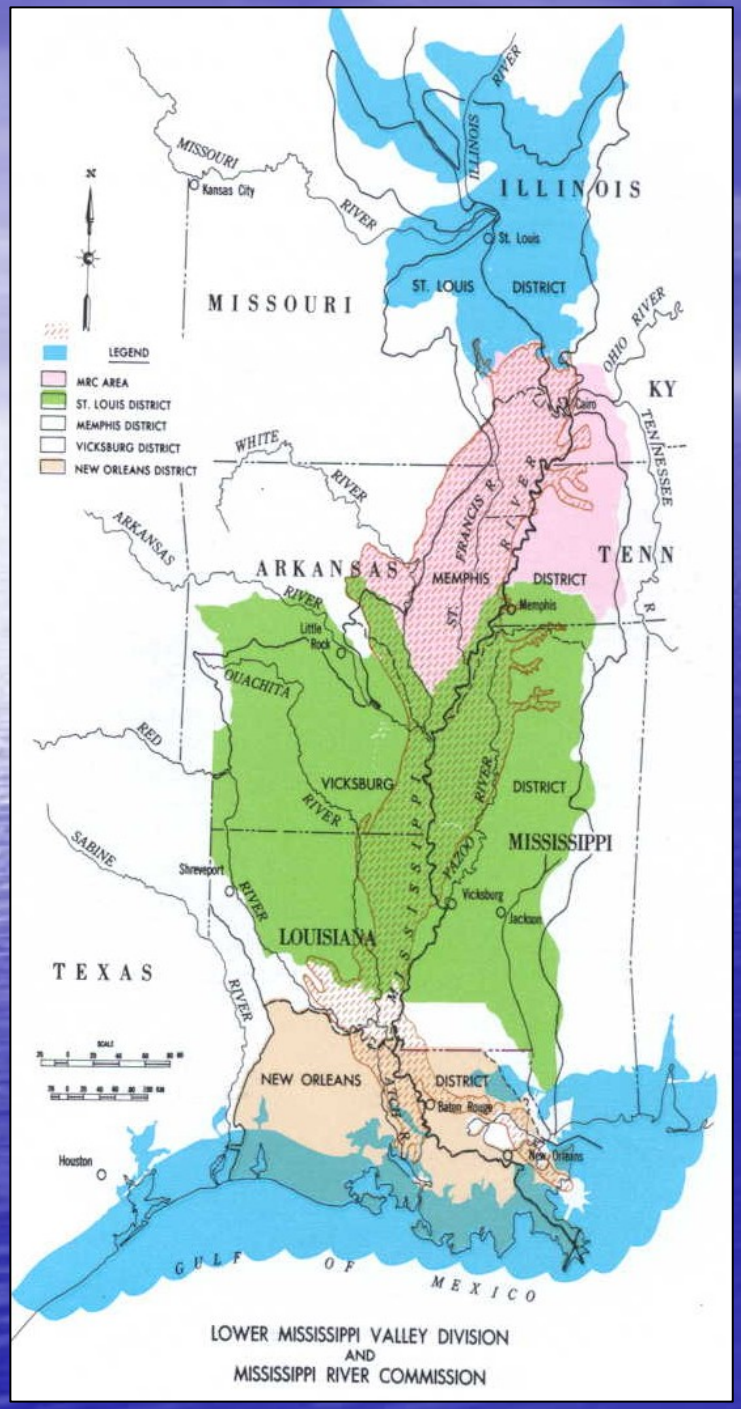
Levees still needed to be raised



DIMENSIONS OF CROSS SECTIONS

YEAR	HEIGHT FEET	BASE WIDTH FEET	AREA SQ FEET
1882	9.0	53.0	274
1896	15.5	120.5	951
1914	24.0	200.0	2455
1928	27.0	260.0	3645
PRESENT	30.5	315.0	4956

- Typical levee cross section in New Orleans area
- Louisiana levee topped out during the record 1973 flood



Operations and Maintenance

- O & M is handled by the respective Corps of Engineers Districts located along the Mississippi River Valley, shown here.
- The district's O&M budgets have been slashed to nothing in recent years, due to shifting Federal budget shortfalls