

“DIG IT KINGWOOD”

San Jacinto River and Lake Houston

Kingwood, TX

2017 - 2018

Devastating Effects of Harvey Flooding in Kingwood



**Kingwood Residents & Businesses
Demand Solutions!**



May 24, 2017



August 31, 2017



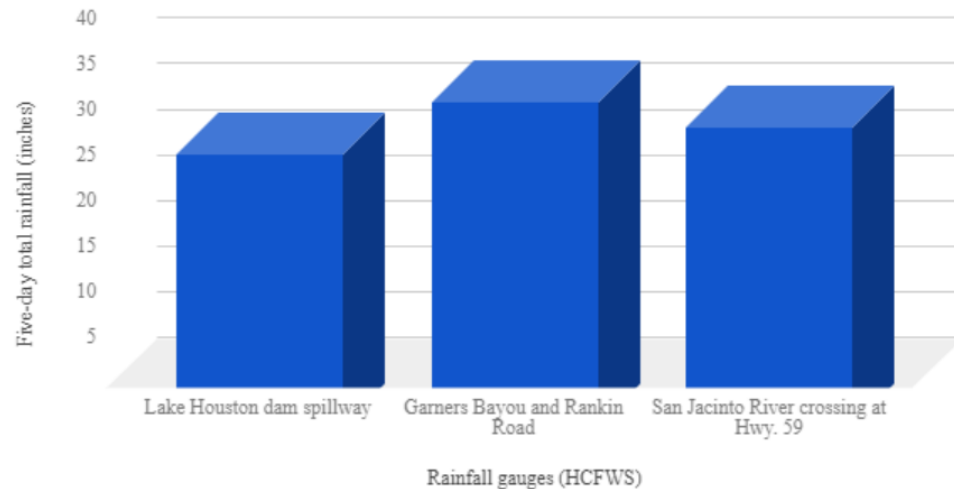
Major existing & new businesses in the Humble, Kingwood, Atascocita areas are debating their options regarding.....

Rebuild vs Relocate?

Perspective on Rainfall Amounts

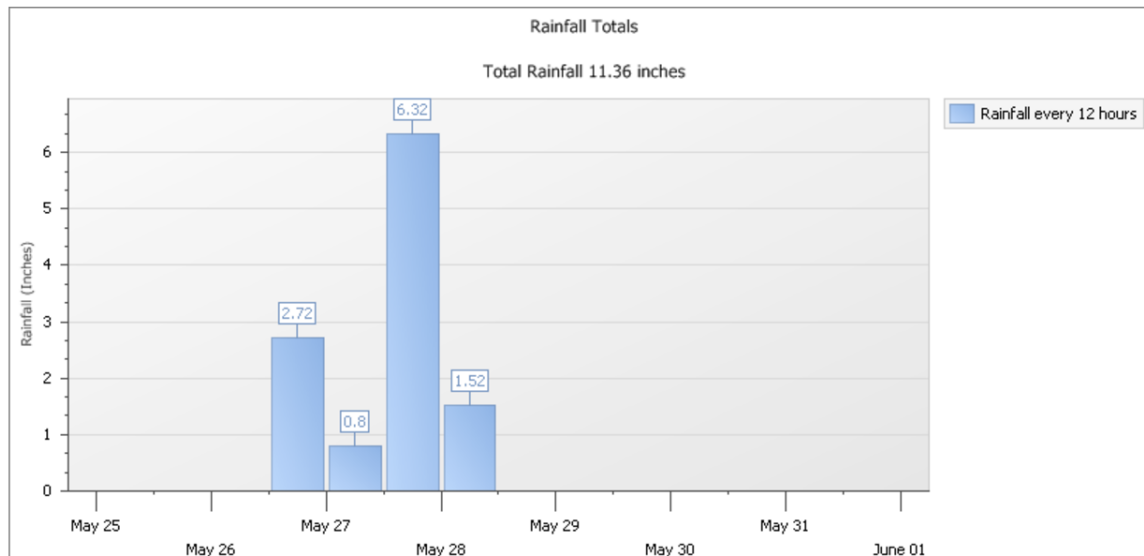
San Jacinto River and Lake Houston Area

Lake Houston area
Aug. 26-30, 2017



Aug 26 – 30, 2017:

- 30+ inches of rain across a large area
- Lake level @ 52.5'



May 26 – 28, 2016:

- 11.36 inches of rain
- Lake level at 47.8'

Somewhat Incorrect Conclusions

- **Had excessive rainfall due to Hurricane Harvey**
- **Due to rain amounts, San Jacinto River & Lake Houston reached historic levels**
- **High lake level flooded extensive areas of Kingwood**
- **Lake Conroe releases accelerated the problem**
- **500+ year storm conditions that will not happen again**
- **Rebuild Humble & Kingwood businesses and residential areas**
- **“Everything will be AOK”**

DIG IT KINGWOOD

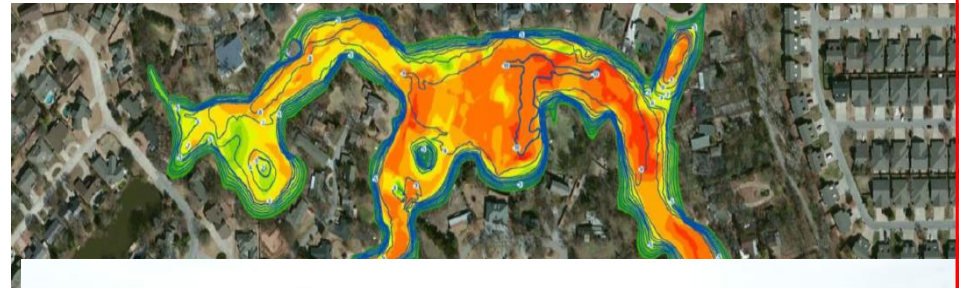
Kingwood...we have a Problem:

- Massive, new sedimentation deposits along key areas of the San Jacinto River and Upper Lake Houston area near the highly urbanized Kingwood community has contributed to unprecedented flooding events which will only worsen with time.



The Solution:

- Hydrographic surveying and 3D imaging analysis of the West Fork of the San Jacinto River and upper Lake Houston region in order to accurately define the problem
- Extensive dredging and relocation of the sediment to new areas in order to clear the blockage and help mitigate future flooding concerns
- Eliminate / Restrict the unregulated major sand mining operations occurring along the river
- Partnership between local, state, federal agencies, sand miners, and an experienced dredging vendor with a common goal is a must



River and Lake Sedimentation

- Catastrophic Flooding -

This is NOT a New Issue

Regional Flood Protection Study

For

Lake Houston Watershed Flood Program

(Final Report)

RECEIVED

SEP 5 2000

WDB
GRANTS MANAGEMENT

for

City of Houston
Harris County Flood Control District
Montgomery County and
San Jacinto River Authority
Texas Water Development Board



PREPARED BY



BROWN & ROOT SERVICES

Engineering Services by Halliburton Technical Services, Inc.

June 30, 2000

EXECUTIVE SUMMARY

Since the early 1970's to the present time, communities surrounding Lake Houston have experienced a rapid growth from a rural to a suburban settling. The proximity to Houston and the growth trend in the area significantly influenced growth in the communities situated along the lower reaches of the West Fork of the San Jacinto River. Undeveloped and agricultural land were converted to residential and commercial development, especially in the planned communities of Kingwood and Atascocita. New developments are mostly focused along the Lake Houston Parkway corridor. Several other existing subdivisions within the area include Lakeside, Riverside Oilfield, Riverside Crest, Forest Cove, Belleau Wood, Ramblewood, and Northshore. With the increased urbanization and record floods in recent years, namely the floods of October 1994 and November 1998, concerns related to the flooding problems have occurred along the West Fork channel upstream of the Lake Houston dam.

Previous studies of Lake Houston suggested that continuous sedimentation may have reduced the storage capacity of the Lake since its construction. Further more, recent floods in the area may suggest that the increased sedimentation in Lake Houston and its upstream tributaries may have aggravated flooding conditions.

In late 1997, Brown & Root was contracted by the City of Houston in conjunction with funding from the Texas Water Development Board (TWDB), the Harris County Flood Control District (HCFCD), Montgomery County and the San Jacinto River Authority (SJRA). The scope was to prepare a regional flood protection study for a Lake Houston Watershed Flood Mitigation Program. The purpose of this study is to identify the sediment problem along the upper reach of the lake and to investigate/formulate methods of controlling flood damage in the area. The study area is limited to the West Fork of the San Jacinto River between one-mile upstream of the US Highway 59 bridge and the FM 1960 bridge.

“Mayor Turner Heads To DC With Plan For Lake Houston Flooding”

July 5, 2016 (U of H – Public Media)

Looking to solve flooding northeast of the city, **Councilman Dave Martin will join Mayor Sylvester Turner**, members of the city’s Congressional Delegation, and others in a meeting with the **U.S. Army Corp of Engineers in Washington**.

Martin thinks the solution to flooding along the San Jacinto River and around Lake Houston is to **dredge the 62-year old lake**. “Because of the silt that has gone from various other tributaries that lead into Lake Houston we’ve **lost probably about 50% of the holding capacity** of the water that sits in Lake Houston,” Martin says. With less room for water in the lake, heavy rains have produced major flooding.

Martin believes the **cost to dredge the lake could be anywhere from \$2-10-billion dollars**, and whatever the cost, it will require federal, state and local money. “Anyone who lives in around the Kingwood, Conroe, Huffman and all those areas can look at it, and there is no doubt about it that it’s different today than it ever was,” said Martin. Houston’s recently appointed **“Flood Czar” Stephen Costello** will also be making the trip to Washington.

Major **Sand Mining Operations** on San Jacinto River are **DESTROYING** the river



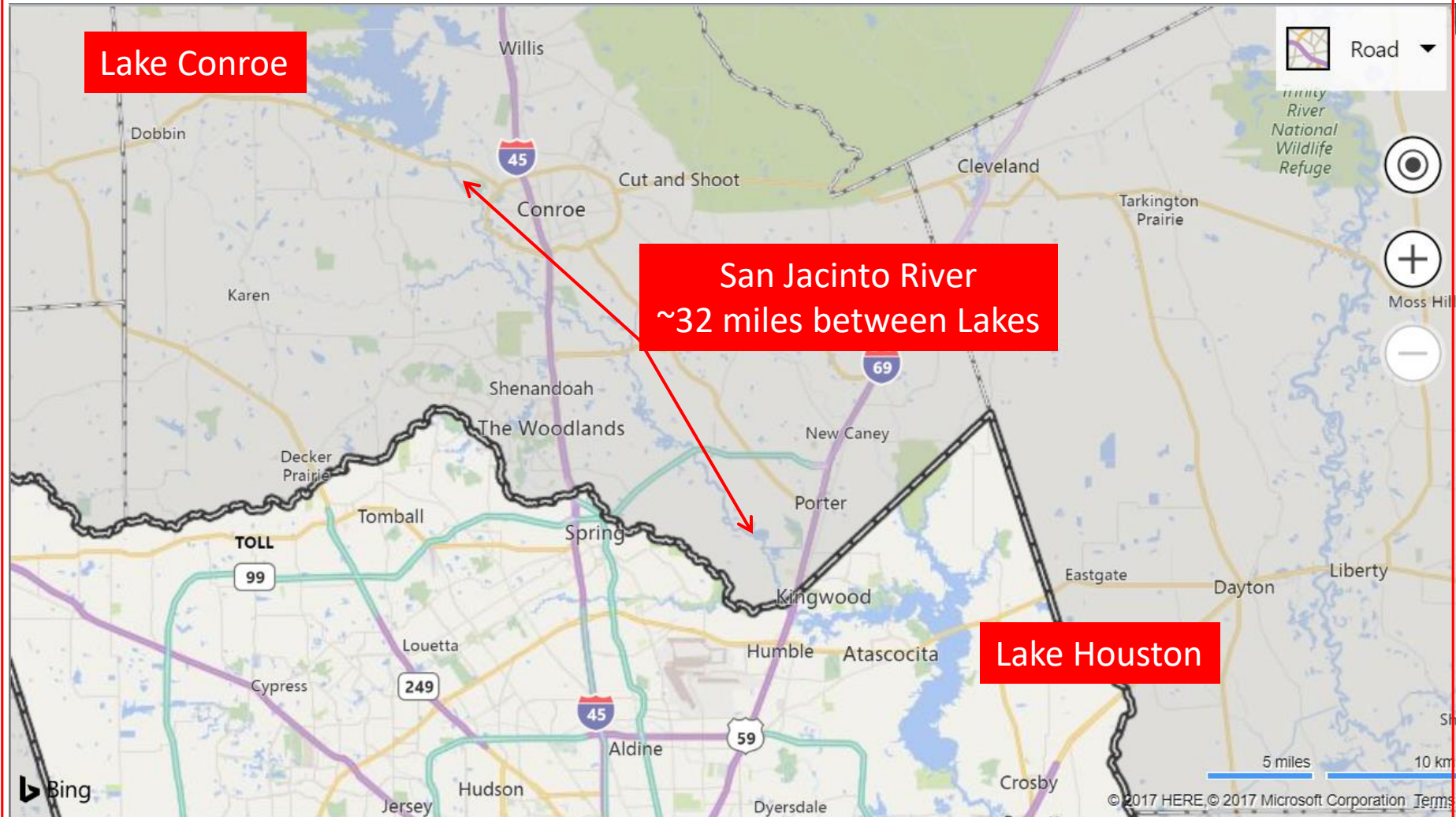
Major **Sand Mining Operations** are pumping
the river full of mud and waste sediment



LAKE CONROE
SAN JACINTO RIVER
LAKE HOUSTON

Simple “Road Map” View of the Area

Issue is more complex than a simple view

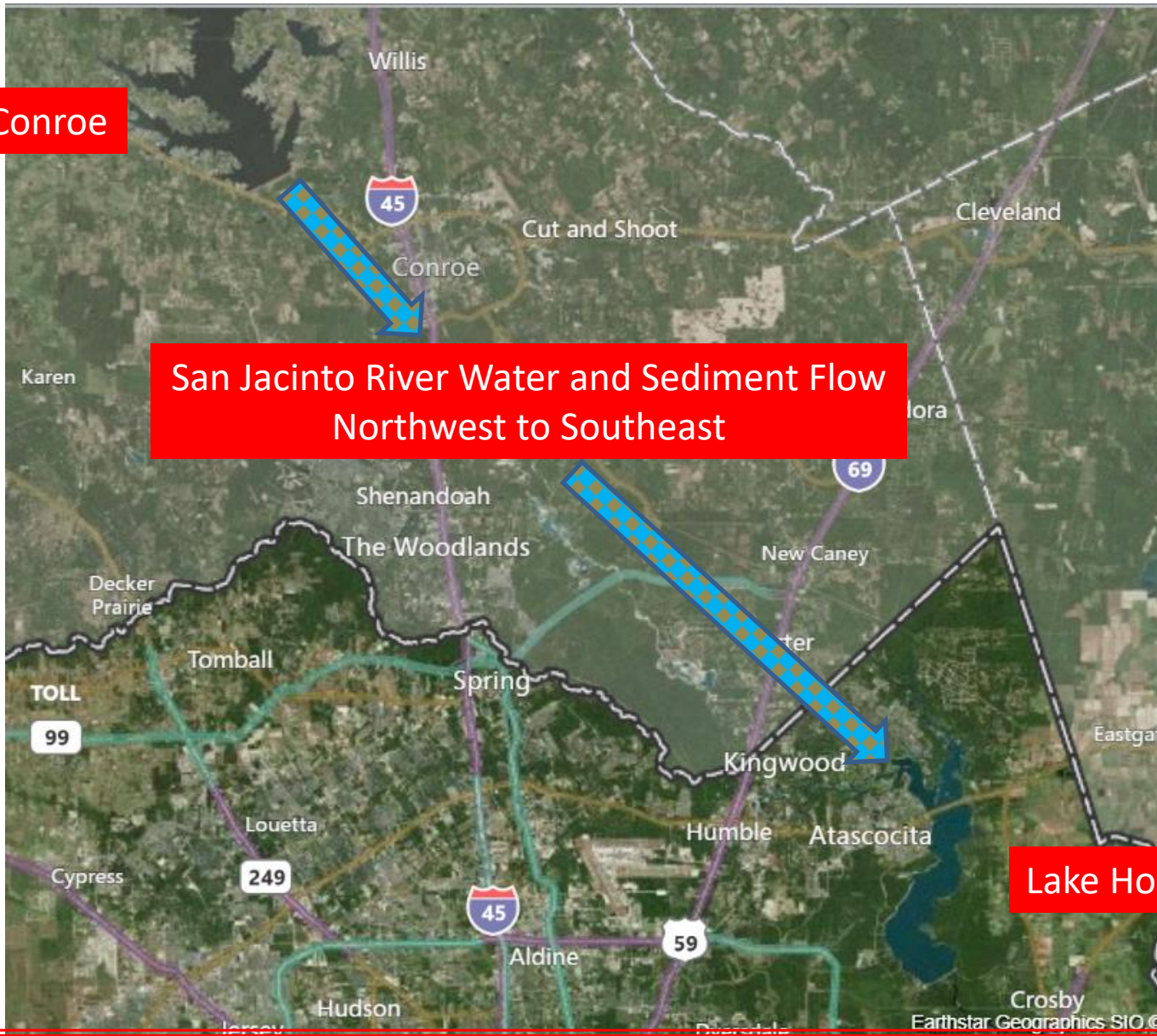


Google Earth Map View of the Area

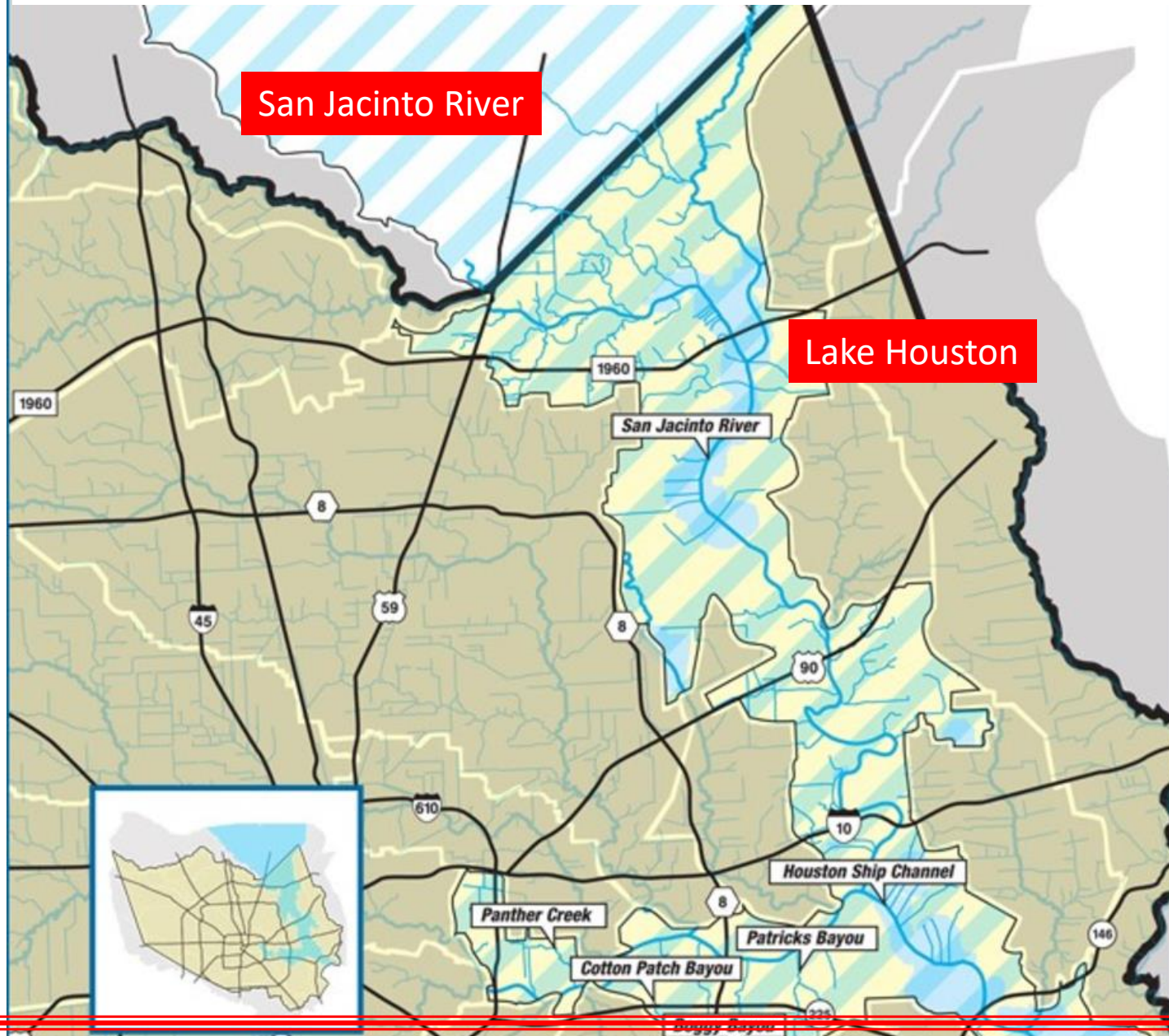
Lake Conroe

San Jacinto River Water and Sediment Flow
Northwest to Southeast

Lake Houston

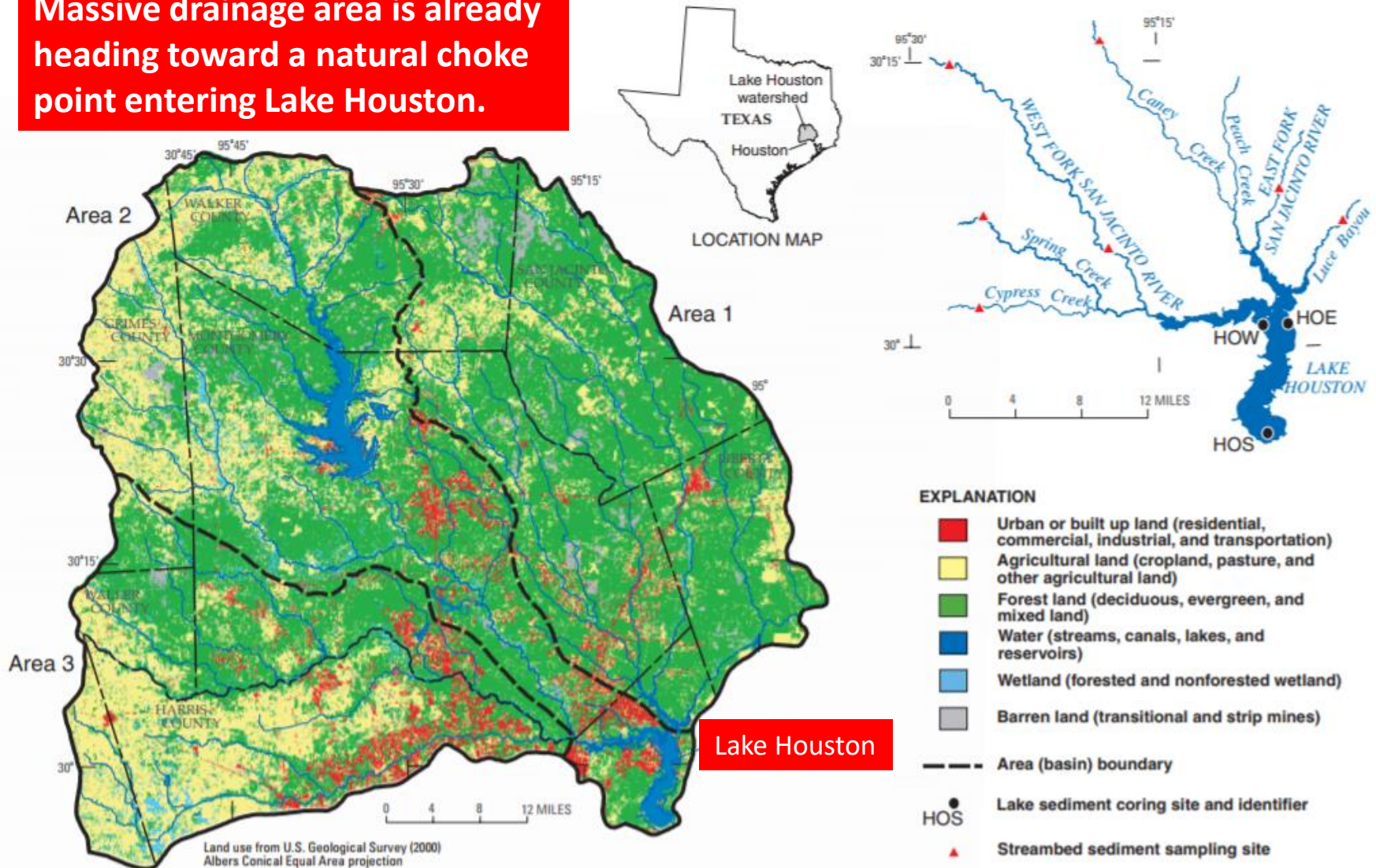


Lake Houston Localized Watershed Map

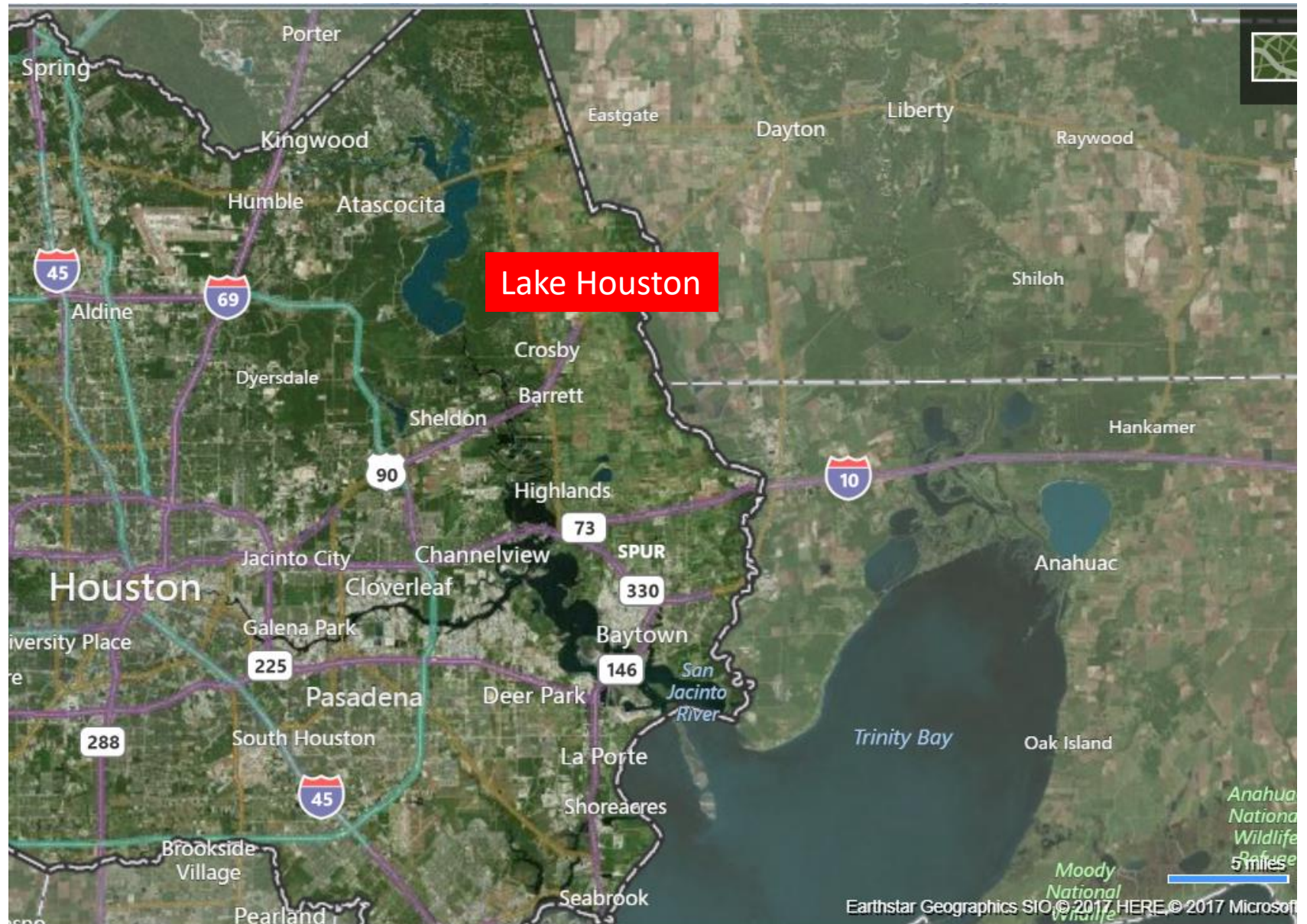


Lake Houston True Watershed Map

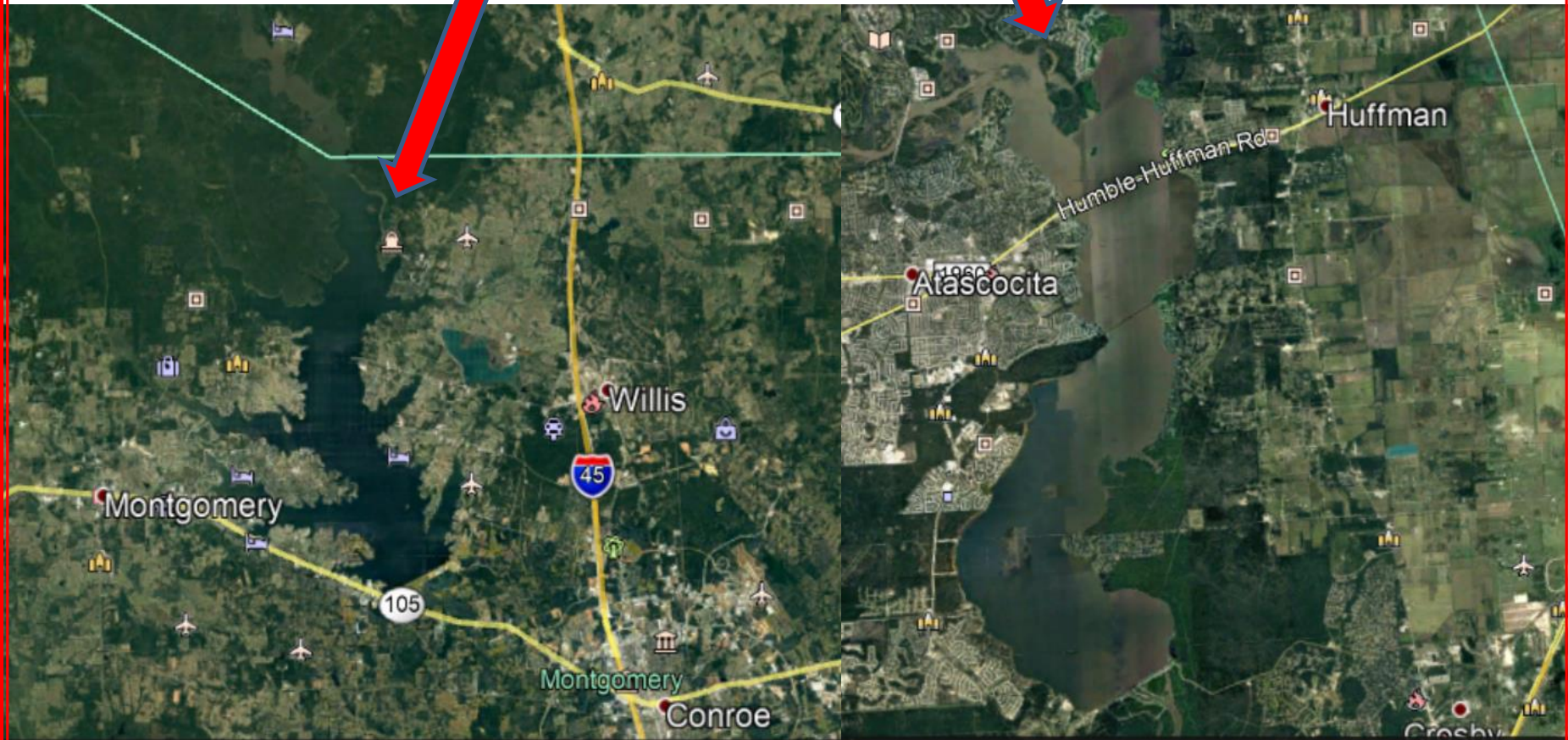
Massive drainage area is already heading toward a natural choke point entering Lake Houston.



Downstream of Lake Houston



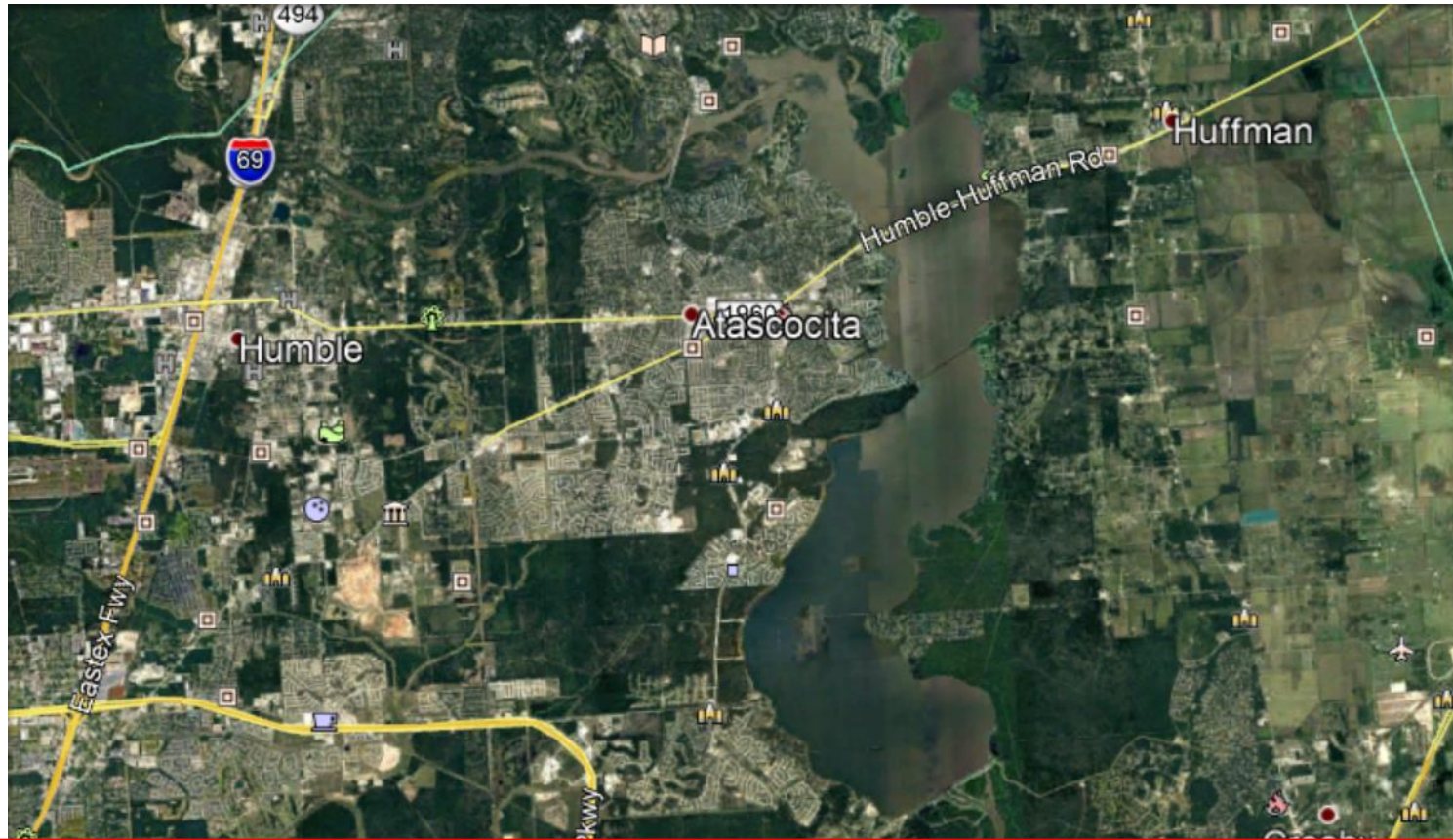
Lake Conroe vs Lake Houston



Lake Houston

- Created in 1954 with a storage capacity of 158,553 acre-feet
- Storage capacity in 2011: 124,661 acre-feet which is 21.4% less than the original capacity
- Storage capacity in 2017: Est at < 120,000 acre feet or ~25% reduction over time

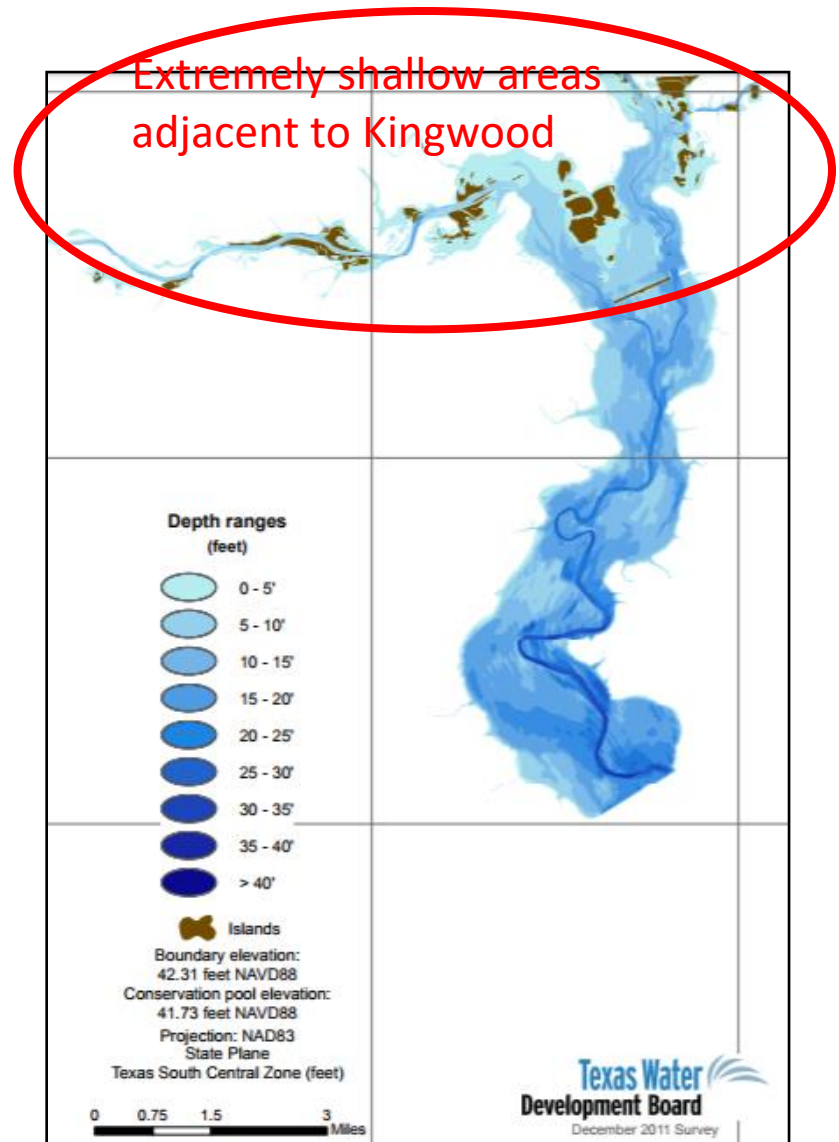
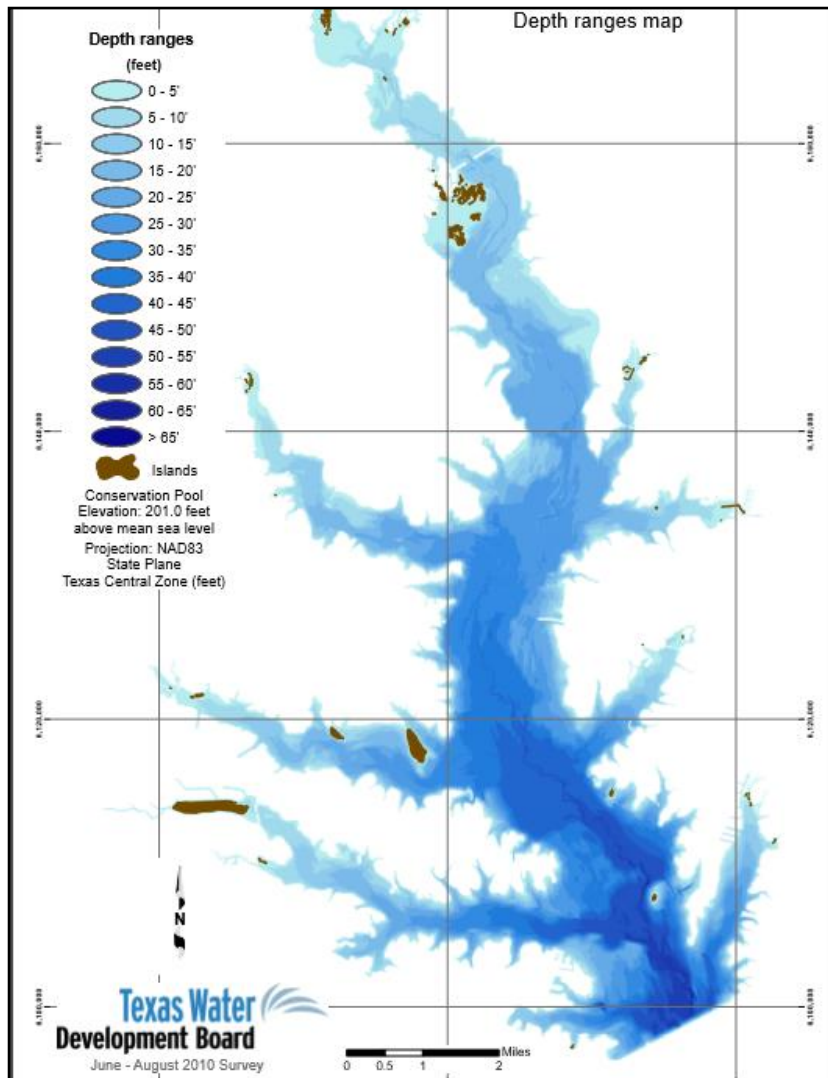
*"The sedimentation survey indicates sediment accumulation varies throughout the reservoir. **Accumulations of sediment are thicker within the natural depressions throughout the reservoir than in the river channels.** The heaviest accumulations measured by this survey are between 1.14 and 2.84 miles north of the dam on the **western half of the reservoir.** TWDB recommends that a similar methodology be used to **resurvey Lake Houston in 10 years or after a major flood event.**"*



Lake Houston vs Lake Conroe

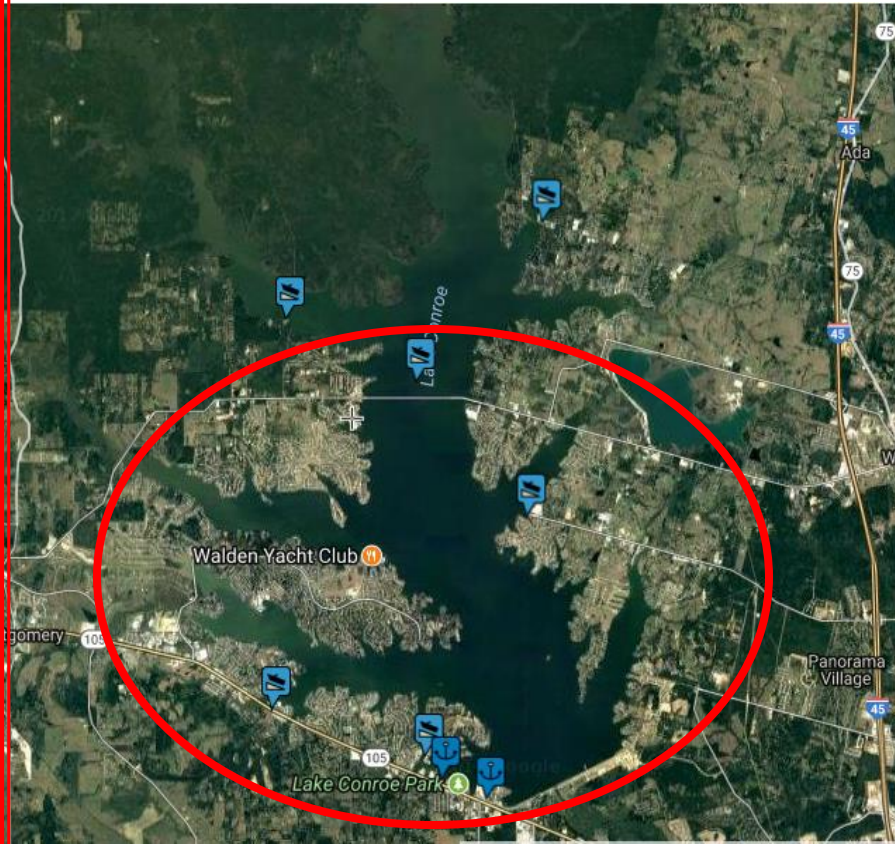
	Lake Houston	Lake Conroe
Year Built	1954	1973
2010/'11 Storage Capacity	124,661	411,022
Area Covered	11,854 acres	21,000 acres
Water Depth (typ. range)	2' to 45'	5' to 80'
Sedimentation Rate (depth adj.)	Rapid	Slow
Flooded Residents in Aug 2017	Thousands	Zero?

Lake Conroe vs Lake Houston

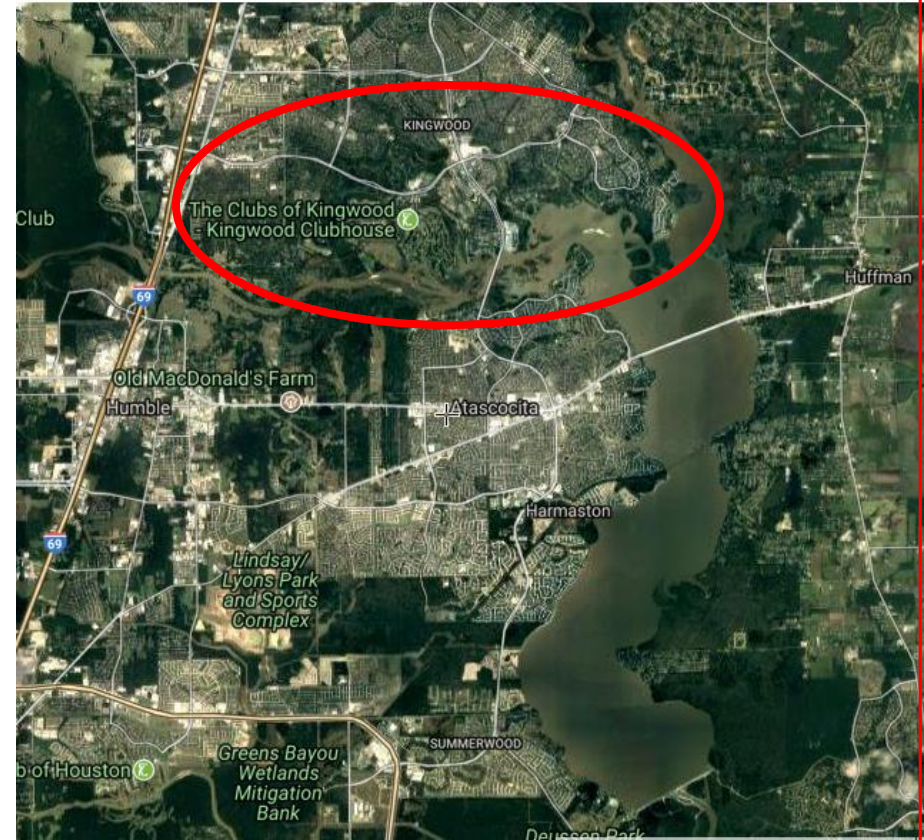


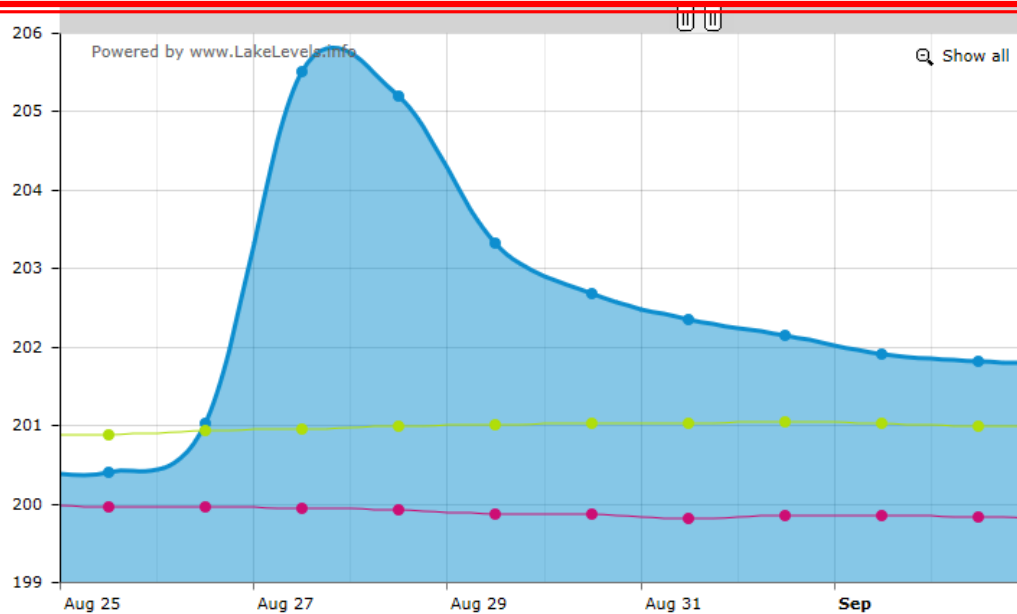
Lake Conroe vs Lake Houston

Lake Conroe development is on south end of lake in the deeper, non flood prone areas



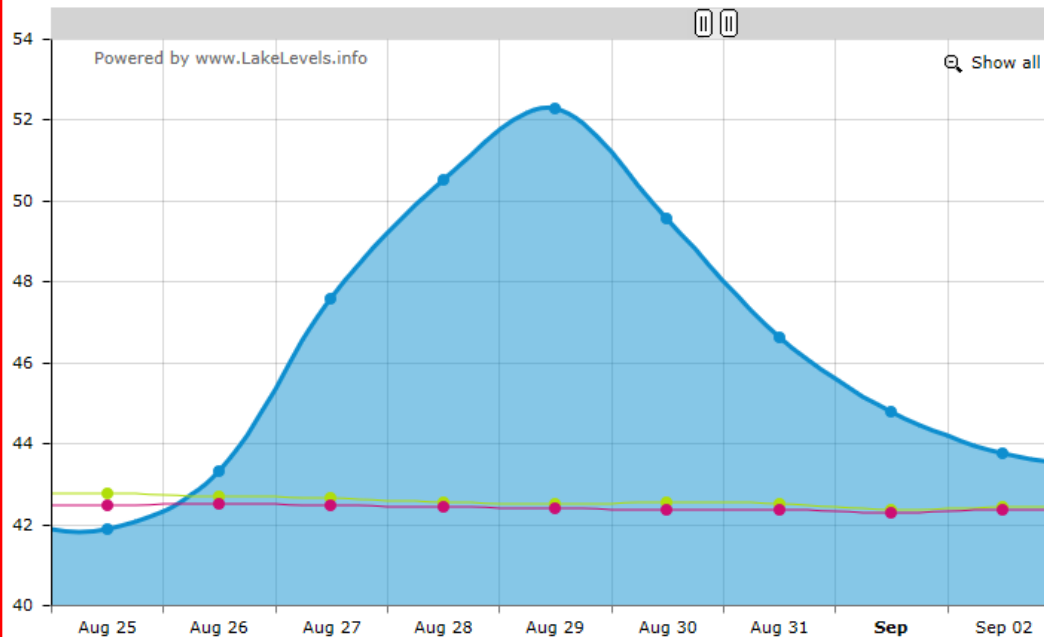
Kingwood development is on north end of lake in the ultra shallow, flood prone areas





Lake Conroe Level:

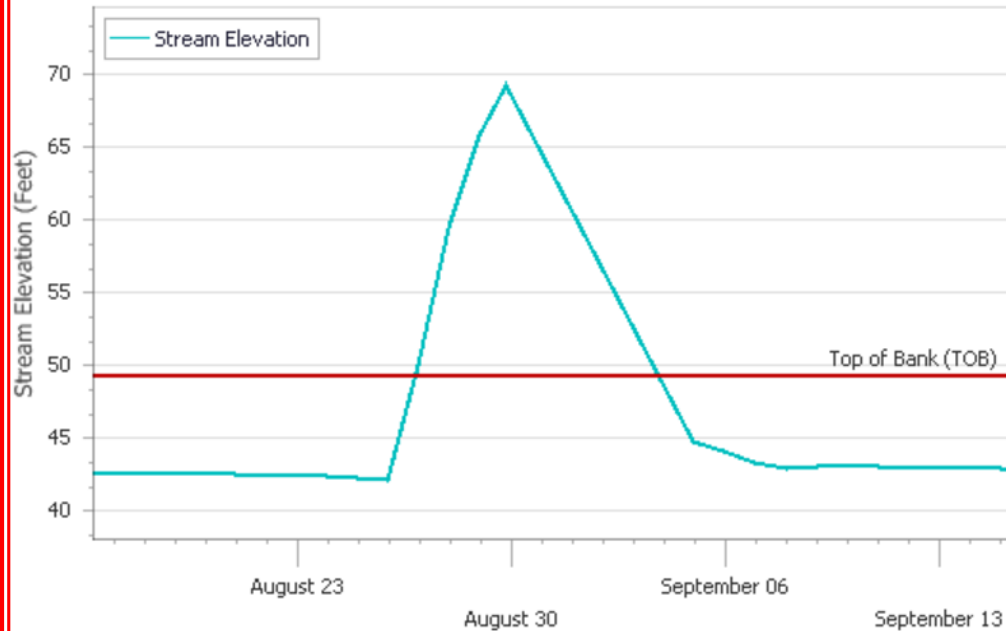
- Max of 205.8'
- 5' above normal
- ~2.5% higher
- Max on August 27, 2017
- ?? flooded residents



Lake Houston Level:

- Max of 52.5'
- 10' above normal
- ~24% higher
- Max on August 29, 2017
- Thousands of flooded residents

Stream Elevation
G103_760 San Jacinto River @ US 59

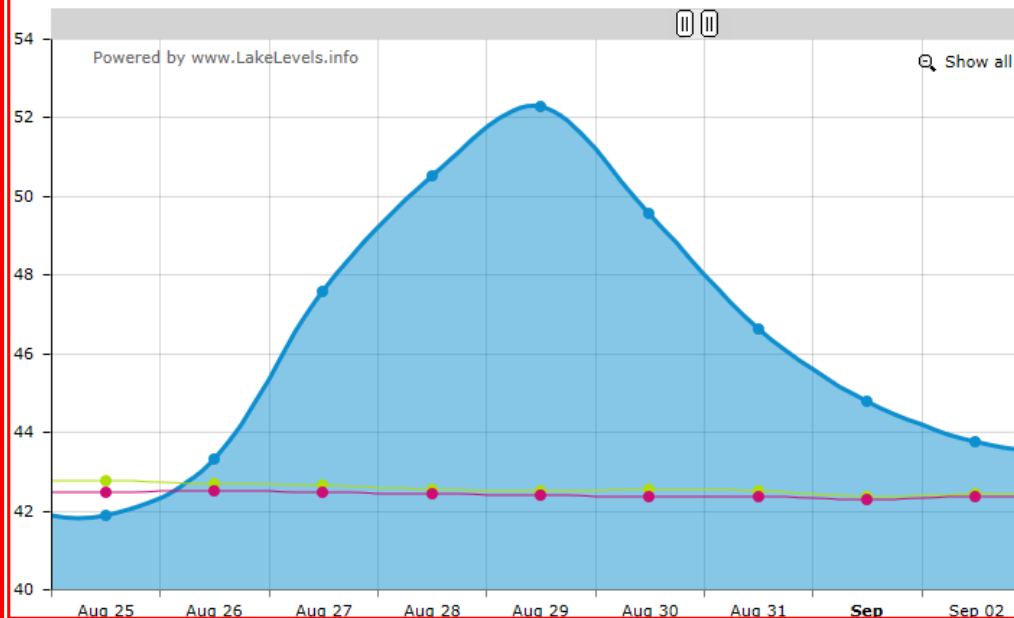


Drone photo Lake Conroe Dam Release – Aug 28th



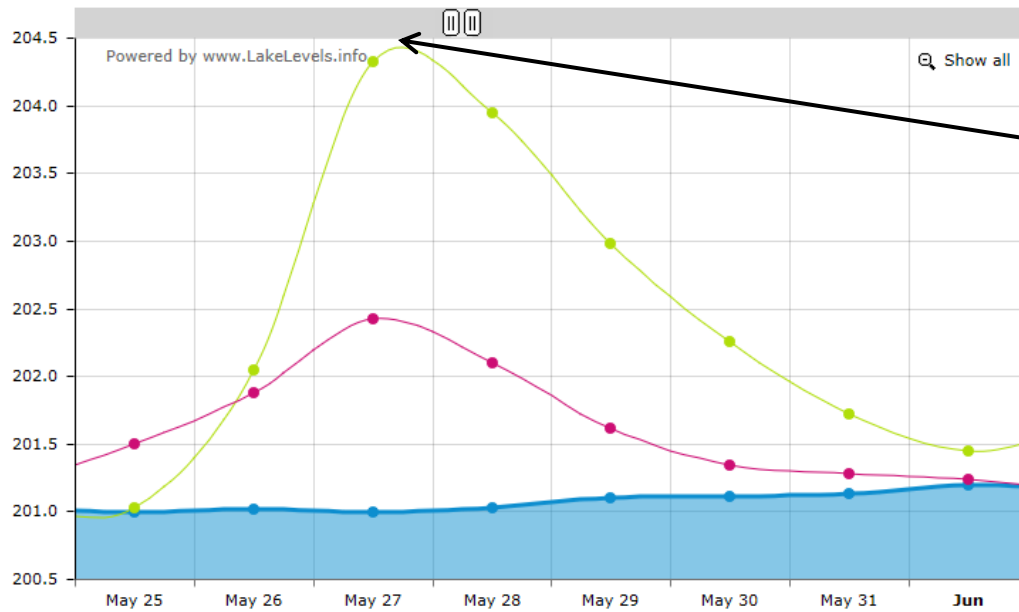
West Fork San Jacinto River at I59:

- Max of 69.2'
- 27' above normal
- ~65% higher
- Max on Aug 29, 2017



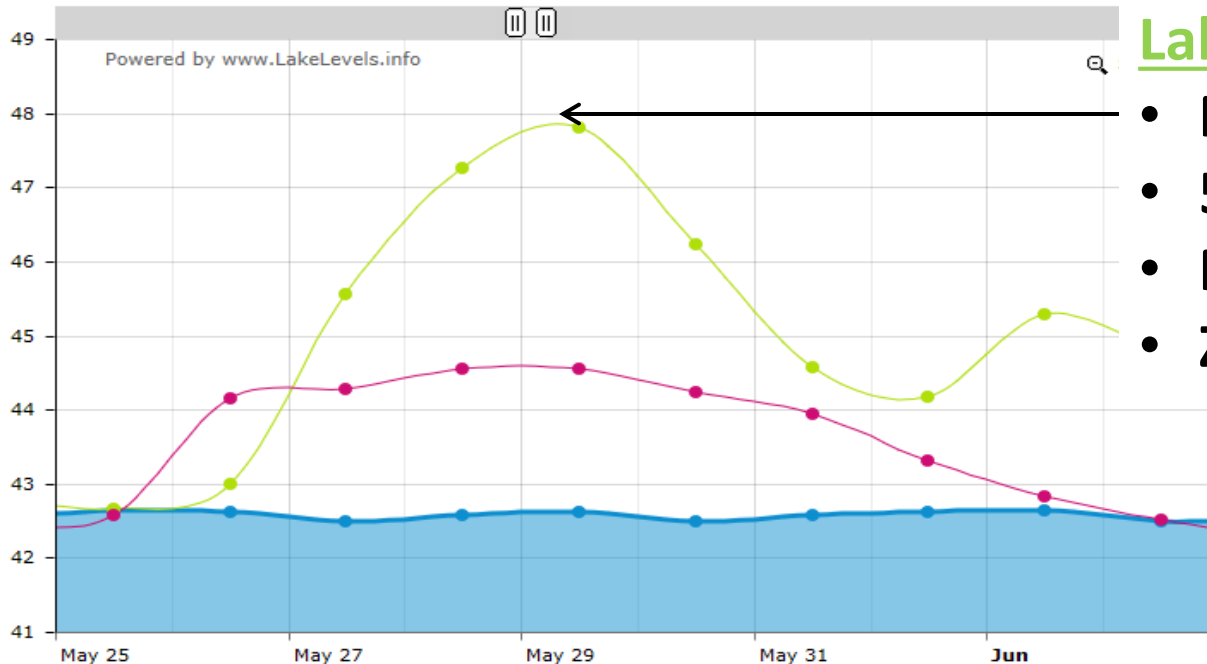
Lake Houston Level:

- Max of 52.5'
- 10' above normal
- ~24% higher
- Max on August 29, 2017



Lake Conroe 2016 Level:

- Max of 204.3'
- 3' above normal
- Max on May 27, 2016
- Zero flooded residents



Lake Houston 2016 Level:

- Max of 47.8'
- 5' above normal
- Max on May 29, 2016
- Zero flooded residents?

New Deimos Satellite Imagery



An illustration of the Deimos-1 satellite (left) and the very-high-resolution Deimos-2 satellite (right). Deimos Imaging; Airbus; Business Insider

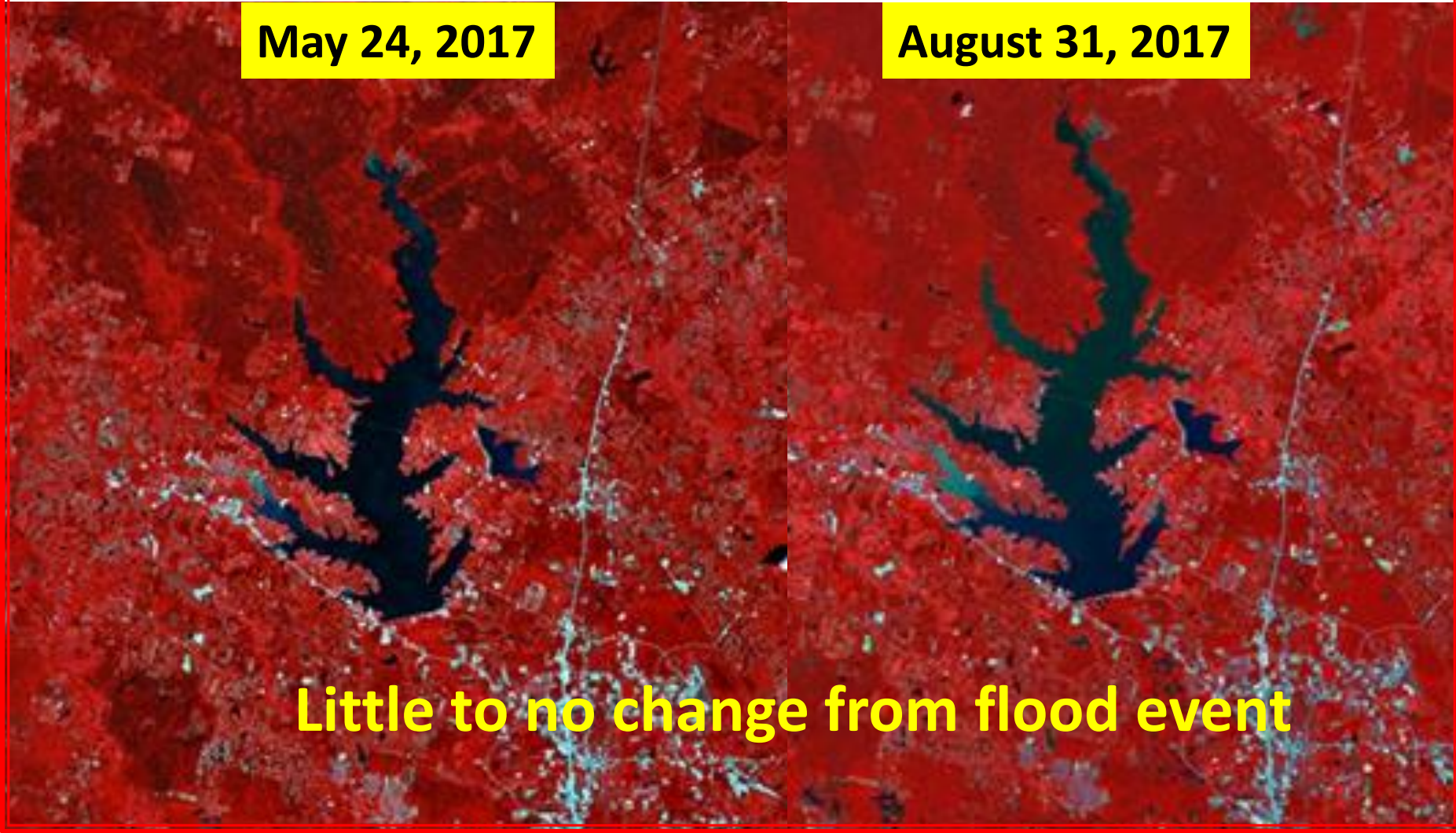
LAKE CONROE

Before & After Harvey

May 24, 2017

August 31, 2017

Little to no change from flood event



LAKE HOUSTON

Before & After Harvey

Major Sediment Plug pre-Harvey

Devastating Flood Event
Upstream & Downstream

West Fork of San Jacinto River at Kingwood

Major River Sediment Plug

May 24, 2017

Wide Spread Flooding Event

August 31, 2017

TRINITY BAY AND GOM

Before & After Harvey



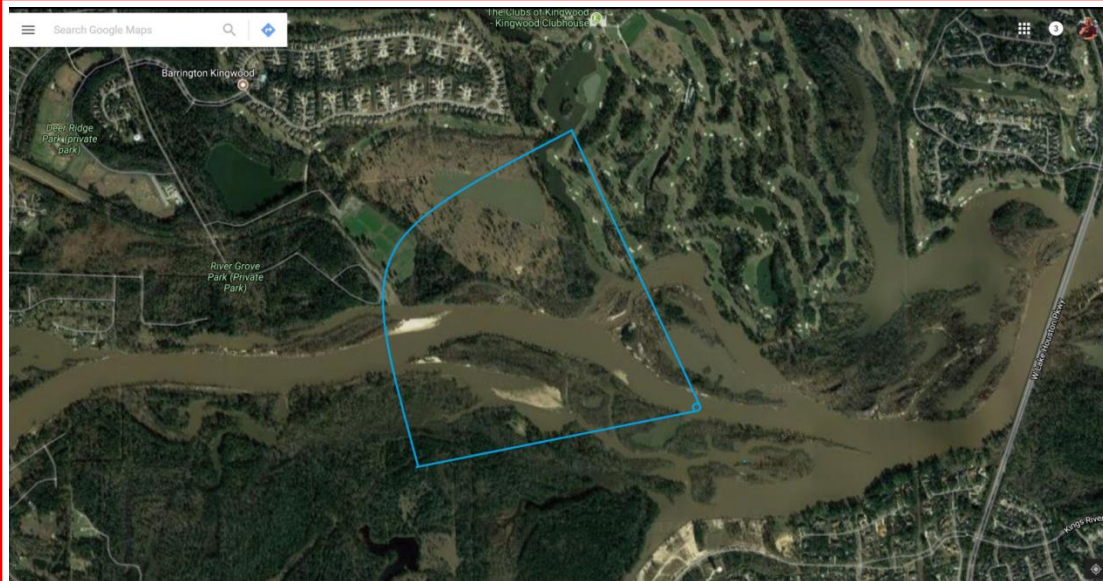
“Kingwood.....we have a Problem”

- **Drone view of NEW sediment plugs as of September 15, 2017**



Pre-Harvey: Kingwood Target Area





Area 1: Pre-Harvey looking to the west of the West Lake Houston bridge



Area 1: Post-Harvey looking back to the west showing new large sediment plugs and ultra shallow water filled with new mud/sediment.

An aerial photograph showing a complex river system with multiple channels and islands. The water is a murky brown color, and large areas of the riverbed are exposed, appearing as light-colored sand or silt. The surrounding landscape is heavily forested with green trees. In the background, a bridge is visible across the river. The text 'W. Lake Houston Bridge' is overlaid in the upper right area.

W. Lake Houston Bridge

**Entire River complex getting
filled with sediment plugs
and ultra shallow water
depths due west of W. Lake
Houston Bridge**

W. Lake Houston Bridge



**Entire River complex getting
filled with sediment plugs
and ultra shallow water**



**River View of major
new sand bar
completely blocking
the West Fork of the
San Jacinto River just
west and upstream of
of the West Lake
Houston Bridge**



Zoom in shot of sand bar

**People literally walking
across the river along the
new sand bar. New river
blockage and ultra shallow
river channel will help to
cause MAJOR FLOODING
EVENTS in the future.**



Sediment Plugs will force river to find new pathways during times of extreme rainfall and new flood prone areas will be created

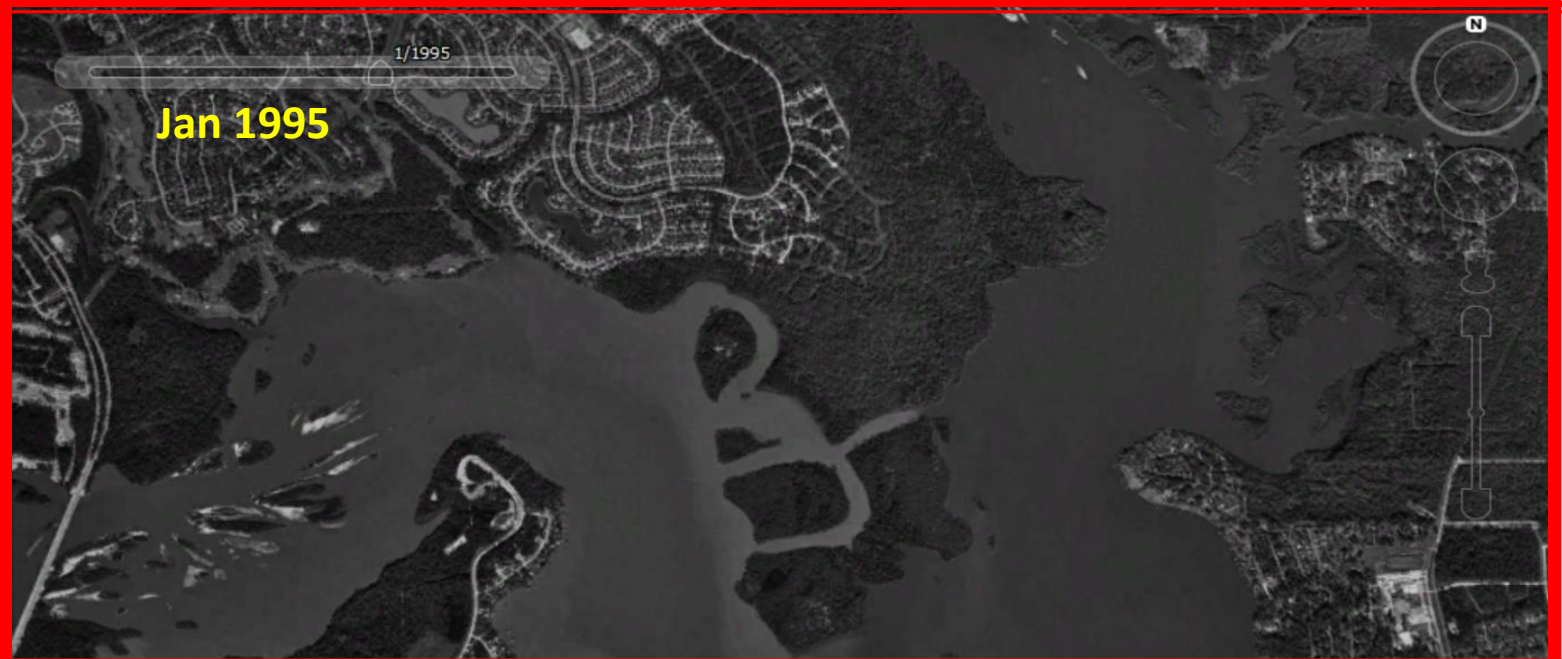


Entire River complex getting filled with sediment plugs and ultra shallow water

Sediment Plugs serve as “choke points” and will force river to find new pathways during times of extreme rainfall and new flood prone areas will be created

W. Lake Houston Bridge





Post Harvey: Major Sediment Plug east of the bridge. Photo shows plug and ultra shallow water covering a very large area



Post Harvey: Major Sediment Plug east of the bridge. Photos shows pre-existing plug getting larger, and ultra shallow water now covering an even larger area



Major new and previously existing sand bars restricting flow along other key areas of the river and entry into Lake Houston, both west and east of the W. Lake Houston Bridge.



Major new and previously existing sand bars restricting flow along other key areas of the river and entry into Lake Houston, both west and east of the W. Lake Houston Bridge.



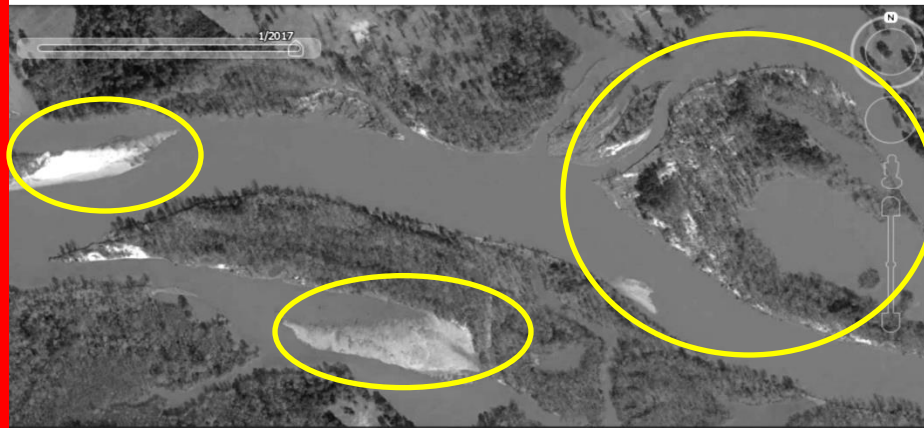
Area 1: Pre-Harvey River channel west of WLH Bridge





1978

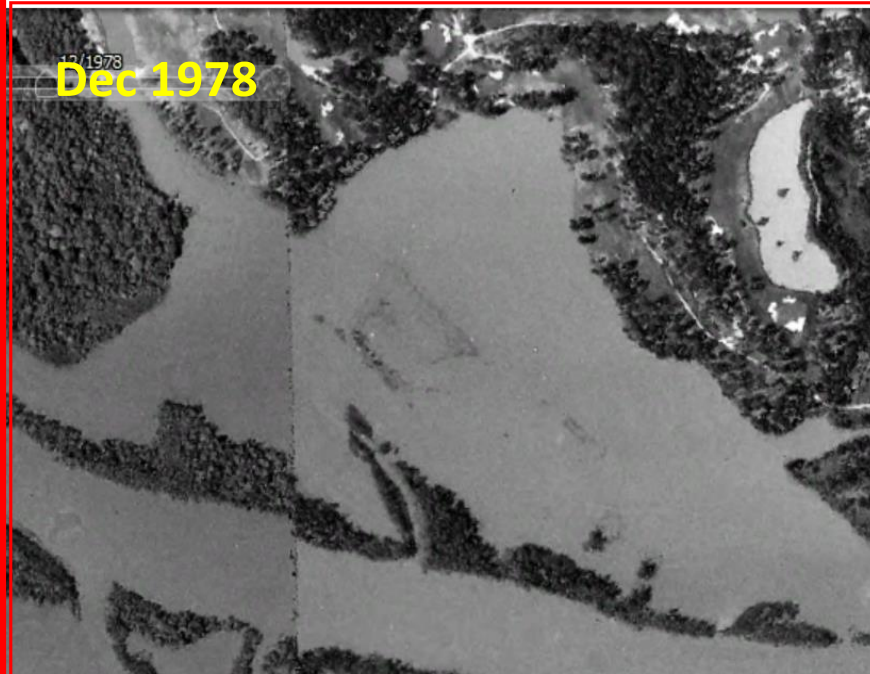
Massive amounts of sediment are now covering major areas of the San Jacinto River upstream of Kingwood, and the problem continues to only get worse!



Jan 2017



Sept 2017



Major Sand Mining Operations

- Major contributing factor in excessive mud and sediments being pumped into the river, and mines causing massive erosional consequences
- These activities must stop immediately and regulations must be put in place to prevent further illegal mud/sediment dumping





Muddy Waters: Sand Mining the Endangered San Jacinto River
By Wendee Holtcamp

- Direct excerpts from Holtcamp article written in June 2006....over 10 years ago!!:

Because of sand mining, the San Jacinto was named one of 10 most endangered rivers in 2006 by American Rivers. Sand and gravel mining – including the production of its main product, concrete -

"Sand pits from the air are 10 times worse than what they look like on the ground," says Dennis Johnston, Harris County Precinct 4 Administrator. "They totally dominate the landscape along the San Jacinto River. It looks like nuclear war was practiced in this theatre. The silt drainage they were pumping into the river was so obvious that it looked like cream running into a fresh poured cup of tea."

Bulldozers, cranes and dumptrucks actively worked, hauling away the fine sugar sand. At many sites, steady streams of muddy water flowed into the river, which is illegal without a permit. At one site, we couldn't see the river for the pit: the sand mine had apparently shifted the entire river course.

The daily operation of Texas sand and gravel companies does not seem to follow national norms. The National Stone, Sand and Gravel Association (NSSGA) mission states that wise environmental stewardship is good business, encouraging members to strive for excellence in environmental affairs and implement landscaping and wildlife habitat development. None of the Harris County companies reviewed by TCEQ were members.

"The San Jacinto has endured some pretty horrendous assaults over the years," says TPWDs Rollin McCrae. "It was apparently a beautiful, shallow, sandy bottom stream running through dense woods for most of its history, but its proximity to the explosive growth of Houston made that sand a prize commodity." That same proximity to Houston means that deforestation and muddying the water harms the citizens who need environmental protections on the river to ensure their health and safety.



December 2006

MANY BAYOUS, ONE RIVER

Recently designated one of America's most endangered rivers, the San Jacinto is under attack by sand mines.

- Excerpts from follow up article in December 2006 in Texas Parks & Wildlife magazine:

Although the San Jacinto actually did burn after the 1994 floods caused an oil pipe to burst, this 10-alarm "river fire" hails from the mining of sand from its bed and banks, and the muddying that has cast a ghostly pall over the river's once clear, flowing water. In April 2006, American Rivers (a national nonprofit river-conservation group) named the San Jacinto one of the nation's Most Endangered Rivers.

Though sand mines exist on both sides of the river, earthen levees keep them hidden from our view. The typical Texas sand mine clears riverside land, then gouges sand in deep pits. When finished, nothing regrows because the topsoil has been stripped. Most build their levees only to the annual water line, rather than the 100-year flood plain. Come flood or high water, rains often wash out low levees, emptying the silty water right into the river. Sand mining is not a regulated industry in Texas, unlike in most other states. In other words, so long as they operate on private property, the industry has no regulations to follow, no permits to apply for and no reclamation to complete once finished. But when they affect a public resource — the river — they fall under the jurisdiction of the Clean Water Act.

Aquatic vegetation does not grow well in Lake Houston. In recent months, the City of Houston has dealt with excessive costs for treating Lake Houston drinking water due to taste and odor problems caused by phytoplankton blooms. The lake's ecosystem is out of whack. Webb's research found marked differences between ecosystems in Lake Houston and Lake Conroe.

As the river that saw Texas through its revolutionary war and the founding of its largest city, it seems prescient to protect, restore and preserve it — for its value to fish and wildlife and for its importance in providing citizens with clean drinking water and protection from excessive flood damage. Houston has many bayous, but only one river.

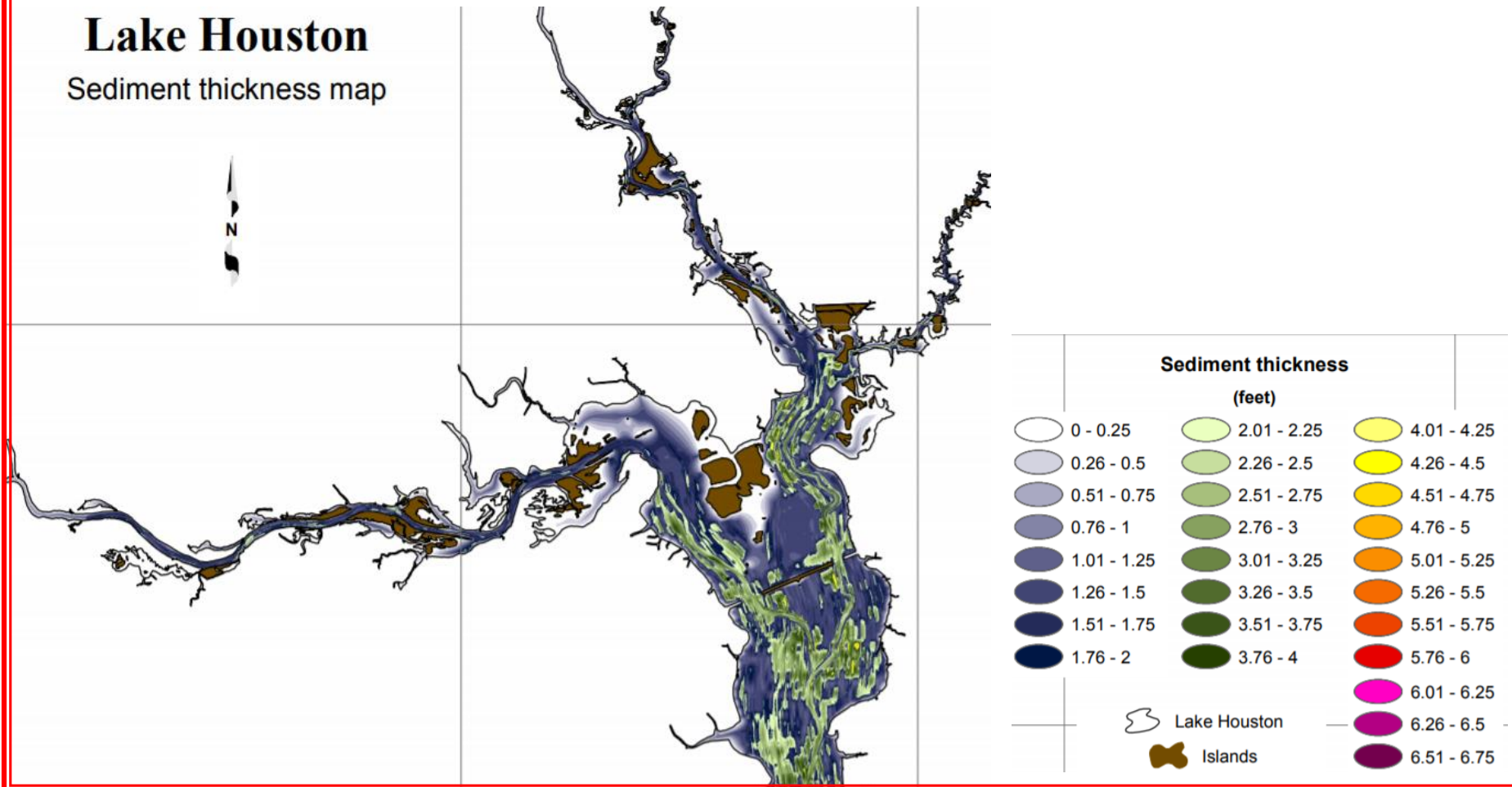
All concrete support beams now have extensive, accumulated debris which will also serve to restrict water flowage along the river and entry into the lake along the West Lake Houston Bridge.



Lake Houston Sediment Thickness Map

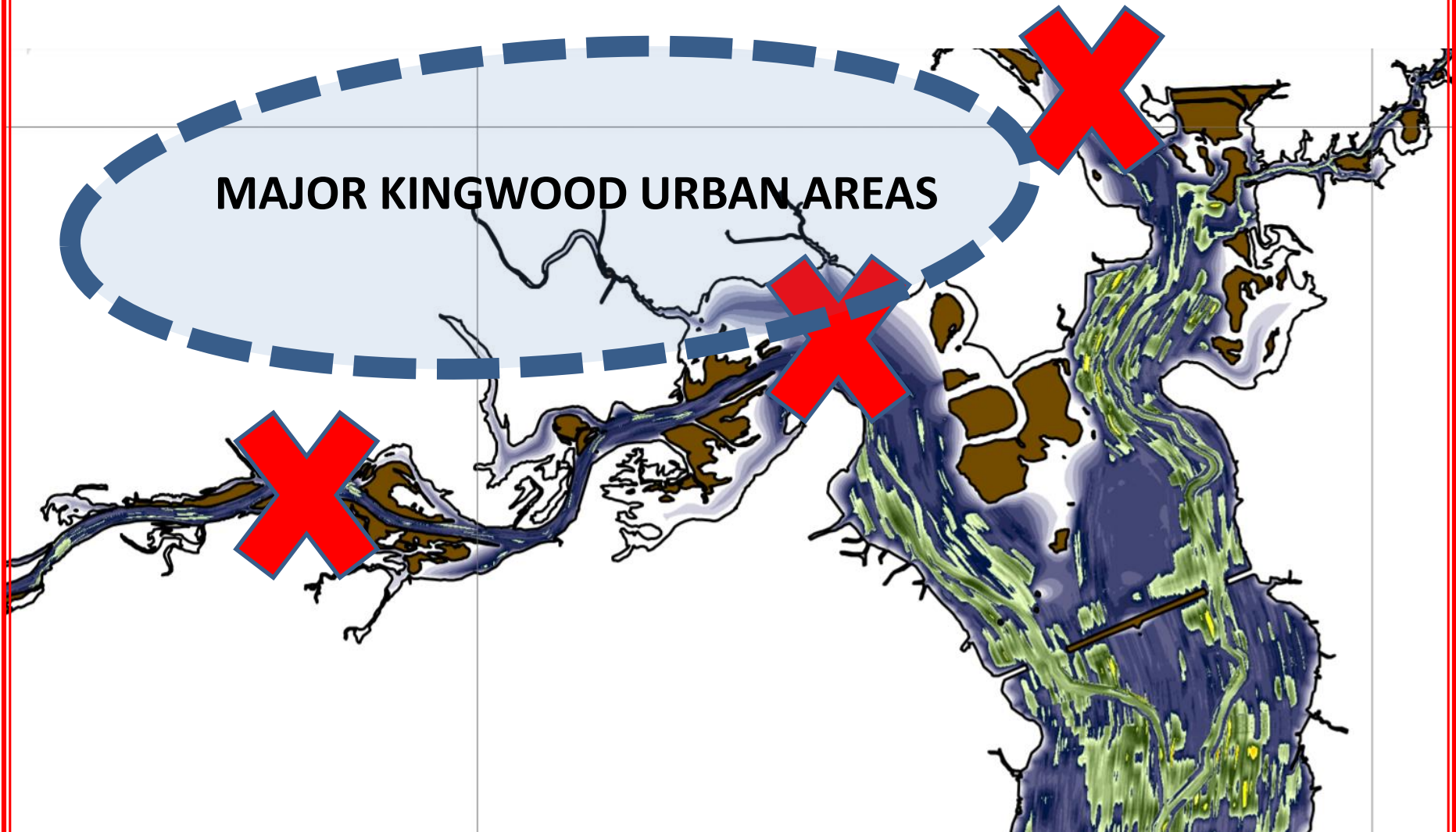
North End near Kingwood

Lake Houston
Sediment thickness map

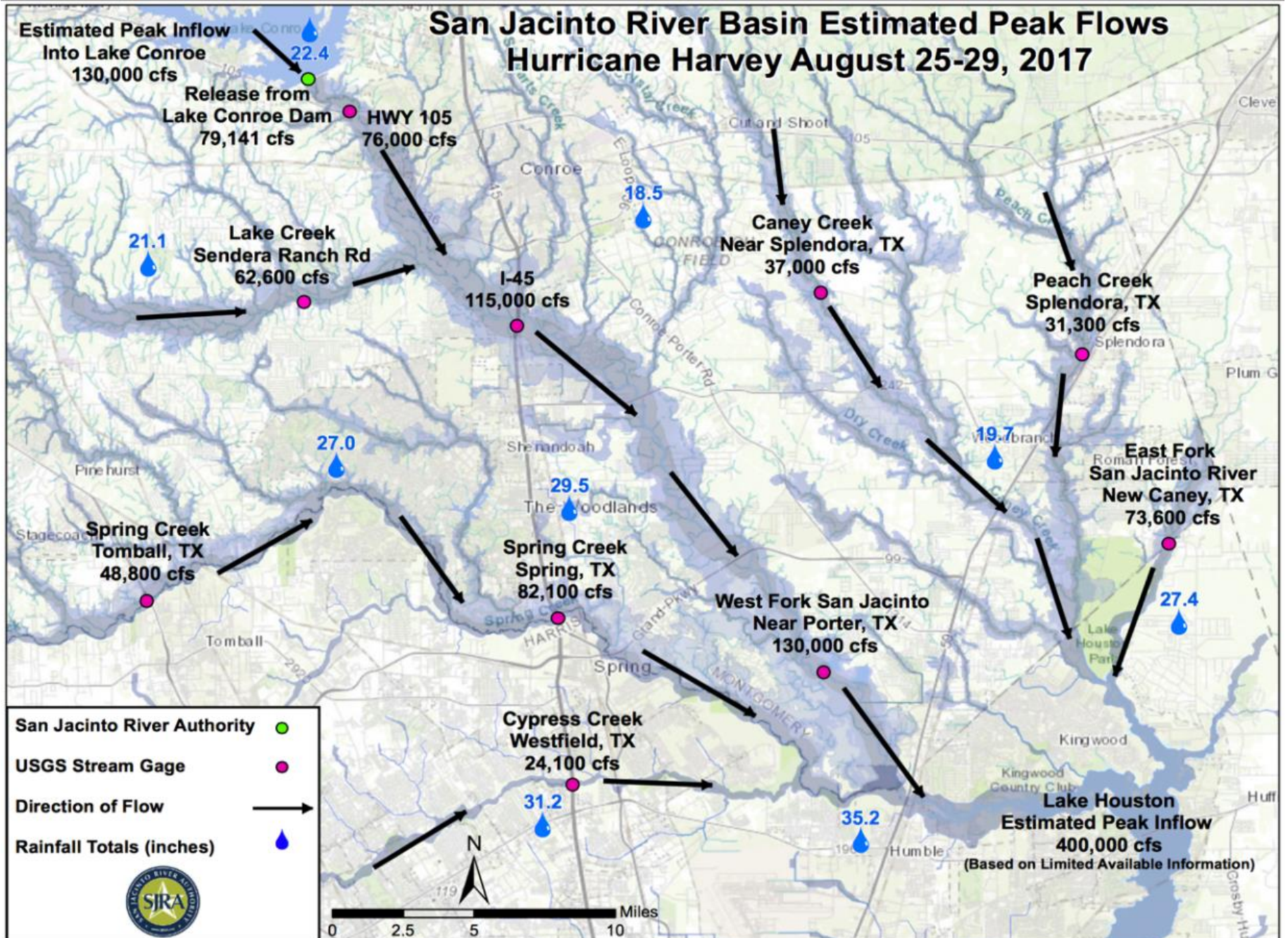


Kingwood Will Not Have a Chance

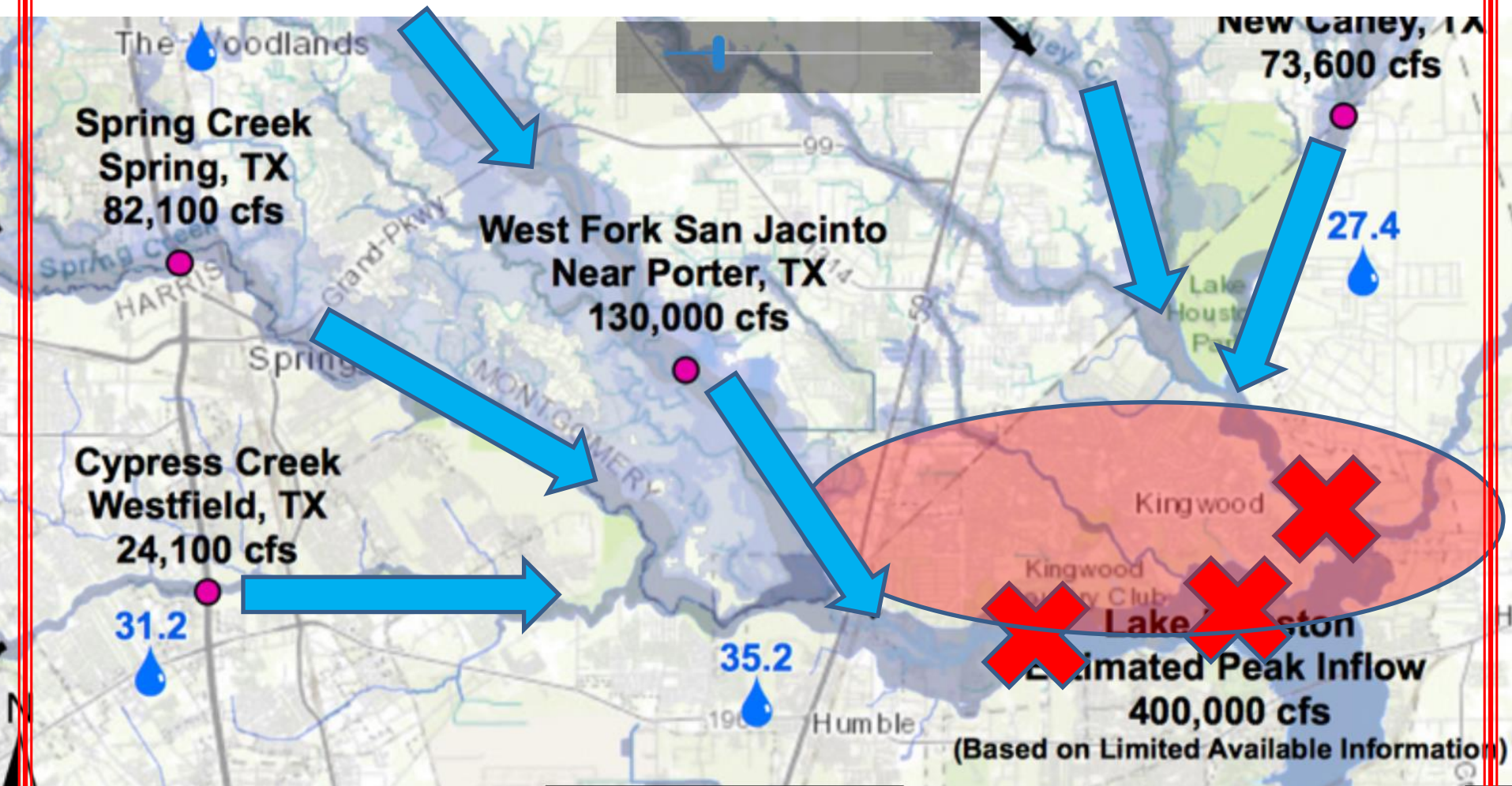
Due to Major Sediment Choke Points

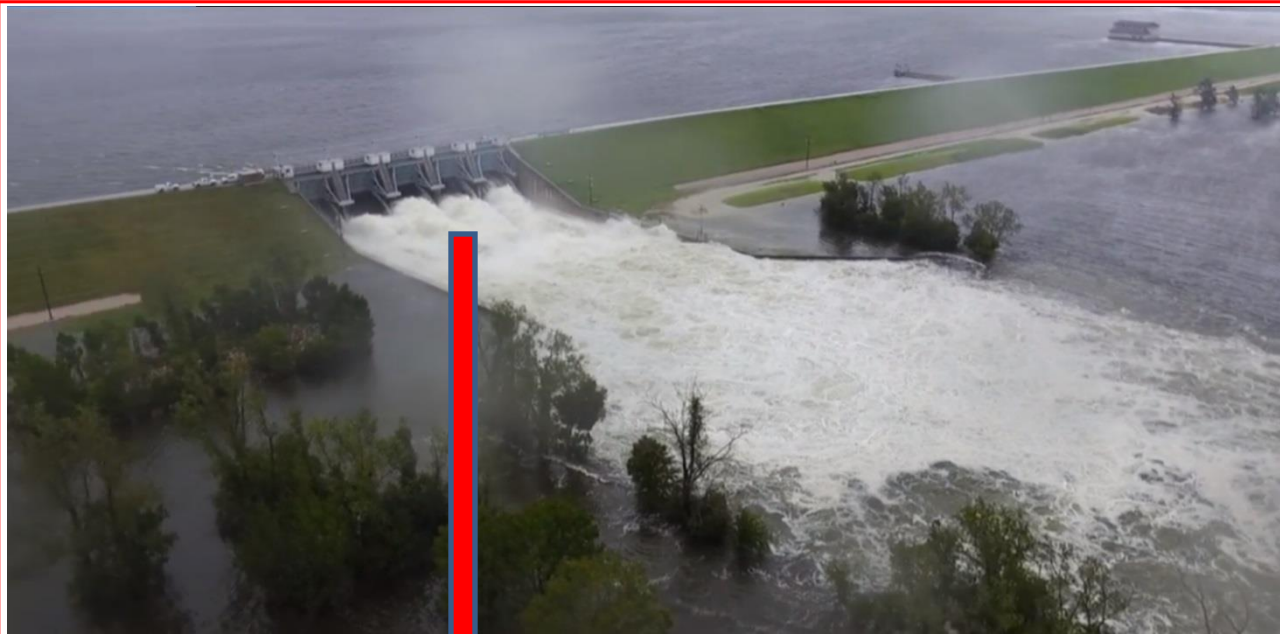


San Jacinto River Basin Estimated Peak Flows Hurricane Harvey August 25-29, 2017



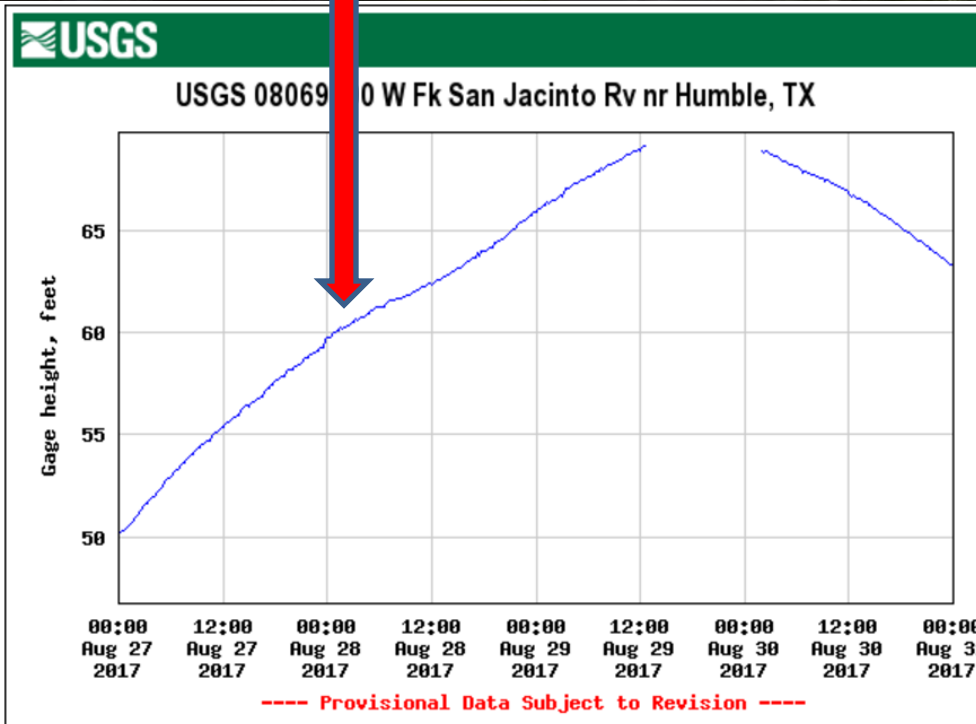
11 Billion Gallons of Water per HOUR rushing towards **MAJOR CHOKES POINTS** prevent flowage to Lake Houston





Lake Conroe Dam Release

- Drone video
- Aug 28th
- ~ 2 billion gallons / hour
- 2.2x more than previous record set in 1994



San Jacinto River Gauge at Humble

- Aug 27th thru Aug 30th
- Level raised from 61' to over 69'

Any future, massive water releases will further compound the SEDIMENT BUILD UP PROBLEM downstream at identified Kingwood choke points!!

Inaccurate & Misleading Flood Plain Maps

FLOOD EDUCATION MAPPING TOOL

FLOOD EDUCATION MAPPING TOOL | ABOUT THE TOOL | FAQs | HCFCD.org

ADDRESS SEARCH

[HELP](#)

Street Address, City, State, Zip Code

e.g. 9900 Northwest Fwy., Houston, TX 77092

MAP VIEW OPTIONS - Select One

☒ Mapped Floodplains

Floodway

1% (100-year) Floodplain

0.2% (500-year) Floodplain

1% (100-year) Coastal Floodplain

☐ Watersheds (color-coded)

☐ Ponding

☒ Channels (Bayous and Creeks)

☐ Open Channels

☐ Enclosed Channels

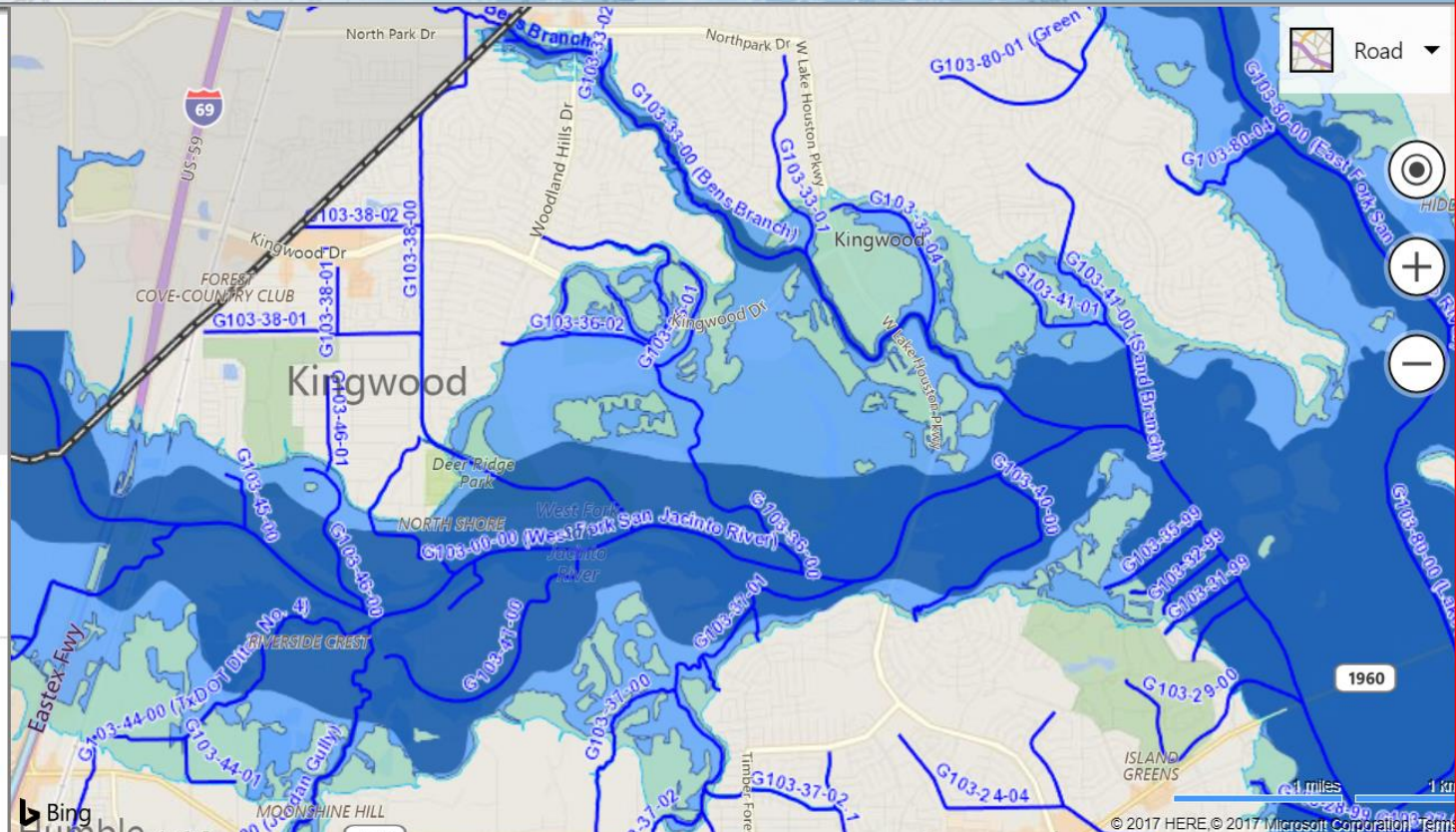
☒ Harris County Boundary

[Reset to County-Level View](#)

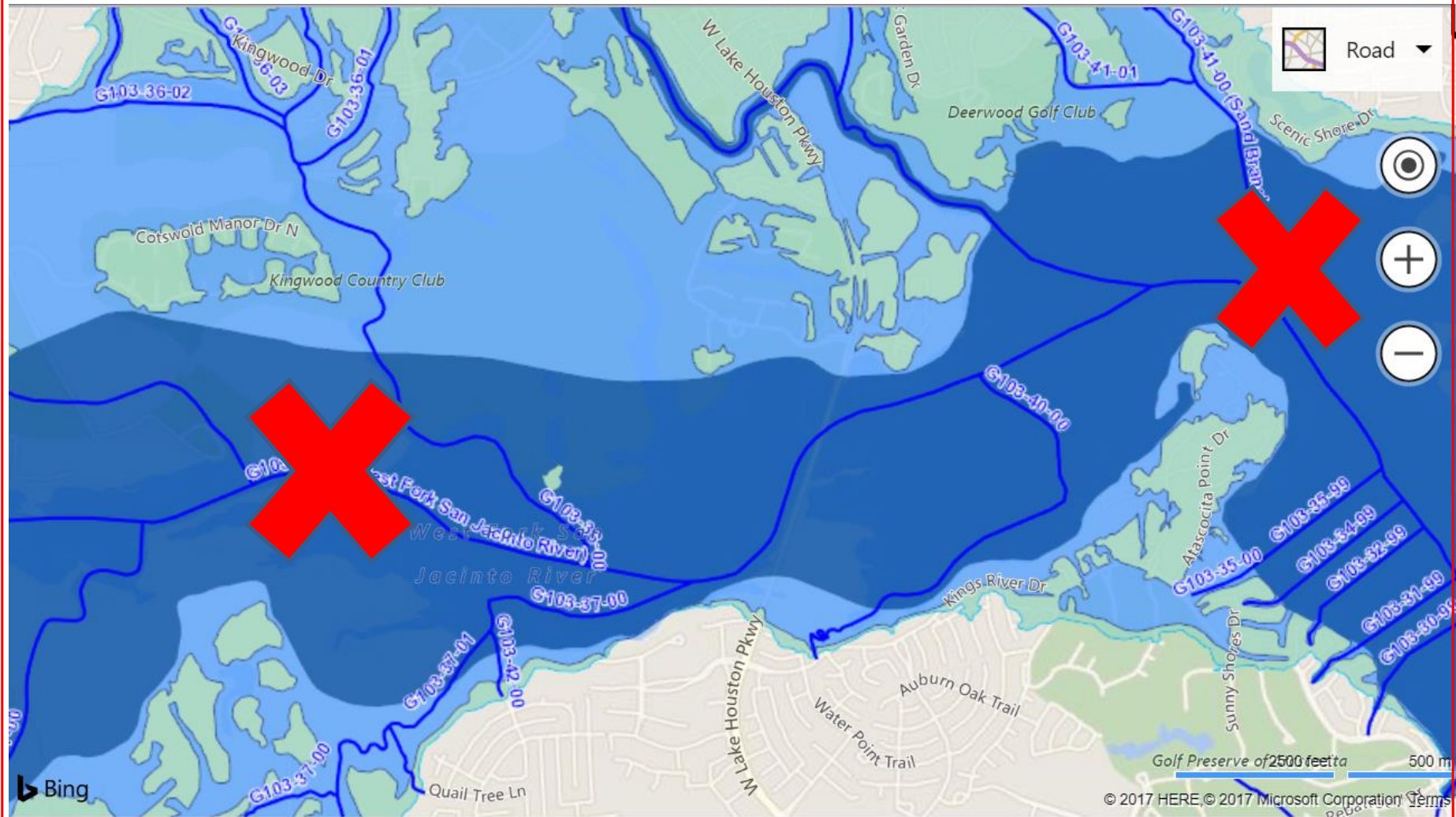
[Disclaimer](#)



An interactive mapping tool of the
Harris County Flood District

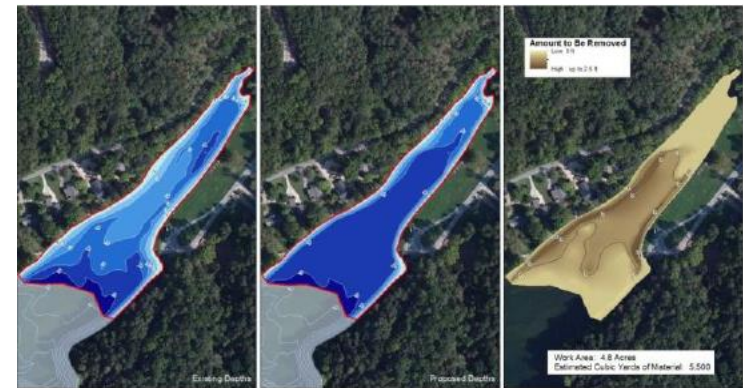
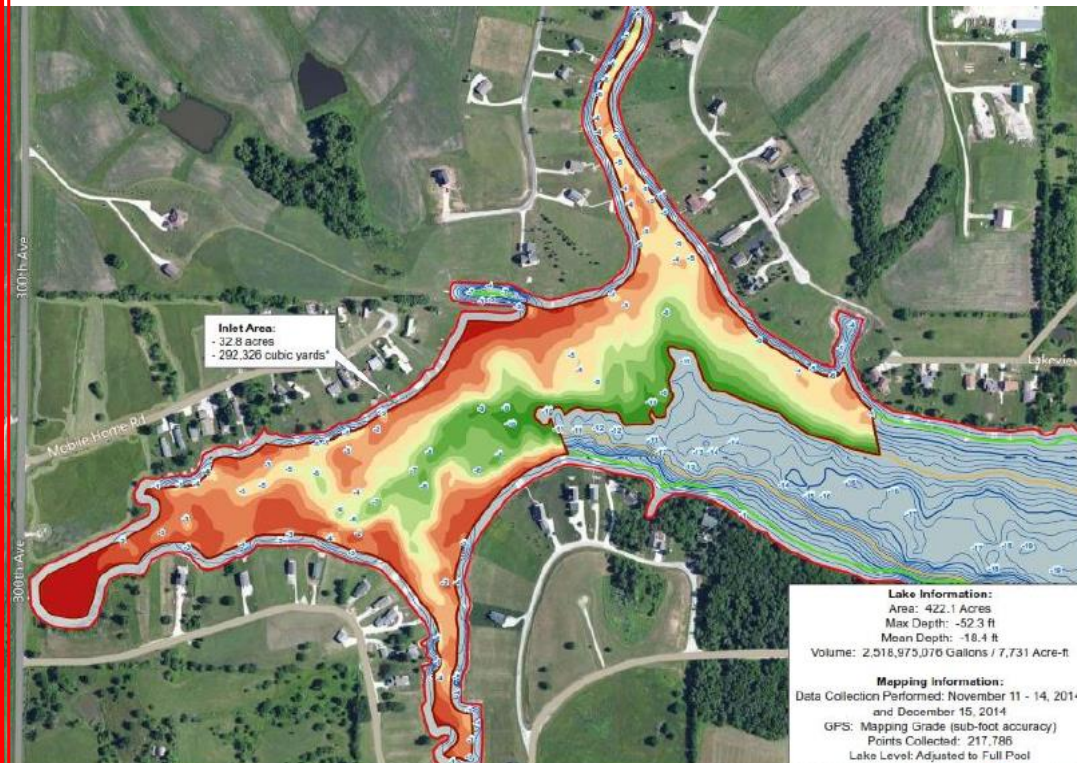


due to **New Sediment Choke Points**



The Solution: Part I

- River and Lake Sediment Surveying and 3D mapping with pre & post-dredging predictive analysis



The Solution Part I: 3D Mapping Project

- Map area from I 59 at Humble down San Jacinto River and upper Lake Houston to the 1960 Bridge
- Outlined Area: 6.5 square miles; 4,150 acres
- Time to Map: 1-2 months
- Estimated Cost: \$65,000
- Final analysis needed to design Dredge Project



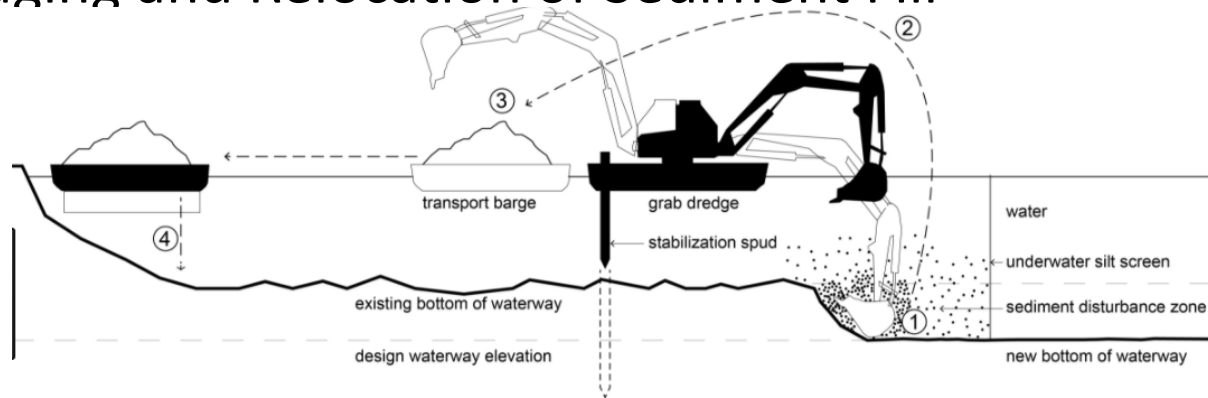
Major Sand Mining Operations

- Parallel with dredging activities, these mining operations must stop immediately and regulations must be put in place to prevent further illegal mud/sediment dumping, or the dredged areas will fill up once again.



The Solution: Part II

- Dredging and Relocation of Sediment Fill

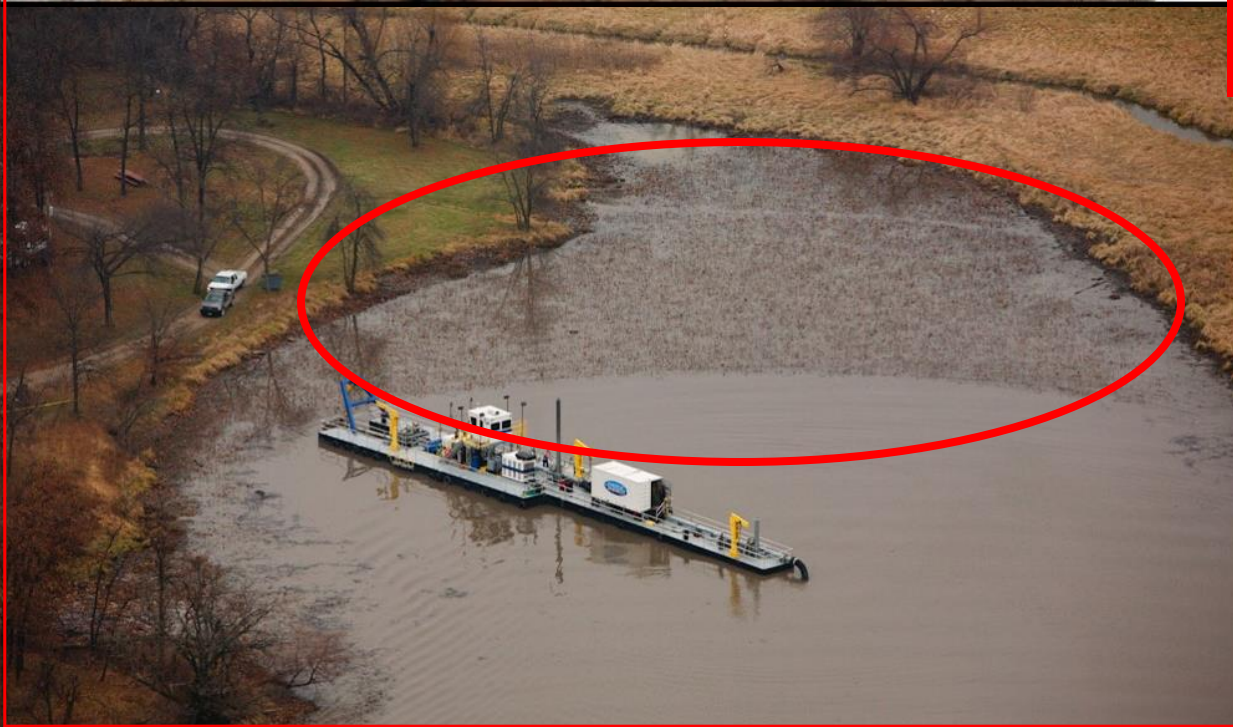


- ① - dislodging of in-situ sediment
- ② - raising of dredged material to the surface
- ③ - horizontal transport
- ④ - placement or further treatment





**Sediment Plug being
dredged out at Mission Lake
in Kansas**

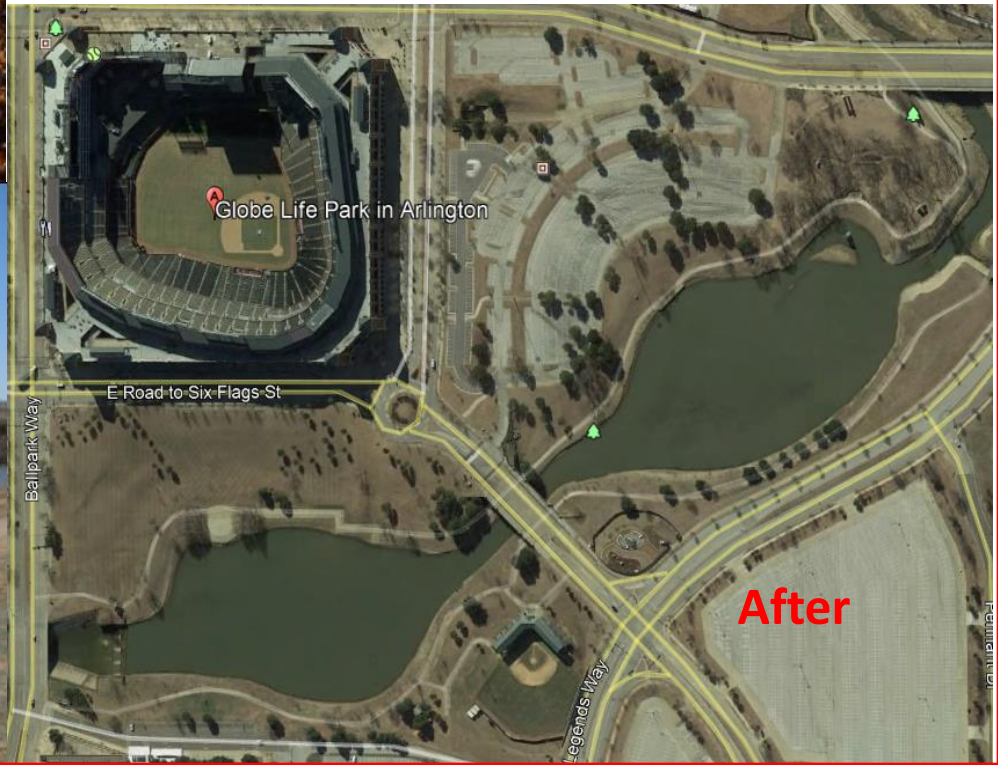
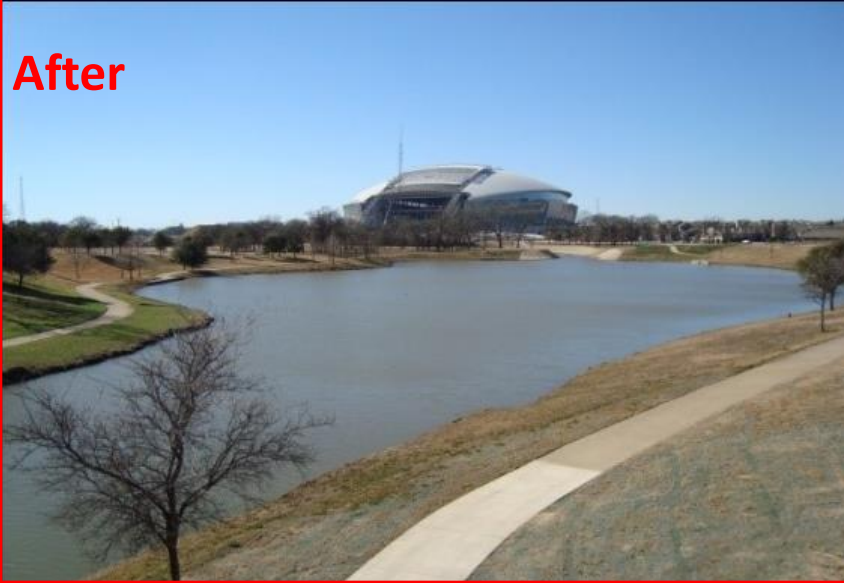


Before



Rangers Stadium – Arlington, TX
Johnson Creek/Lake
Dredging Project
Before and After Photos

After





The Solution: Part III

- **Soil and Sediment Stabilization** along the San Jacinto River between Lake Conroe and Lake Houston
- Cement/lime-based solidification is an environmentally sound solution for the management of **dredged marine sediments**
- Solidified dredged sediments are **beneficial for use as a material in road construction**. Cement is superior to lime in terms of strength improvement, and adding 6% cement is an economic and reasonable method to stabilize fine sediments.

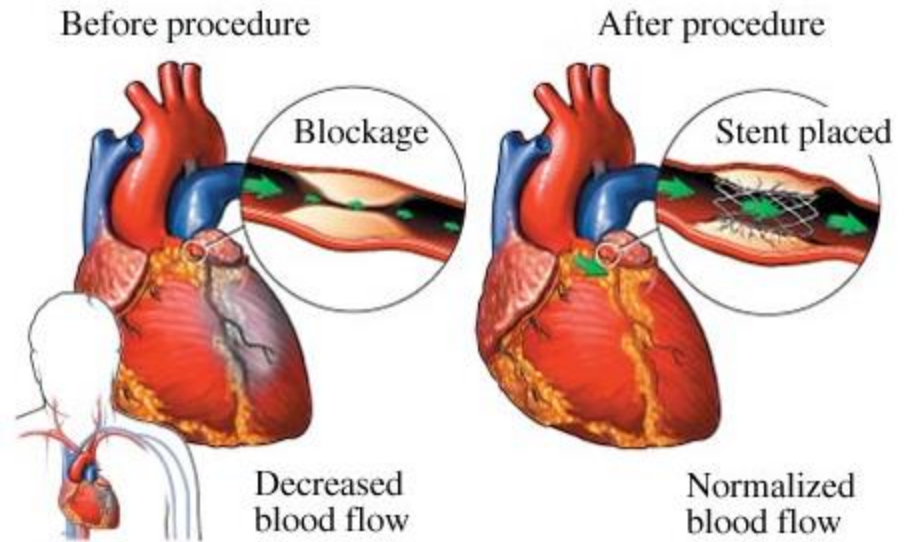


DIG IT KINGWOOD

12-MONTH PROJECT TIMELINE

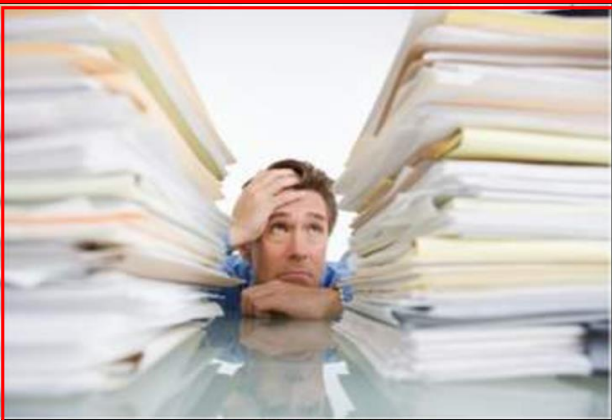
	Q4 2017	Q1 2018	Q2 2018	Q4 2018
Government Awareness	*			
3D Sedimentation Survey	*			
Prepare Full Project Report	*			
Project Funding Secured		*		
Multi-Faceted Dredging Project			*	*
River Sediment Stabilization			*	*

CHOKE POINTS CAUSE DISASTERS



River Flood Waters Escape their Boundaries





Since the Kingwood flood of 1994, reports have been written by at least 4 government agencies and Millions of Pages of Reports have been printed.....



and Hundreds of Millions of Dollars have been spent on Kingwood/Humble repairs and rebuilding.....



But over this 23 year period, Not a Single Bucket of Sediment mud has been dredged out of the San Jacinto River or Lake Houston.....

Insanity: doing the same thing over and over again and expecting different results.