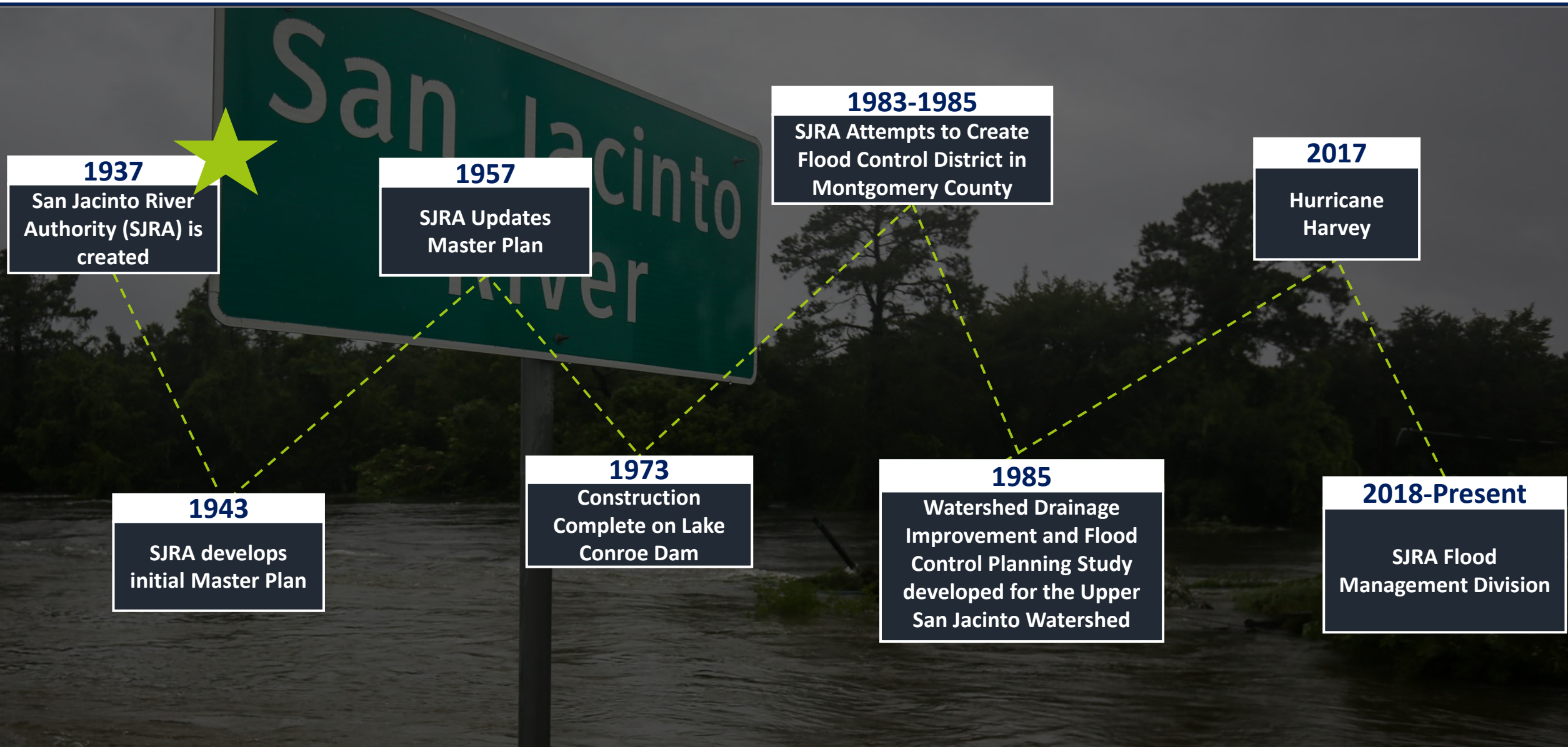




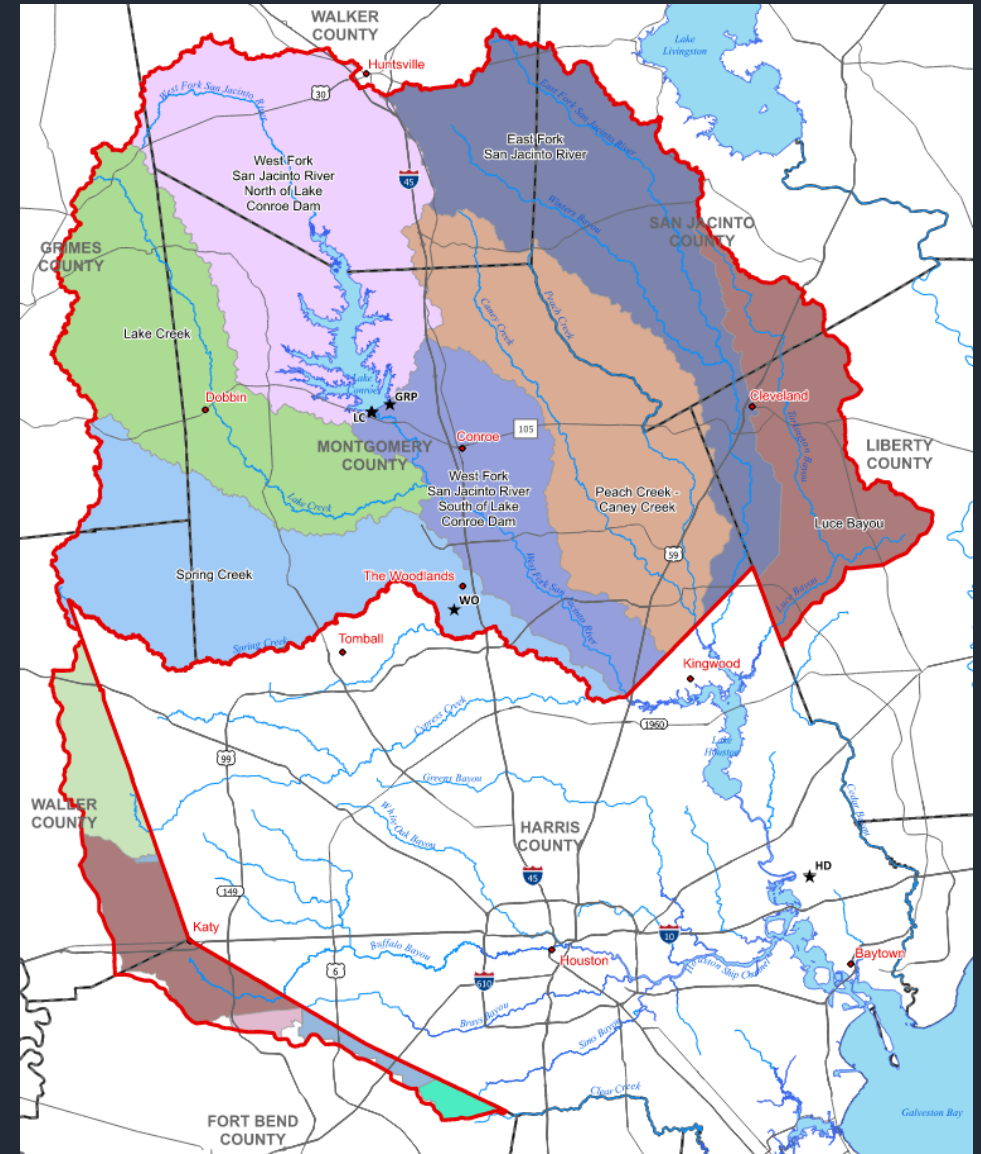
SJRA Role in Flood Management

Flood Management Timeline

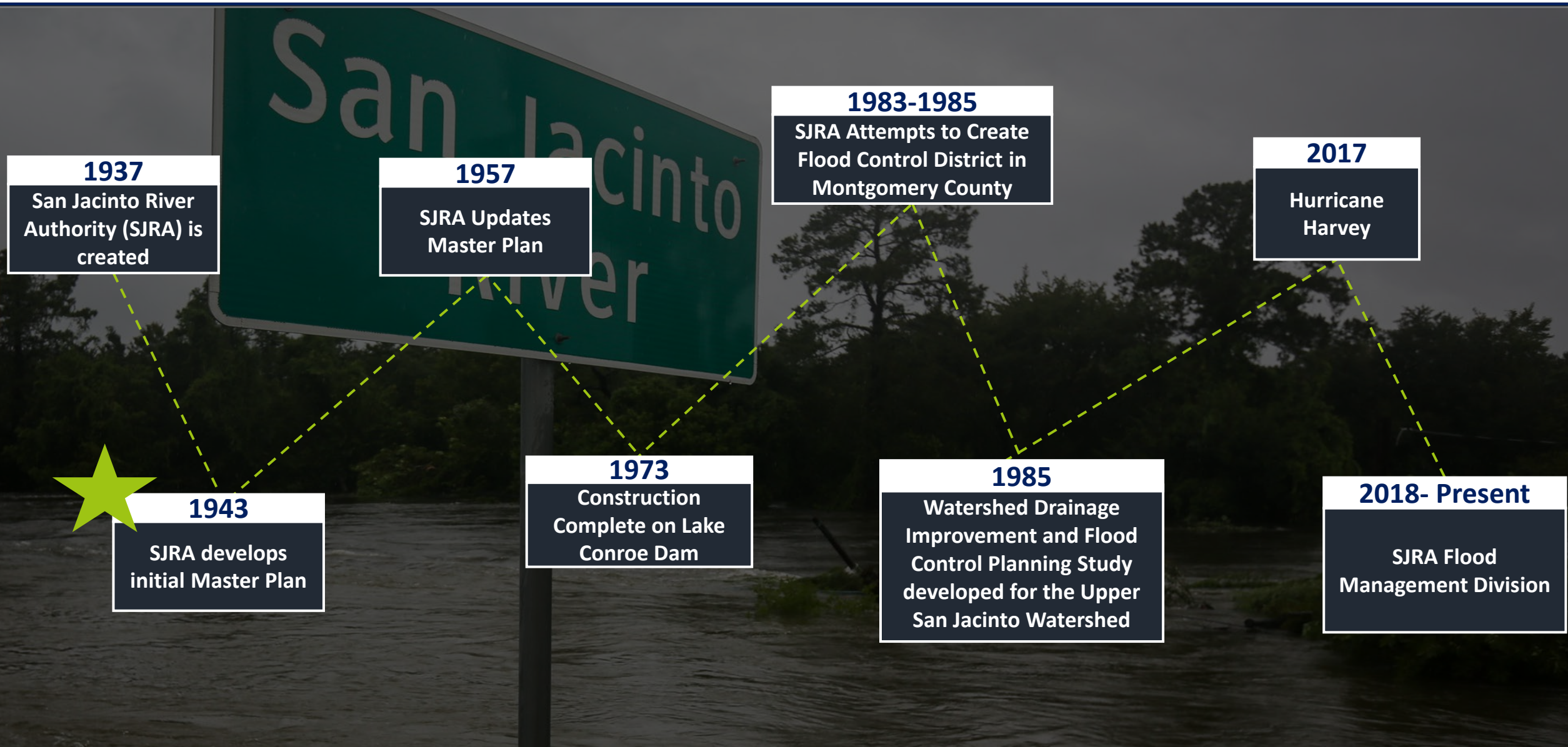


Creation of SJRA

- 1937: SJRA was created by the Texas Legislature with a mission to develop, conserve, and protect the water resources of the San Jacinto River Basin.
- SJRA's jurisdiction includes the San Jacinto River Basin and covers all or part of seven counties, excluding Harris County.
- One of 10 major river authorities in Texas.
- Included four operating divisions until 2018, when the Flood Management Division was added.

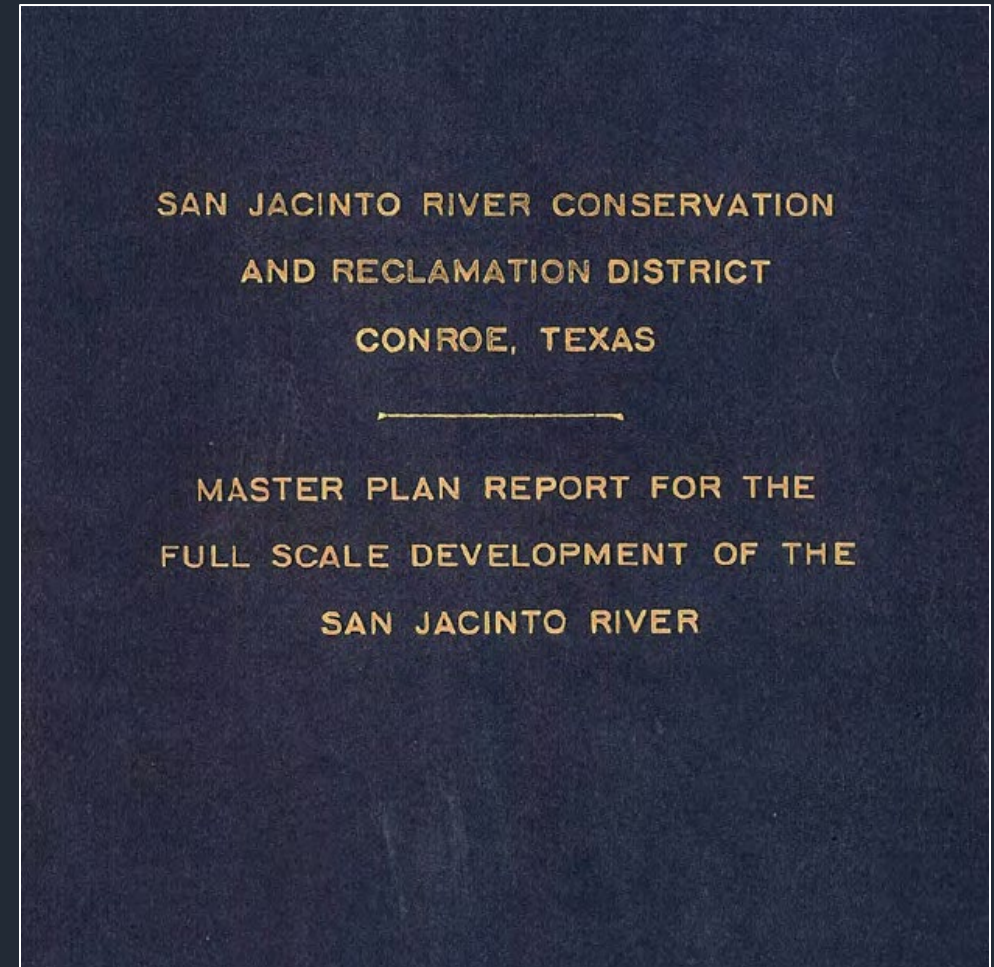


Flood Management Timeline

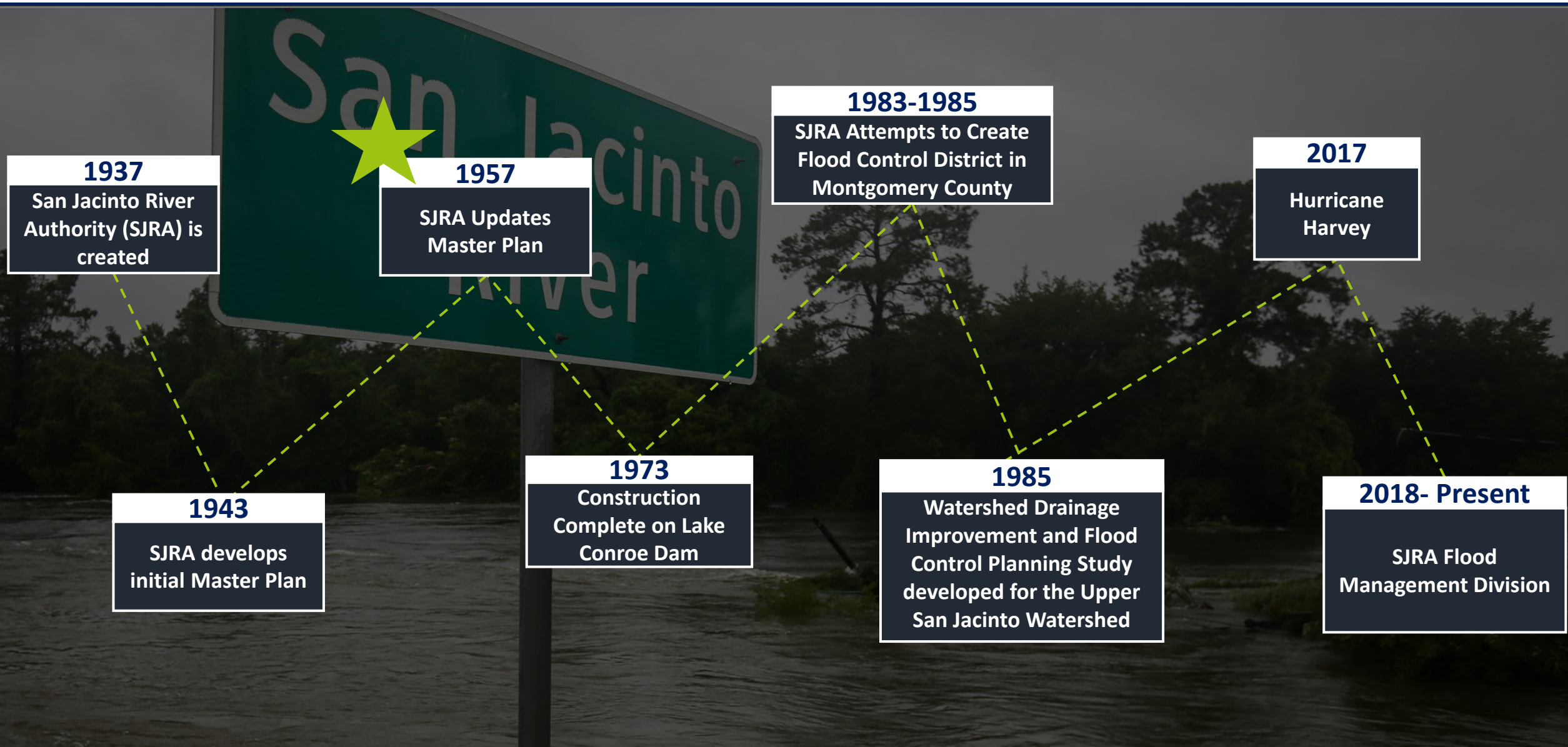


1943: SJRA Develops Initial Master Plan

- In response to flood damage in the watershed.
- To document need for Comprehensive Flood Risk Assessment.
- To address short and long-term flooding issues.
- To identify projects to reduce flood risks.
- With the goal of protecting and maximizing the utilization of land with growth and development occurring in the watershed.
- Proposed projects included:
 - 14 dams and reservoirs (886,000 acre-feet of storage).
 - Channel improvements and levee construction.



Flood Management Timeline

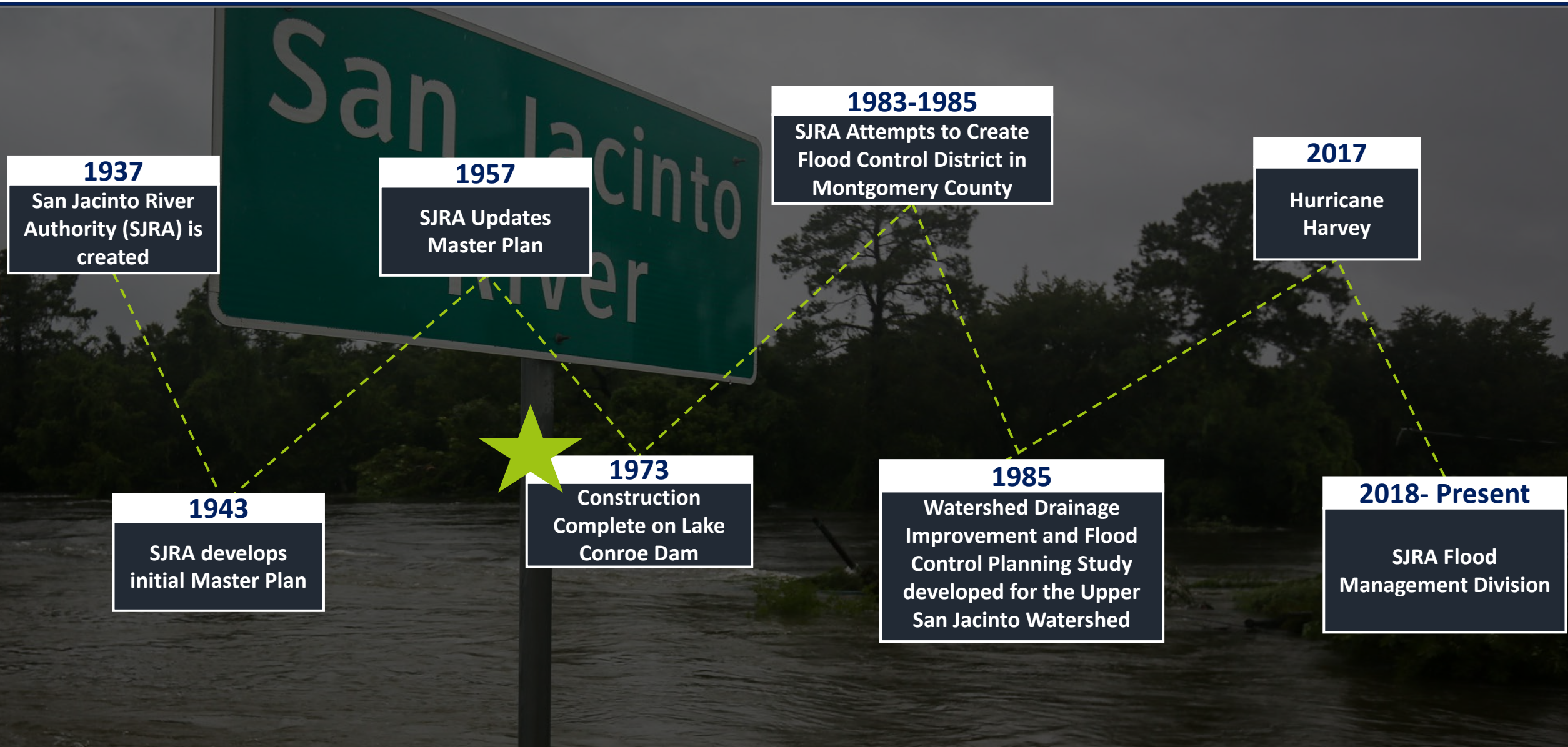


1957: SJRA Updates Master Plan

- Similar alternatives to those outlined in the 1943 master plan were discussed and evaluated.
- Included cost estimates for potential projects.



Flood Management Timeline

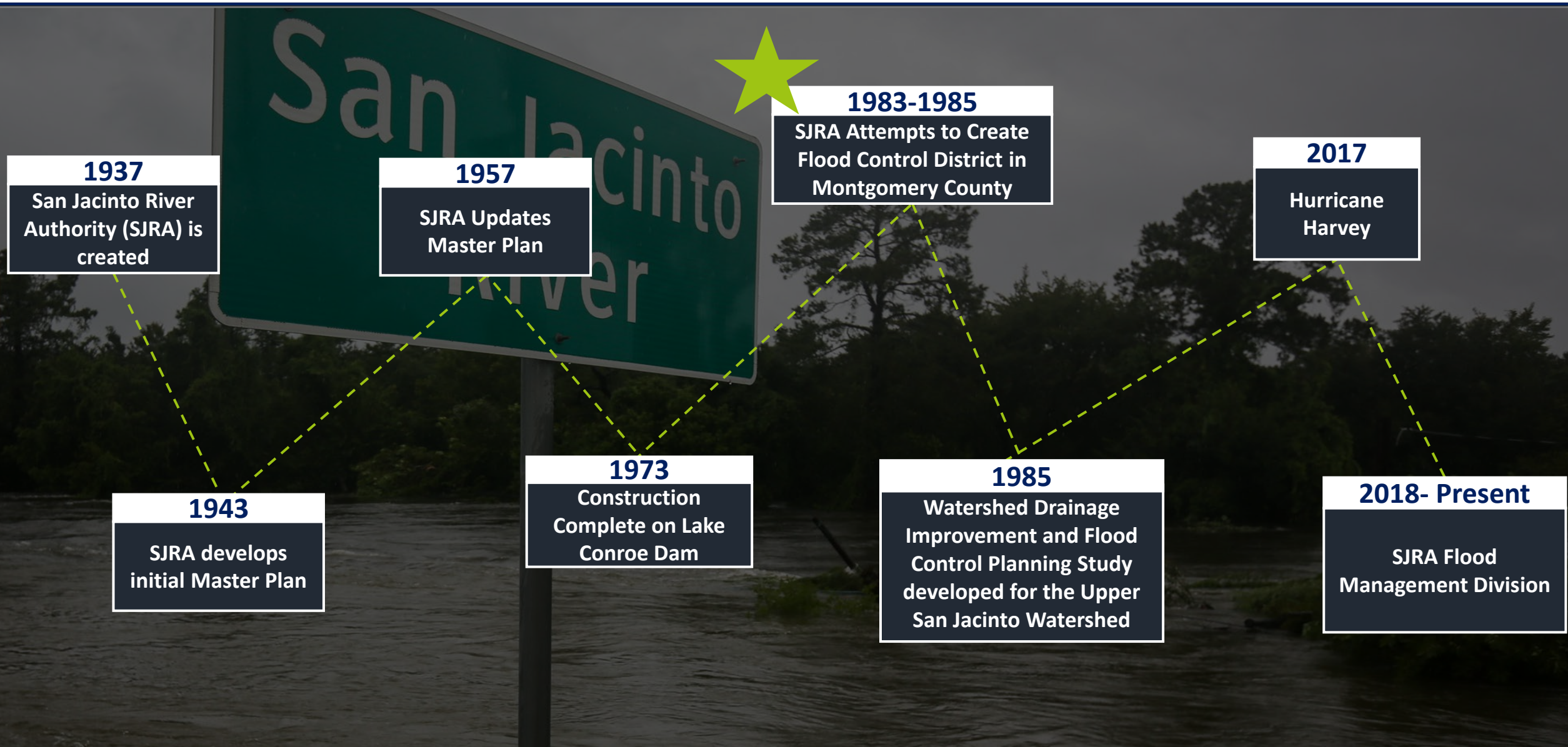


1973: Lake Conroe Dam Constructed

- Surface acres: ~20,000.
- Capacity: > 400,000 acre-feet.
- Normal pool elevation: 201 feet above mean sea level.
- Service spillway: five gates, 40 ft by 30 ft.
- Width of Dam: 2.2 miles (11,280ft).
- Maximum gate opening: approximately 20 ft/gate.
- 1/3 of water rights owned by SJRA, 2/3 by City of Houston.



Flood Management Timeline



- 1983:
 - **February:** Rep. Tow proposed SJRA take over flood control duties in coordination with Montgomery County. No method of funding future projects existed.
 - **March:** Rep. Tow introduces a flood control district bill to be funded by a \$0.01 county-wide sales tax.
 - **April:** Opposition of the tax caused the bill to be amended, ultimately leading to the bill passing the House and Senate without the tax included.
 - **July:** SJRA board meets with Rep. Tow and reached an agreement on the initial start up of the flood control district.
 - **September:** SJRA contacts Attorney General (AG) for clarification on taxing authority despite funding language being deleted from the bill.

Ballot No. (No. de Balota) _____

MONTGOMERY COUNTY FLOOD CONTROL DISTRICT ...

CONFIRMATION AND TAX ELECTION

August 10, 1985

DISTRITO PARA EL CONTROL DE INUNDACIONES
DEL CONDADO DE MONTGOMERY

ELECCION DE CONFIRMACION E IMPUESTO

10 de agosto de 1985

OFFICIAL BALLOT
BALOTA OFICIAL

NOTE: You may vote on the proposition by placing an "X" in the square beside the statement indicating the way you wish to vote.

NOTA: Usted puede votar sobre la proposicion poniendo una "X" en el cuadro al lado de la declaracion indicando como desee votar.

<u>PROPOSITION</u>		<u>PROPOSICION</u>
[]	FOR A FAVOR DE	THE CREATION OF THE MONTGOMERY COUNTY FLOOD CONTROL DISTRICT
[]	AGAINST EN CONTRA DE	LA CREACION DEL DISTRITO PARA EL CONTROL DE INUNDACIONES DEL CONDADO DE MONTGOMERY

Election Ballot Language

- 1984:
 - **February:** Rep. Tow indicated operations of the flood control district could not take place until suitable funding was implemented. If not provided by the 1985 session, the legislation would be withdrawn.
 - **May:** SJRA Board felt flood control activities would be better funded through an ad valorem tax rather than sales tax. However, acquiring this authority would require statutory changes.
 - **July:** SJRA reviews AG opinion confirming an election must be held to create a Flood Control District in Montgomery County to be funded by a \$0.01 sales tax.



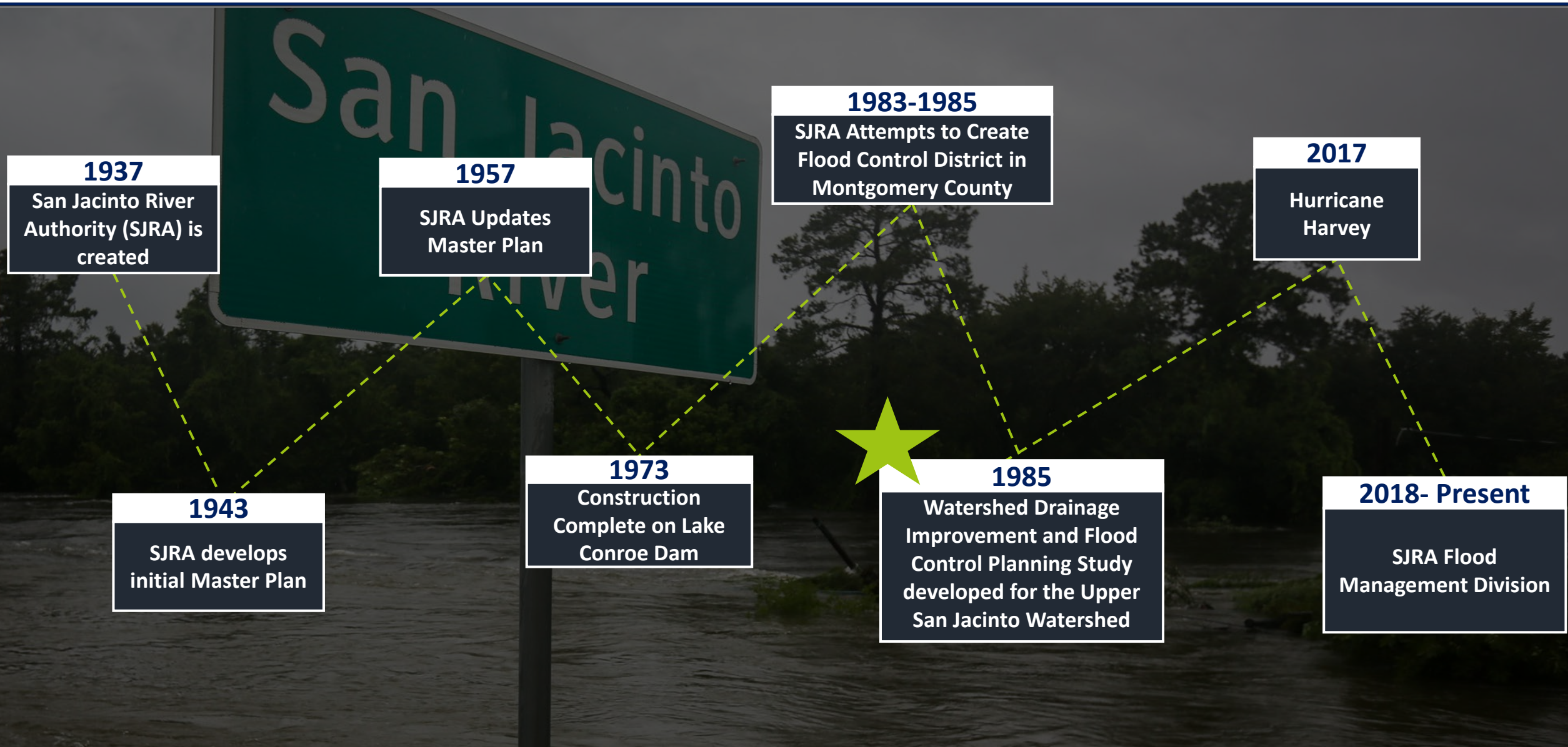
News Article about Flood Control

- 1985:
 - **February:** SJRA Board intends to hold election in August of 1985 to determine whether the Flood Control District should be funded by a \$0.01 sales tax.
 - **April:** SJRA Board adopts formal resolution to call the election.
 - **July:** SJRA Board adopted an order calling for Confirmation and Tax Election for the proposed Montgomery County Flood Control District.
 - **August:** Montgomery County Commissioners Court motioned to adopt resolution supporting the Flood Control District to be funded by a \$0.01 sales tax. Motion failed.
 - **August:** SJRA Board received official election results, showing majority against the creation of a flood control district.

<u>Election Precinct No.</u>	<u>For</u>	<u>Against</u>	<u>Total</u>
Absentee	64	67	131
1	25	160	185
2	19	63	82
3	18	71	89
4	16	39	55
5	82	226	308
6	30	92	122
7	15	105	120
8	532	129	661
9	28	178	206
10	37	104	141
11	40	580	620
12	41	539	580
13	83	186	269
14	11	48	59
15	49	54	103
16	77	35	112
17	35	8	43
18	20	30	50
<u>Totals</u>	<u>1,222</u>	<u>2,714</u>	<u>3,936</u>

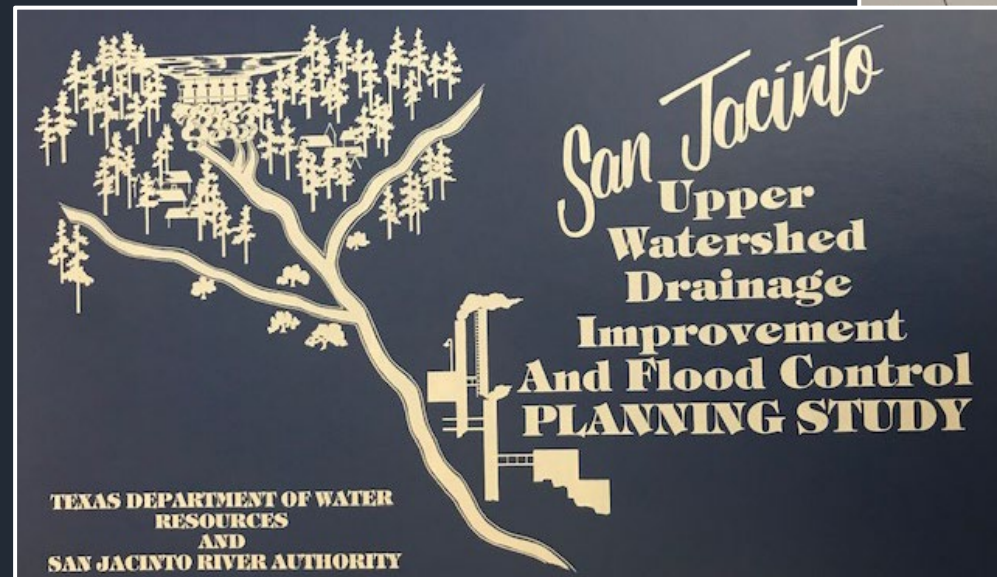
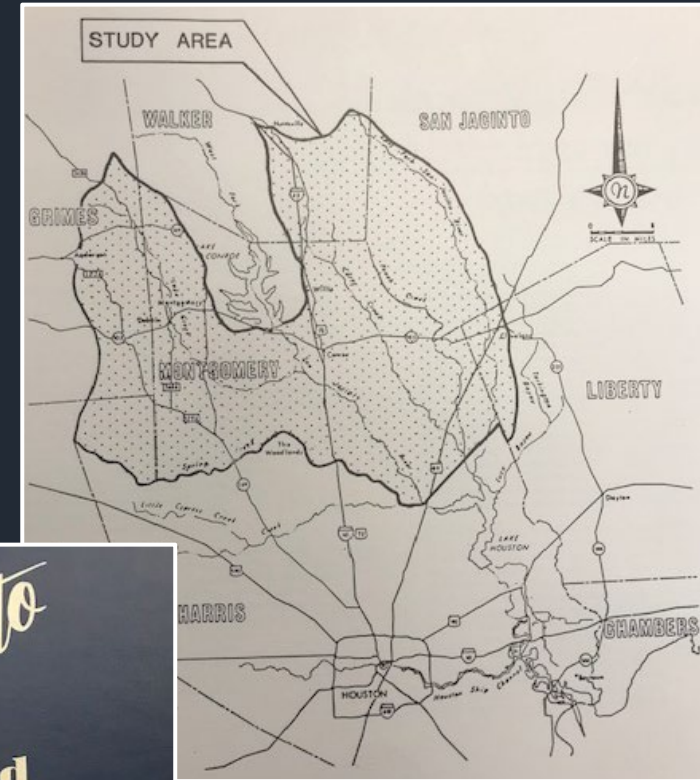
Election Results

Flood Management Timeline

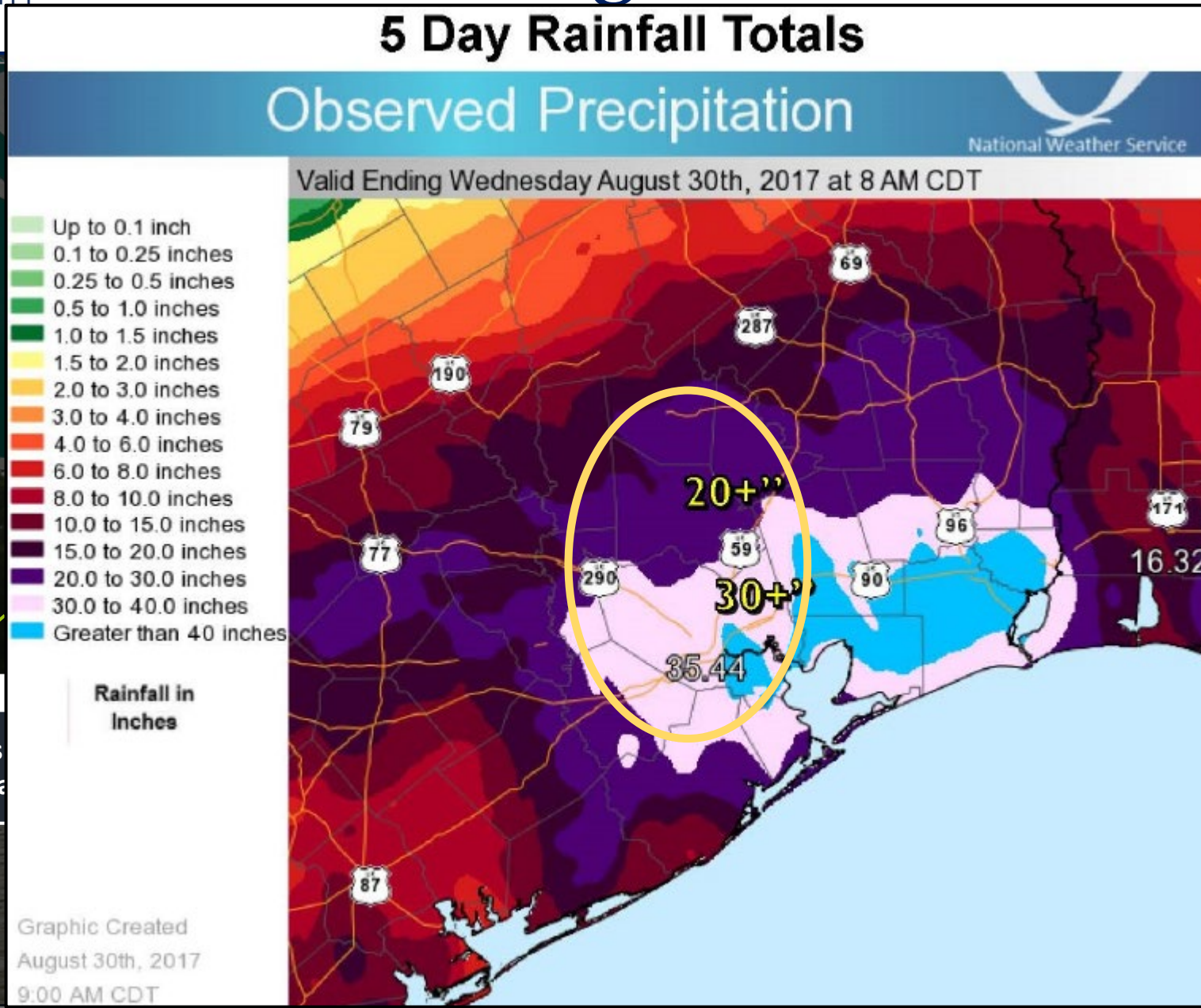


1985: Watershed Drainage Improvement and Flood Control Planning Study

- First study that focused on detailed evaluation of proposed alternatives and incorporated hydraulic modeling to evaluate feasibility and flood risk reduction effectiveness.
- Alternatives evaluated:
 - Total Channelization
 - Selective Channelization
 - Vegetation Clearing
 - Bridge Modification
 - Property Buyouts
 - Lake/Reservoir Construction



Flood Management Timeline



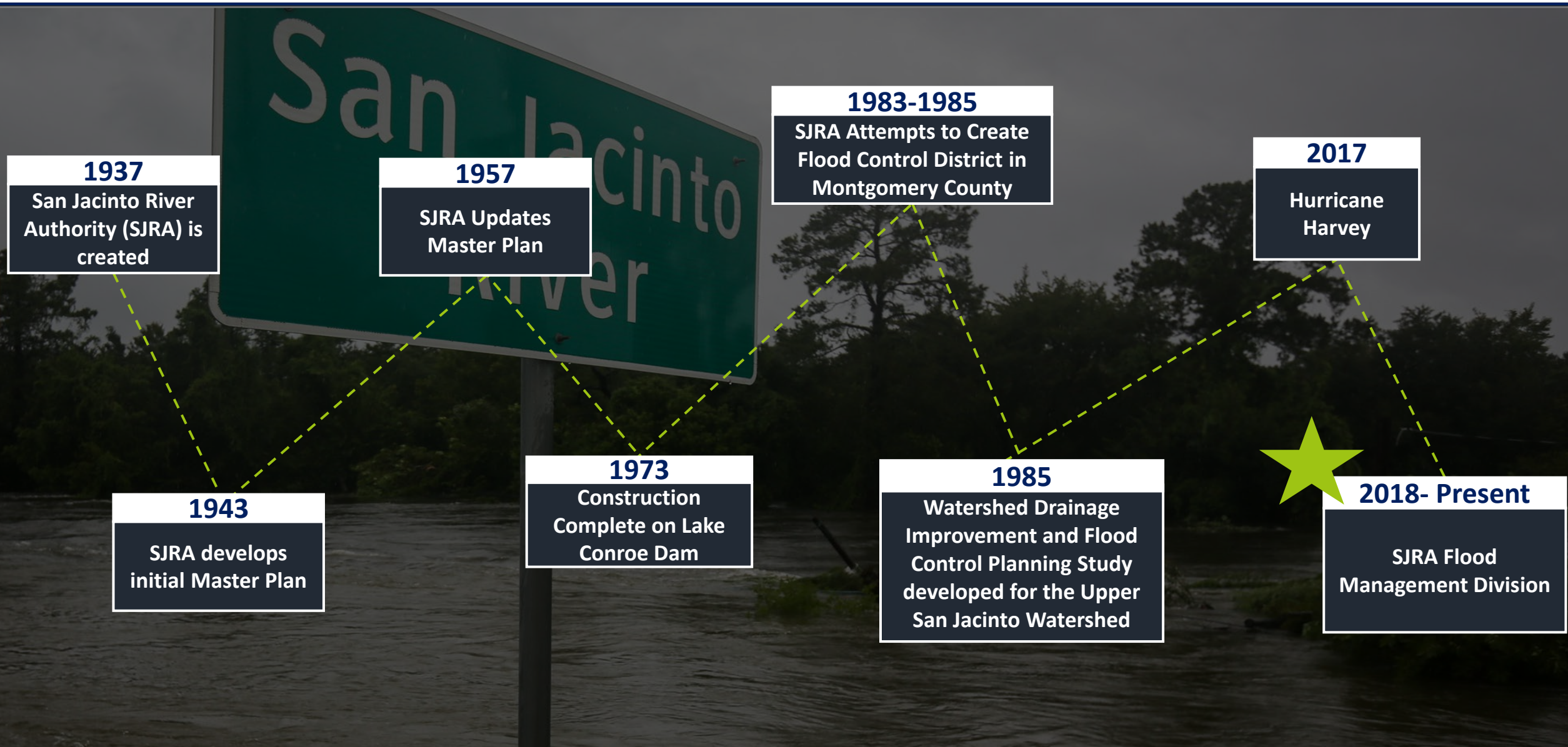
1937
San Jacinto River Authority (SJRA) is created

1943
SJRA develops initial Master Plan

2017
Hurricane Harvey

2018- Present
SJRA Flood Management Division

Flood Management Timeline



- **August 2017:** After Hurricane Harvey the call for flood control efforts in the San Jacinto River Basin resurfaced.
- **March 2018:** Governor Abbott calls on SJRA to become more involved with regional flood management.
- **April 2018:** SJRA Board and SJRA leadership create a new Flood Management Division.
- **May 2018:** SJRA staffs the Flood Management Division with Director of Flood Management and one additional support staff.



Conroe, Hurricane Harvey





Develop short-term and long-term flood management strategies



Building partnerships with federal, state, and local government entities



Identify funding sources and opportunities

- SJRA does not have a dedicated funding source or taxing authority to fund flood management efforts
- Partnerships allow for SJRA to support projects via a project management/facilitation role
- Partnerships allow for projects that cross jurisdictional boundaries
- Partnerships allow for more flexibility in applying for grant funding
- Partnerships increase public trust due to multi-agency involvement

Flood Protection for the West Fork San Jacinto River Watershed Phase I:

- Partners: City of Conroe and Montgomery County.
- Focused on Lake Conroe, the West Fork San Jacinto River upstream of confluence with Lake Creek, and Alligator Creek
- Development of local flood response strategies and formulate a flood protection plan
- Improvements to and expansion of SJRA's ALERT gage network.
- Development of a rainfall runoff routing model for the Lake Conroe Watershed.



Flood Protection for the West Fork San Jacinto River Watershed Phase II:

- Develop a reservoir forecasting tool for the Lake Conroe watershed which uses:
 - Real-time data from rain gages
 - Precipitation forecasts from NWS
 - Measured streamflow
 - Lake Conroe levels and operations data
- Tool provides anticipated Lake Conroe releases and peak lake levels.
- Information can be provided to OEMs, counties, and other regional partners for use in their decision-making processes.



Initiatives (Completed)

San Jacinto Regional Watershed Master Drainage Plan:

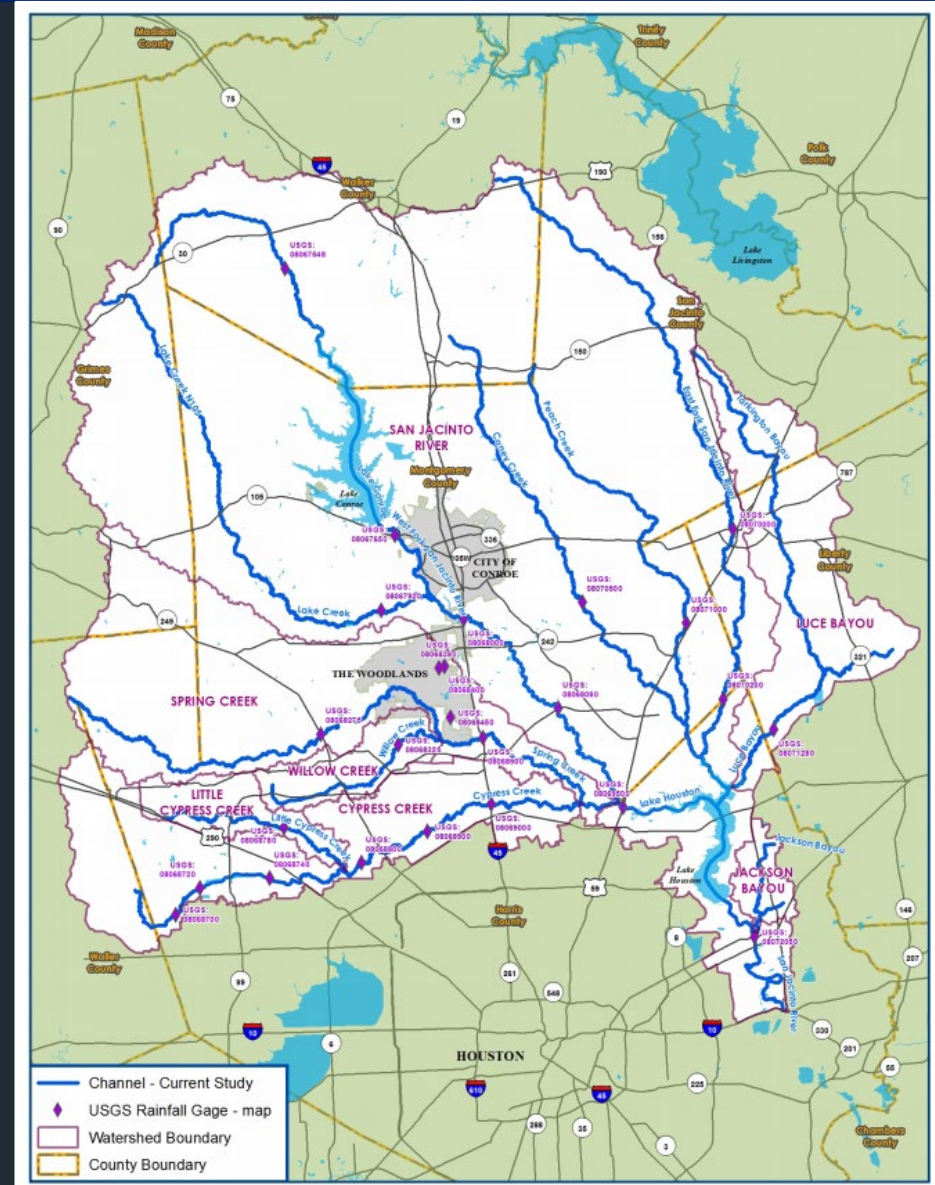
3,000 SQUARE MILES OF STUDY AREA

The watershed for the streams to be studied covers an expanse of nearly 3,000 square miles, located in seven different counties:

- Grimes County
- Harris County
- Liberty County
- Montgomery County
- San Jacinto County
- Walker County
- Waller County

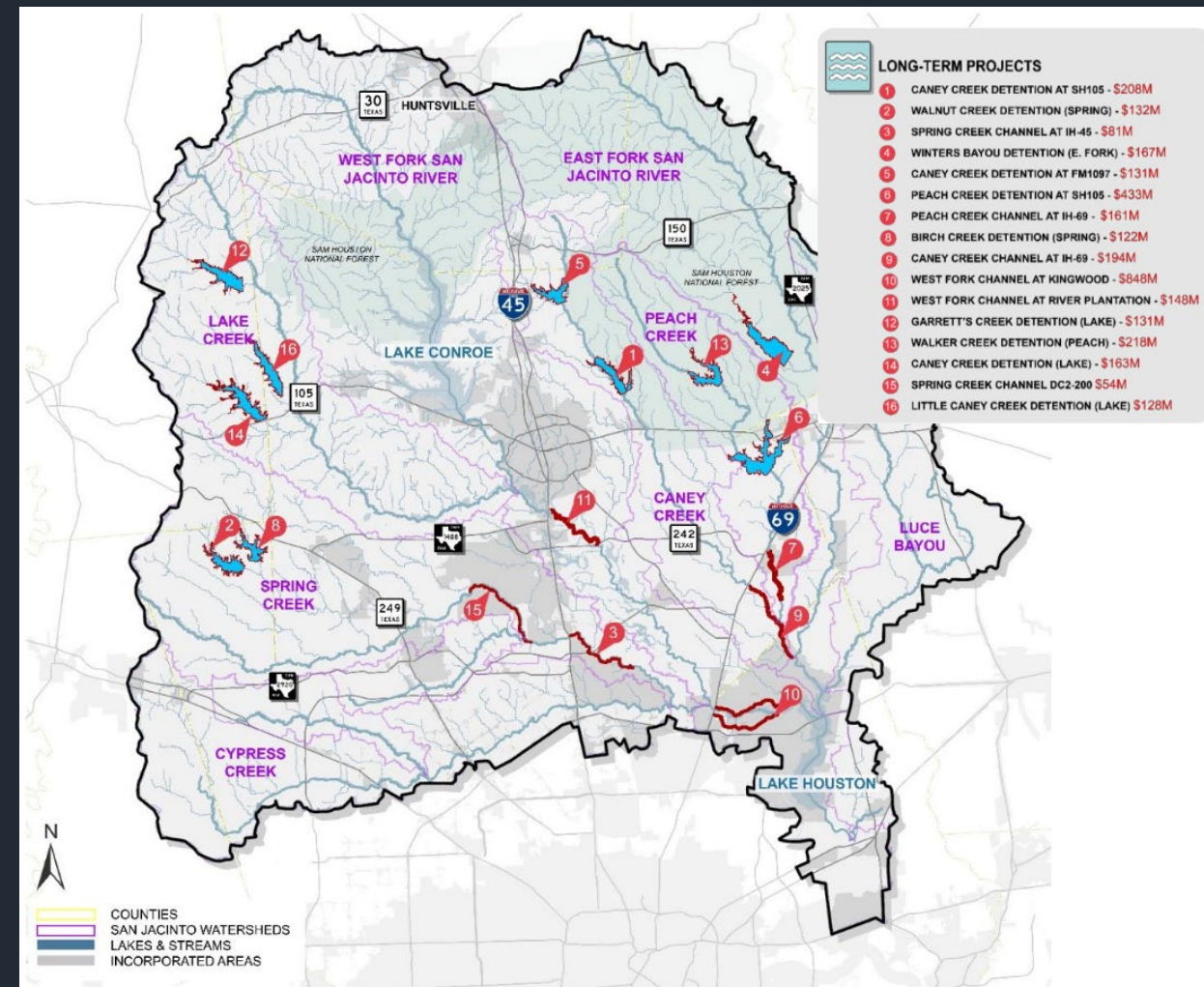
The study includes approximately 535 miles of stream, including West Fork San Jacinto River, East Fork San Jacinto River, San Jacinto River, Lake Creek, Cypress Creek, Little Cypress Creek, Spring Creek, Willow Creek, Caney Creek, Peach Creek, Luce Bayou, Tarkington Bayou, and Jackson Bayou.

Stream Name	Stream Length (Miles)
West Fork San Jacinto River	61.4
East Fork San Jacinto River	73.2
San Jacinto River	16.3
Lake Creek	58.9
Cypress Creek	60.5
Little Cypress Creek	20.8
Spring Creek	69.6
Willow Creek	19.8
Caney Creek	49.3
Peach Creek	53.5
Luce Bayou	10.8
Tarkington Bayou	36.9
Jackson Bayou	4.6
Total	535.6



San Jacinto Regional Watershed Master Drainage Plan:

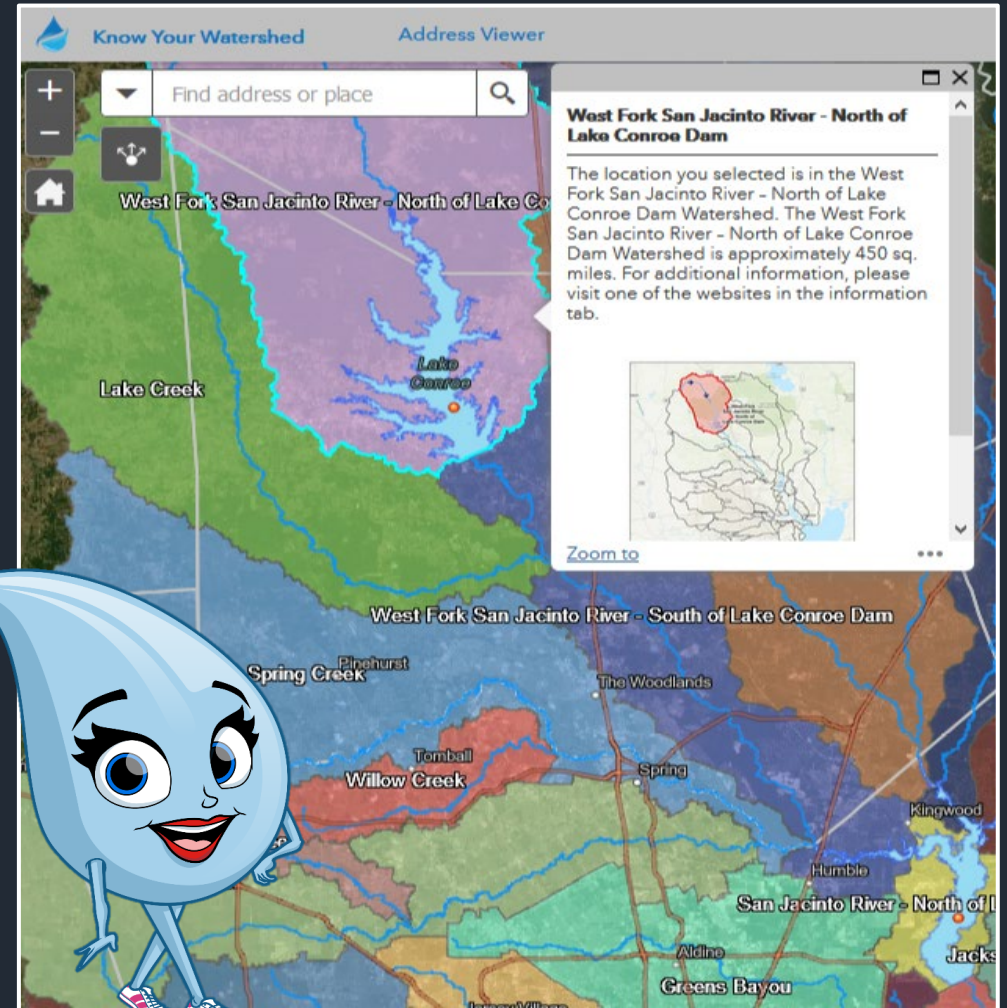
- Develop H&H models that will help predict flood risks in the study areas.
- Evaluate flood mitigation measures.
- Evaluate sediment management strategies.
- Analyze existing watershed conditions.
- Identify flood mitigation projects that will potentially reduce the flood risk in the study area.
- Study Goal: to identify vulnerabilities to flood hazards and develop a comprehensive flood mitigation plan.



Initiatives (Completed)

Know Your Watershed Campaign:

- Provides the public with a better understanding of the watersheds in the San Jacinto River Basin, as well as how watersheds interact.
- The first phase of the campaign consists of two tools:
 - An address viewer to show residents the watershed they reside in.
 - An interactive story map that gives viewers an educational digital “tour” of the West Fork of the San Jacinto River.



Sediment and Siltation Removal in Lake Houston:

- \$30 million allocated by the State of Texas during the 86th legislative session (Senate Bill 500).
- Study led by HCFCD with partners SJRA, City of Houston, and Harris County.
- Study was first step in the potential development of a long-term strategy for managing siltation and sedimentation in Lake Houston.
- Continuous removal of siltation and sediment has the potential to provide additional river conveyance capacity and lake storage.



Temporary Seasonal Lake Lowering:

- Normal Lake Conroe pool level is 201' msl.
- For the spring season, beginning April 1, the City of Houston (COH) calls for the release of an amount of water from Lake Conroe that is necessary to create one foot of capacity to catch storm runoff (i.e. to lower the lake to 200' msl). After June 1, the lake is allowed to return to its normal level of 201' msl.
- For the fall season, beginning August 1, the COH calls for the release of an amount of water from Lake Conroe that is necessary to create one foot of storage capacity to catch storm water runoff (down to 200' msl). After September 1, releases are made to create an additional six inches of storage capacity (down to 199.5' msl). If a named storm is predicted to impact our region, the COH may initiate an additional release to create six more inches of storage capacity (down to 199' msl) by notifying SJRA in writing of their call for release. After October 1, the lake is allowed to return to its normal level of 201' msl.
- All water released as part of this program comes from the COH's contract 2/3 share of permitted water supply in Lake Conroe and must be requested by the COH. SJRA staff coordinate with COH staff on the details and timing of any releases. Coordination with COH involves ensuring that a Lake Conroe release considers releases from Lake Houston.

Sediment Removal/Sand Trap Development:

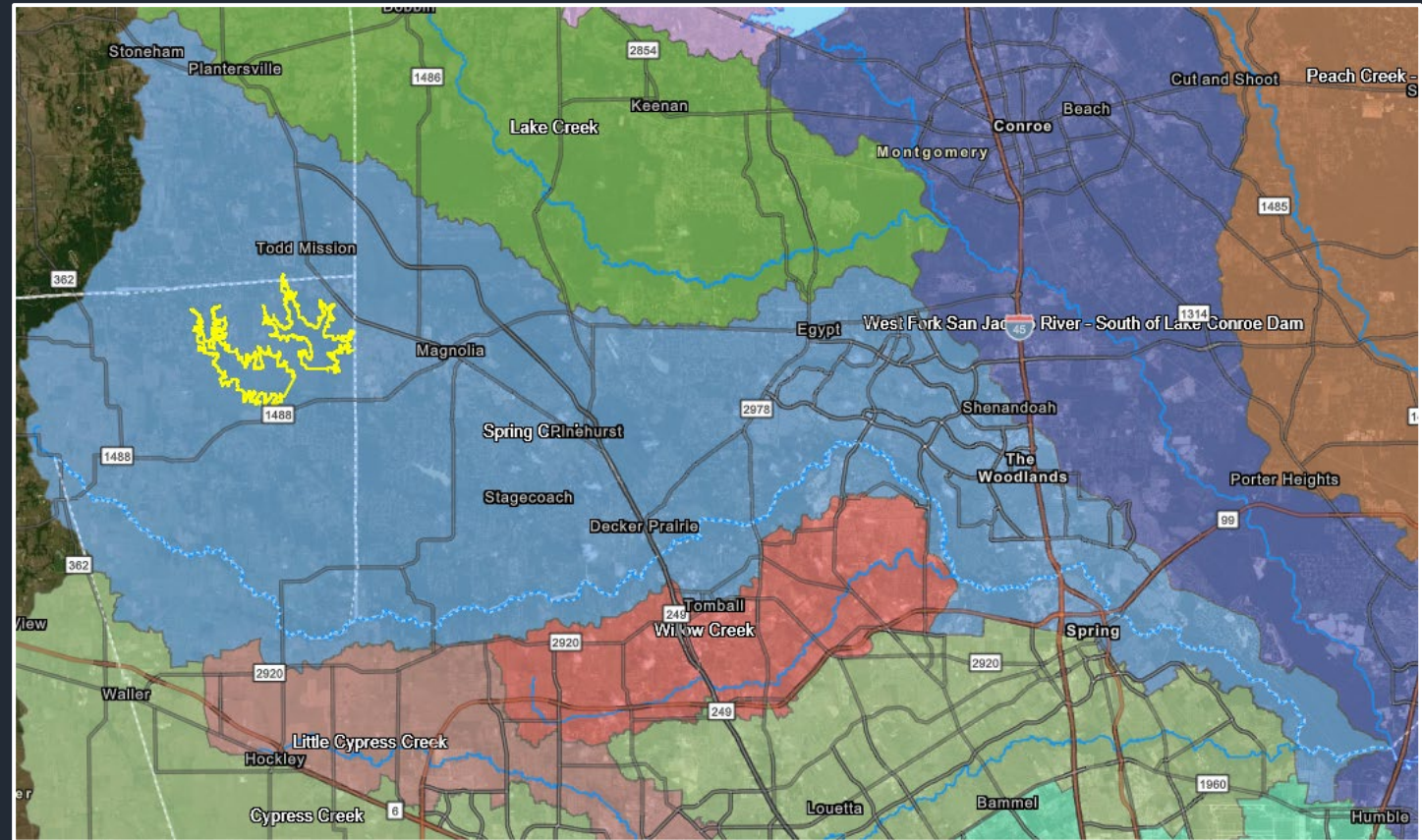
- HB 1824 (86th Legislature) exempts SJRA and HCFCD from state permitting and royalty fees for sediment removal in the San Jacinto River and its tributaries.
- SJRA and HCFCD partnered to perform conceptual design study for sand trap pilot project.
- SJRA applied for grant funds for future phases but did not receive grant funding.
- SJRA and HCFCD coordinating on next steps, pilot project will likely involve public-private partnership with APO(s).



Texas Water Development Board Flood Infrastructure Fund Grant Projects

Spring Creek Flood Control Dams:

- Continuation of Spring Creek Siting Study (Master Drainage Plan)
- Major project Components:
 - Environmental due diligence
 - Conceptual design
 - Modeling and benefit/cost ratio updates
- Partners include HCFCD, City of Humble, and 5 MUDs in the Woodlands area



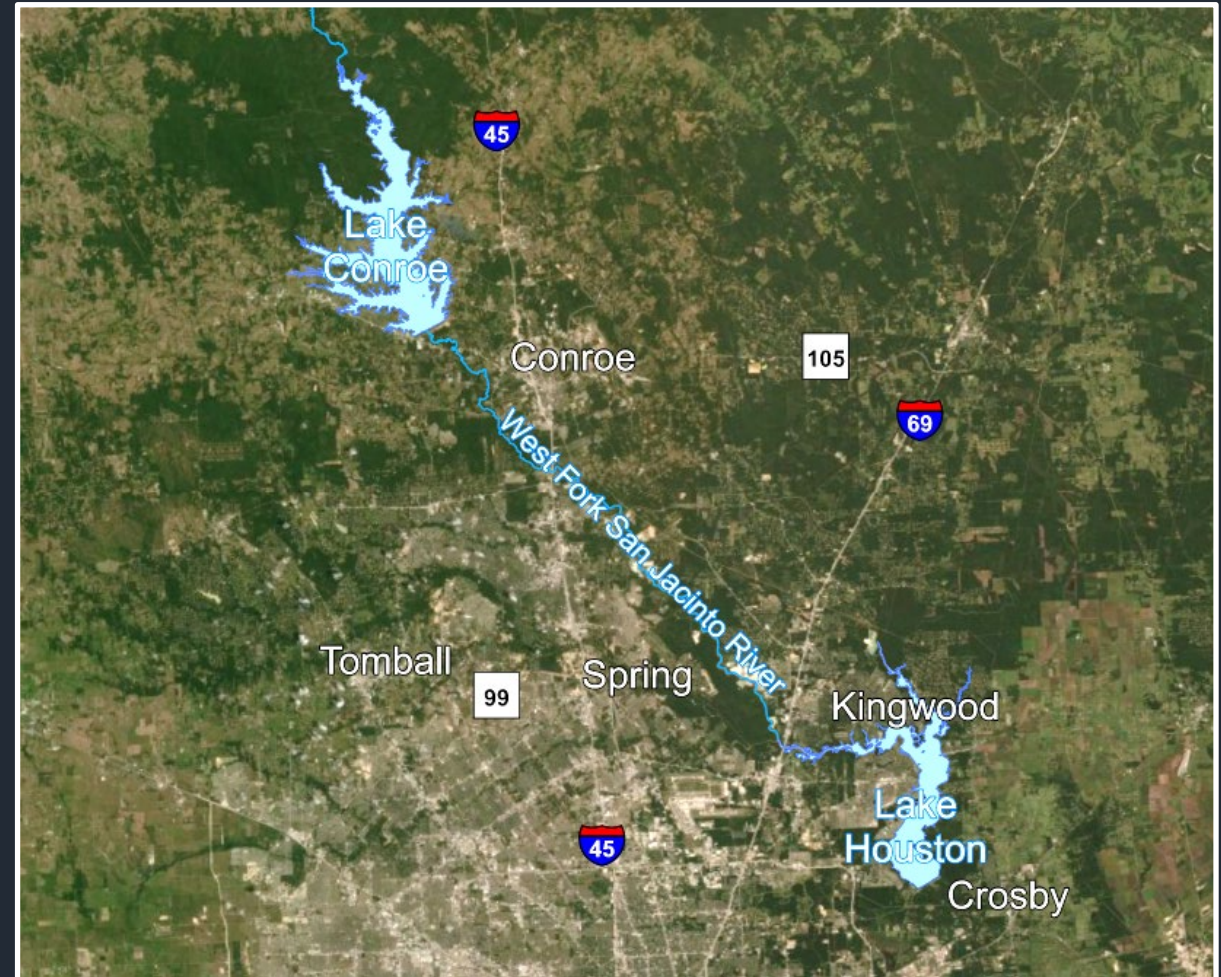
Regional Sedimentation Study:

- Identify sub-watersheds that produce and store the most sediment
- Prioritize sub-watersheds and individual locations for improvements
- Develop & analyze conceptual solutions and non-construction best management practices
- Develop regional sediment management plan
- Partners include HCFCD, City of Houston, and City of Humble



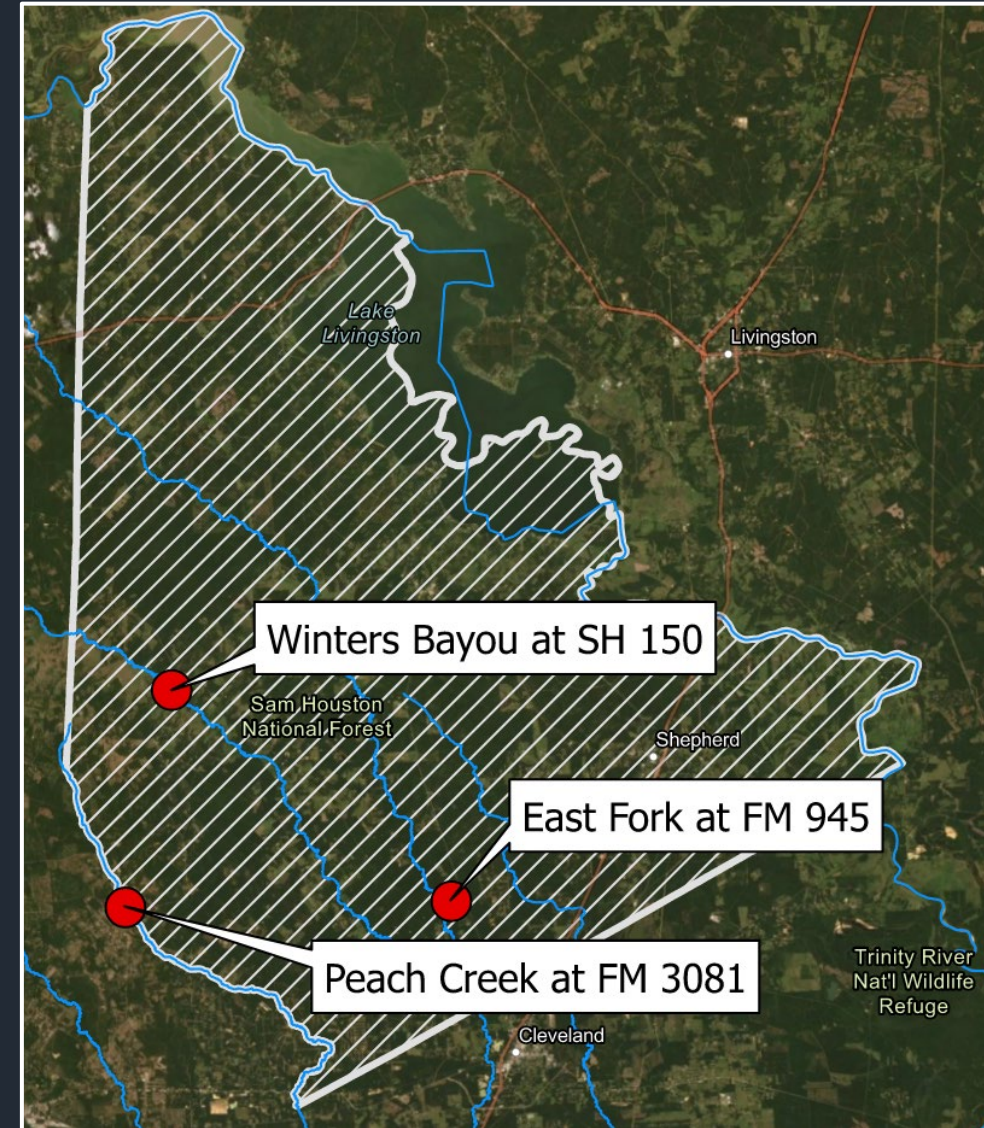
Lake Conroe – Lake Houston Joint Operations:

- City of Houston/CWA completing preliminary design of Lake Houston Gates
- Project anticipated to include:
 - Evaluation of pre-releases
 - Lake Houston flow-forecasting
 - Gate operations policy for Lake Houston
- Ensure most efficient and safe operation of reservoirs in series
- Partners include City of Houston and City of Humble



Flood Early Warning System for San Jacinto County:

- Installation of 3 rain/stream gages in San Jacinto County
- SJRA staff will perform installation in-house, with some external support as necessary
- O&M to be performed by SJRA staff and funded by County
- Provide early warning to residents and emergency personnel



Highlands Reservoir Partnership:

- HCFCD and Harris County working to improve drainage near neighborhood north of reservoir.
- SJRA partnered with HCFCD to evaluate alternatives utilizing the reservoir.
- SJRA has agreed to provide ~93 acres of reservoir property to HCFCD and allow the northern reservoir berm to be relocated up to ~250 feet south to accommodate drainage improvement efforts.

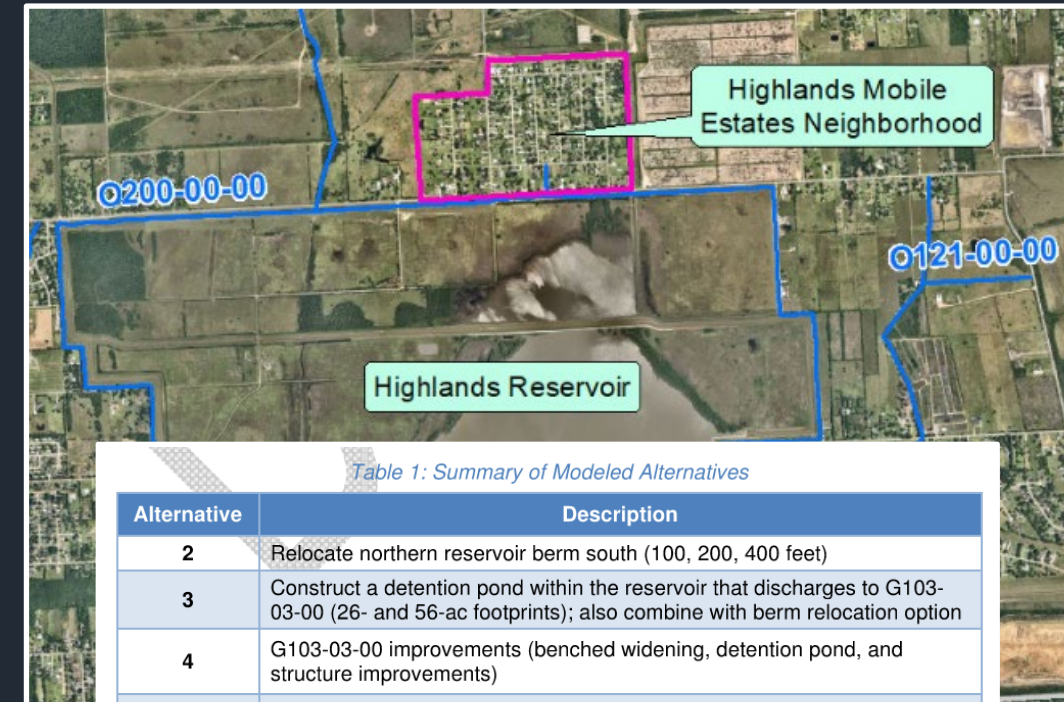


Table 1: Summary of Modeled Alternatives

Alternative	Description
2	Relocate northern reservoir berm south (100, 200, 400 feet)
3	Construct a detention pond within the reservoir that discharges to G103-03-00 (26- and 56-ac footprints); also combine with berm relocation option
4	G103-03-00 improvements (benched widening, detention pond, and structure improvements)
6	Utilize G103-04-00 as new outfall and divert flow from O200-00-00 via box culvert; also combine with a detention pond north of Barbers Hill Road and berm relocation option
8	Box culvert from HME neighborhood directly to G103-04-00



- Regional flood management efforts outside of Harris County are in their infancy, and the heavy lifting is yet to come!
- The San Jacinto Regional Watershed Master Drainage Plan recommended 16 projects, totaling approximately \$3 billion in 2020 estimates, many of which would take multiple decades to permit, design, and construct
- Large scale projects will require stakeholder buy-in and likely funding beyond State and local sources
- The San Jacinto (Region 6) Regional Flood Plan will recommend evaluations, projects, and strategies to be performed in the region, and will guide State funding availability

Questions?