

# Trinity San Jacinto BBEST Modeling Project

## Hydrologic Component

August 13, 2009

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# Overview / Study Objectives

## **Study Objectives**

- Apply information related to water quality, biology and geomorphology
- Apply HEFR, IHA analyses, and PEAKFQ
- Develop a matrix of preliminary flow recommendations for consideration by BBEST
- Present technical evaluations

# Overview / Study Objectives

## **Questions To Be Addressed:**

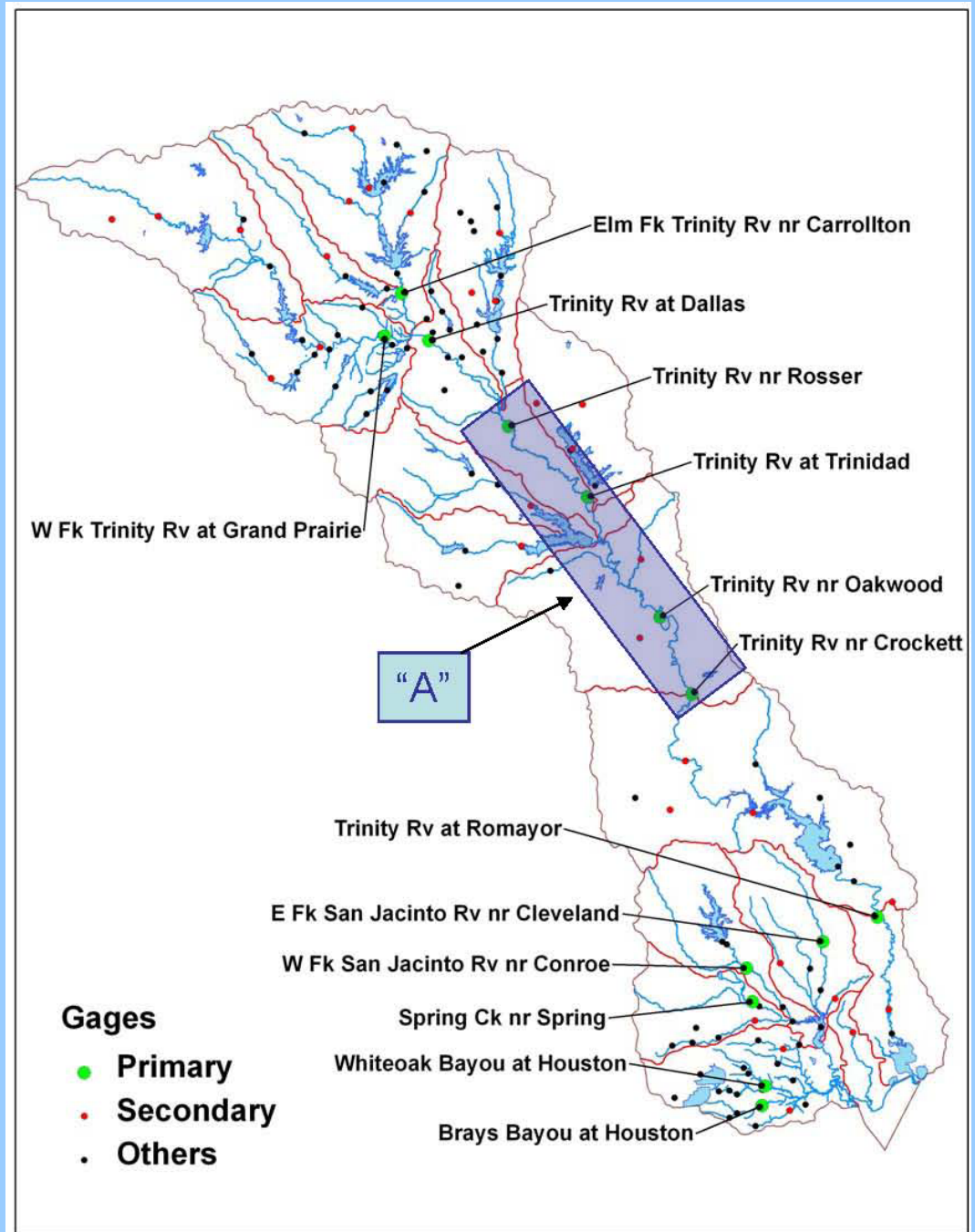
- What are/were the typical seasonal flow patterns?
- To what extent have the flows in the river changed over time in response to human influences?
- What are the primary human influences on the flow regime, and where do these impacts occur?

# Scope of Work

## Project Tasks

- Task 1 – Project Management
- Task 2 – Assemble Available Data
- Task 3 – Flow Separation Analysis
- Task 4 – Episodic Event Analysis
- Task 5 – Flow Matrix
- Task 6 – Technical Report

# Basin and Priority Gage Locations

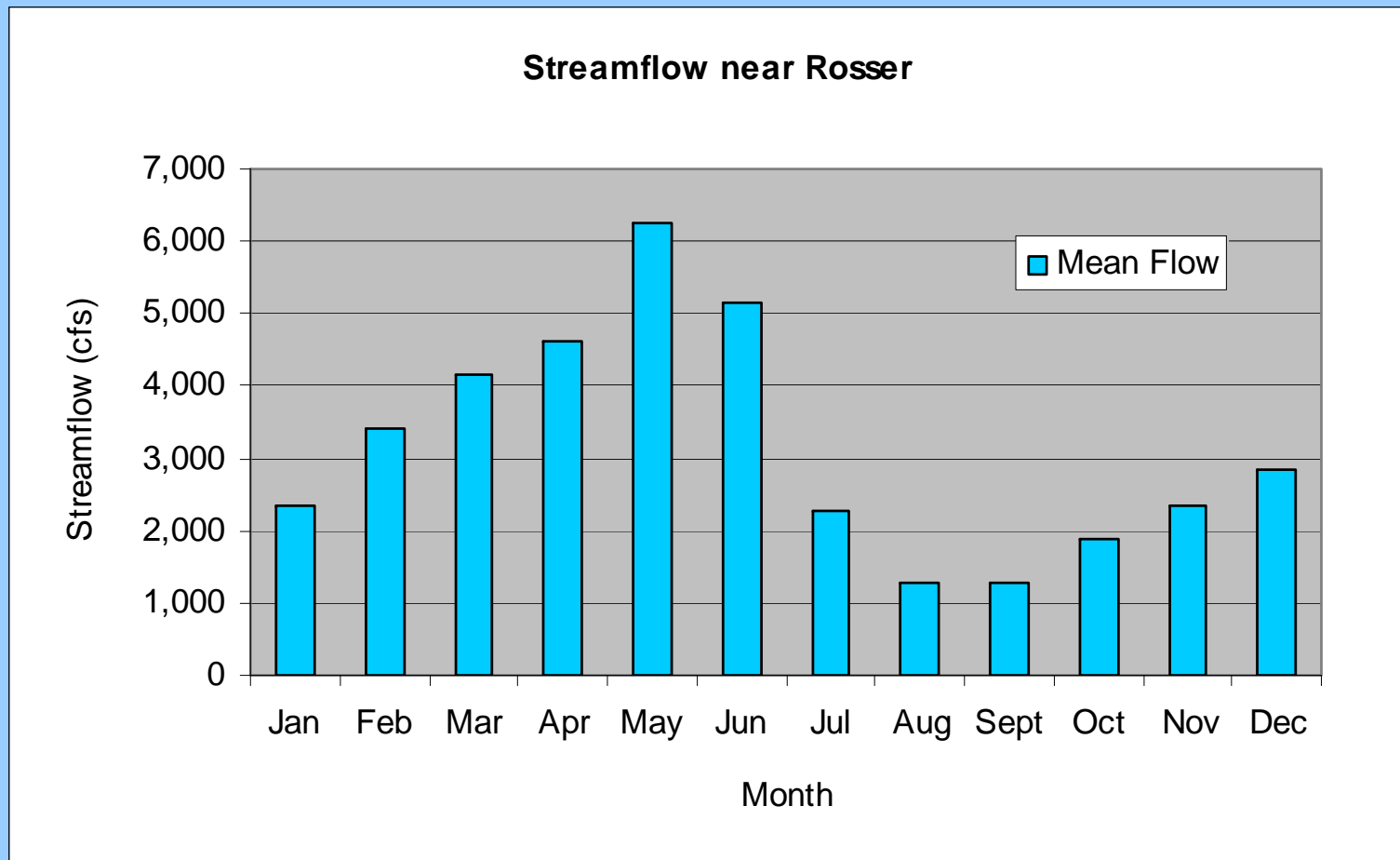




# Trinity River near Rosser Gage 08062500

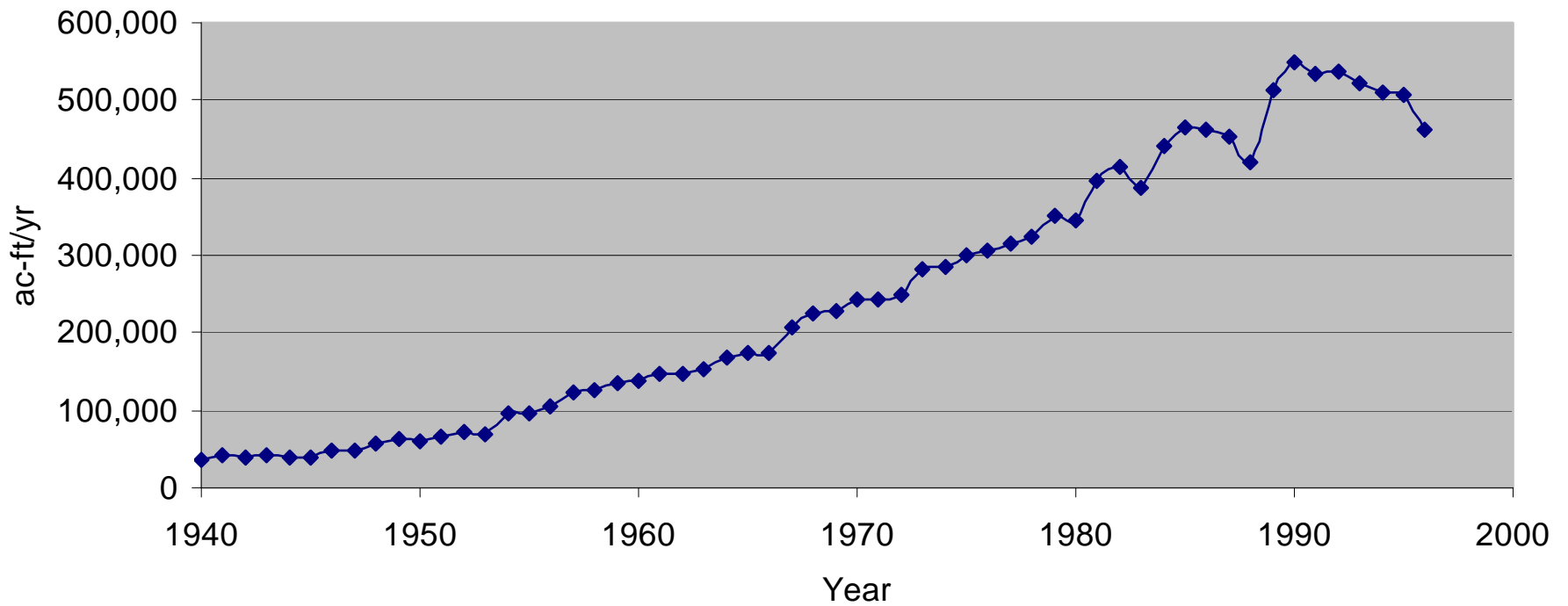
- Priority A Gage
- Located along Trinity River downstream of Dallas/Fort Worth area
- Drainage Area – 8,147 mi<sup>2</sup>
- River Mile 451.1
- Length of Record: 1938-present
- Quality of Record - Good
- 8 Major Reservoirs Upstream (At least 10% of area)
- Impacted by Return Flows

# Mean Streamflow Trinity River near Rosser



# Return Flows

Return Flows Upstream of Rosser  
Gage 08062500



# Preliminary Separation Analysis

Reservoir	Drainage Area (square miles)	Stream	Date of Impoundment	Upstream of	Permitted Conservation Storage (ac-ft/yr)
<b>Trinity River Basin</b>					
Amon Carter	99.8	Big Sandy Creek	May 1956	W Fk Trinity Rv at Grand Prairie	20,000
Bridgeport	1,111	West Fork Trinity River	April 1932		387,000
Eagle Mountain	1,970	West Fork Trinity River	February 1934		210,000
Worth	2,064	West Fork Trinity River	July 1914		38,124
Weatherford	109	Clear Fork Trinity River	March 1957		19,470
Benbrook	429	Clear Fork Trinity River	September 1952		87,000
Lake Arlington	143	Village Creek	March 1957		45,710
Ray Roberts	692	Elm Fork Trinity River	June 1987	Elm Fk Trinity Rv nr Carrollton	799,600
Lewisville	1,660	Elm Fork Trinity River	November 1954		618,400
Grapevine	695	Denton Creek	July 1952		161,250
* separate from flow to gage 8049500					
Joe Pool	232	Mountain Creek	January 1986	Trinity Rv at Dallas	176,900
Mountain Creek	295	Mountain Creek	March 1937		22,840
flow merges from all upstream gages					
White Rock	100	White Rock Creek	March 1905	Trinity Rv nr Rosser	21,345
Lavon	770	East Fork Trinity River	September 1953		380,000
Ray Hubbard	1071	East Fork Trinity River	March 1978		490,000

# PEAKFQ Results

## Trinity River near Rosser

<b>Return Period</b>	<b>Pre-1952 Flow</b> cfs	<b>Pre-1952 95% CI</b> cfs	<b>Post-1954 Flow</b> cfs	<b>Post-1954 95% CI</b> cfs
1.5-year	23,660	16,170 - 32,380	18,980	16,040 - 22,150
2-year	32,550	23,240 - 45,310	25,570	21,910 - 29,870
5-year	60,360	43,530 - 95,640	44,770	37,890 - 54,520
10-year	83,090	57,860 - 146,000	59,330	49,210 - 74,850

# PEAKFQ Results

## All Gages

STA NAME	STA ID	YEARS	P1.5	P2	P5	P10
W Fk Trinity Rv at Grand Prairie, TX	8049500	84	6,770	9,200	17,300	24,400
Elm Fk Trinity Rv nr Carrollton, TX	8055500	85	5,540	8,410	19,200	29,700
Trinity Rv at Dallas, TX	8057000	105	15,000	21,000	41,300	59,200
Trinity Rv nr Rosser, TX	8062500	71	19,300	26,200	47,000	63,600
Trinity Rv at Trinidad, TX	8062700	44	24,600	32,600	53,500	67,300
Trinity Rv nr Oakwood, TX	8065000	85	25,500	34,800	62,500	83,800
Trinity Rv nr Crockett, TX	8065350	45	26,300	34,300	55,600	70,400
Trinity Rv at Romayor, TX	8066500	85	34,000	43,300	67,200	83,100
W Fk San Jacinto Rv nr Conroe, TX	8068000	73	6,450	10,200	24,200	37,600
Spring Ck nr Spring, TX	8068500	70	3,810	6,090	14,100	21,100
E Fk San Jacinto Rv nr Cleveland, TX	8070000	69	3,410	5,500	14,000	22,800
Whiteoak Bayou at Houston, TX	8074500	72	4,420	6,570	12,800	17,300
Brays Bayou at Houston, TX	8075000	73	6,510	9,590	18,600	25,200

# 7Q2 Flow Data

	Segment	USGS Gage	Gage Name	7Q2 (cfs)
Priority A	0805	8062500	Trinity Rr nr Rosser	606.6
	0804	8062700	Trinity Rv nr Trinidad	657.3
	0804	8065000	Trinity Rv nr Oakwood	716.7
	0804	8065350	Trinity Rv nr Crockett	810.8
Priority B	0841	8049500	W Fk Trinity Rv at Grand Prairie	107.4
	0822	8055500	Elm Fk Trinity Rv nr Carrollton	15.9
	0805	8057000	Trintiy Rv at Dallas	221.4
	0802	8066500	Trinity Rv at Romayor	732.3
Priority C	1004	8068000	W Fk San Jacinto Rv nr Conroe	20.3
	1008	8068500	Spring Ck nr Spring	15.4
	1003	8070000	E Fk San Jacinto Rv nr Cleveland	18.2
	1007	8075000	Brays Bayou at Houston	n/a
	1017	8074500	Whiteoak Bayon at Houston	29.1

# HEFR Results – Seasonal Trinity River near Rosser

Overbank Flows	Return Period (R) : 4.1 (years)					Duration (D) : 48 (days)																													
	Volume (V) : 1009528 (ac-ft)					Peak Flow (Q) : 34200 (cfs)																													
High Flow Pulses	F: 1		F: 1			F: 1		F: 1																											
	D: 10		D: 10			D: 9		D: 8																											
	Q: 7265		Q: 7140			Q: 4803		Q: 5310																											
	V: 74043		V: 66498			V: 38902		V: 35702																											
	F: 2		F: 2			F: 2		F: 2																											
	D: 7		D: 6			D: 5		D: 6																											
	Q: 3890		Q: 3660			Q: 2495		Q: 3015																											
	V: 28582		V: 23703			V: 15988		V: 18837																											
	F: 3		F: 3			F: 3		F: 4																											
	D: 5		D: 4			D: 4		D: 4																											
	Q: 1910		Q: 2310			Q: 1413		Q: 1480																											
	V: 12774		V: 14038			V: 8399		V: 9364																											
Base Flows (cfs)	1090		1200			892		826																											
	739		787			619		576																											
	404		444			414		356																											
Subsistence Flows (cfs)	121		118			128		124																											
<table border="1"> <thead> <tr> <th>Dec</th> <th>Jan</th> <th>Feb</th> <th>Mar</th> <th>Apr</th> <th>May</th> <th>Jun</th> <th>Jul</th> <th>Aug</th> <th>Sep</th> <th>Oct</th> <th>Nov</th> </tr> </thead> <tbody> <tr> <td colspan="3">Winter</td> <td colspan="3">Spring</td> <td colspan="3">Summer</td> <td colspan="3">Fall</td> </tr> </tbody> </table>												Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Winter			Spring			Summer			Fall		
Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov																								
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Hydrologic Conditions		Wet (75th %ile)					High Flow Pulse Characteristics																												
		Average (50th %ile)																																	
		Dry (25th %ile)																																	
		Subsistence																																	
						F = Frequency (per season)																													
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# HEFR Results - Monthly Trinity River near Rosser

Overbank Flows	Return Period (R) : 4.1 (years)						Duration (D) : 48 (days)								
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High Flow Pulses	F: 1						F: 1						F: 1		
	D: 10						D: 10						D: 9		
	Q: 7265						Q: 7140						Q: 4803		
	V: 74043						V: 66498						V: 38902		
	F: 2						F: 2						F: 2		
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	F: 3						F: 3						F: 3		
	D: 5						D: 4						D: 4		
Q: 1910						Q: 2310						Q: 1413			
V: 12774						V: 14038						V: 8399			
Base Flows (cfs)	944	1110	1200	1120	1250	1200	1080	891	805	821	798	879			
	609	762	832	732	821	801	749	632	566	558	586	586			
	387	409	440	443	442	461	444	422	390	356	365	348			
Subsistence Flows (cfs)	128	101	116	111	136	139	132	128	130	124	124	128			
	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov			
	Winter			Spring			Summer			Fall					

<b>Hydrologic Conditions</b>	Wet (75th %ile)
	Average (50th %ile)
	Dry (25th %ile)
	Subsistence

<b>High Flow Pulse Characteristics</b>	F = Frequency (per season)
	D = Duration (days)
	Q = Peak Flows (cfs)
	V = Volume (ac-ft)

# Compilation and Synthesis of Principle Riverine Components

- Biology (aquatic and terrestrial)
- Water Quality
- Geomorphology (physical processes)
- Connectivity (longitudinal, lateral and vertical)