



***Brazos River Authority
Special Briefing
for
Brazos Basin BBASC***

***System Operation Permit
vs.
SB3***



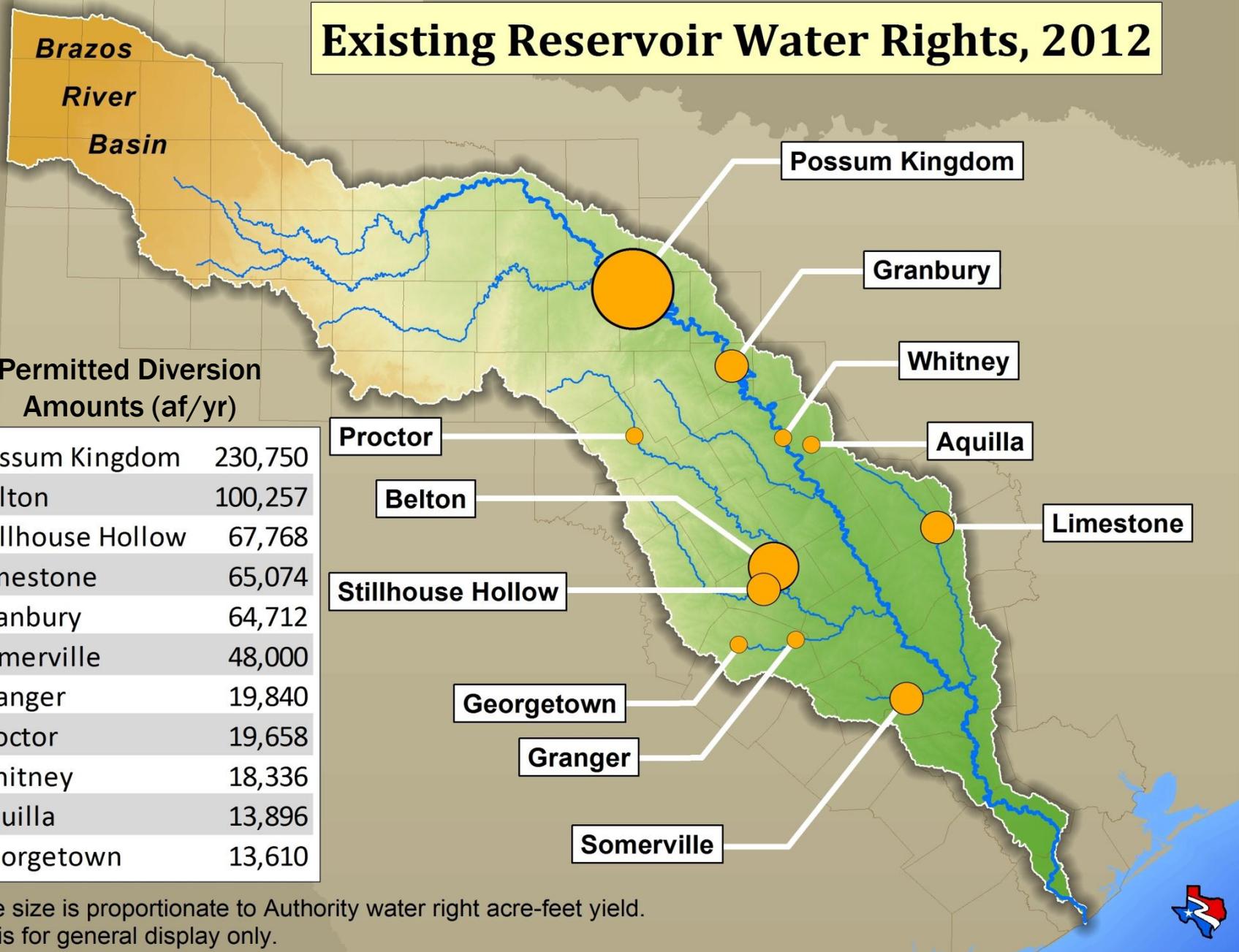
Brazos River Authority Water Supply Reservoirs



- Owned & Operated by BRA
- US Army Corps of Engineers
- Permitted Reservoir by City of Houston & BRA



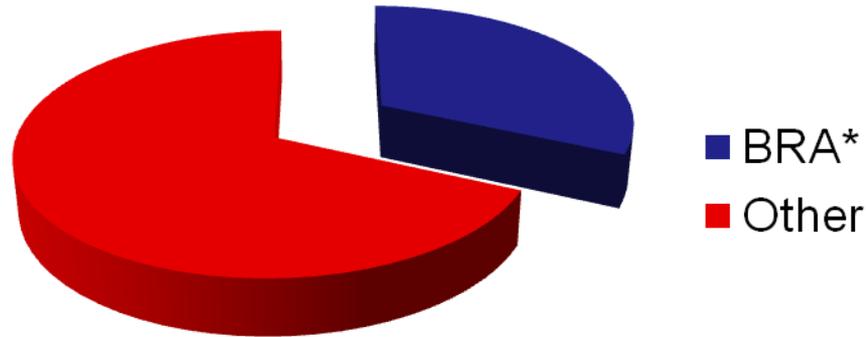
Existing Reservoir Water Rights, 2012





Total Authorized Diversions in Brazos Basin (acre/feet)

2,300,000 est.



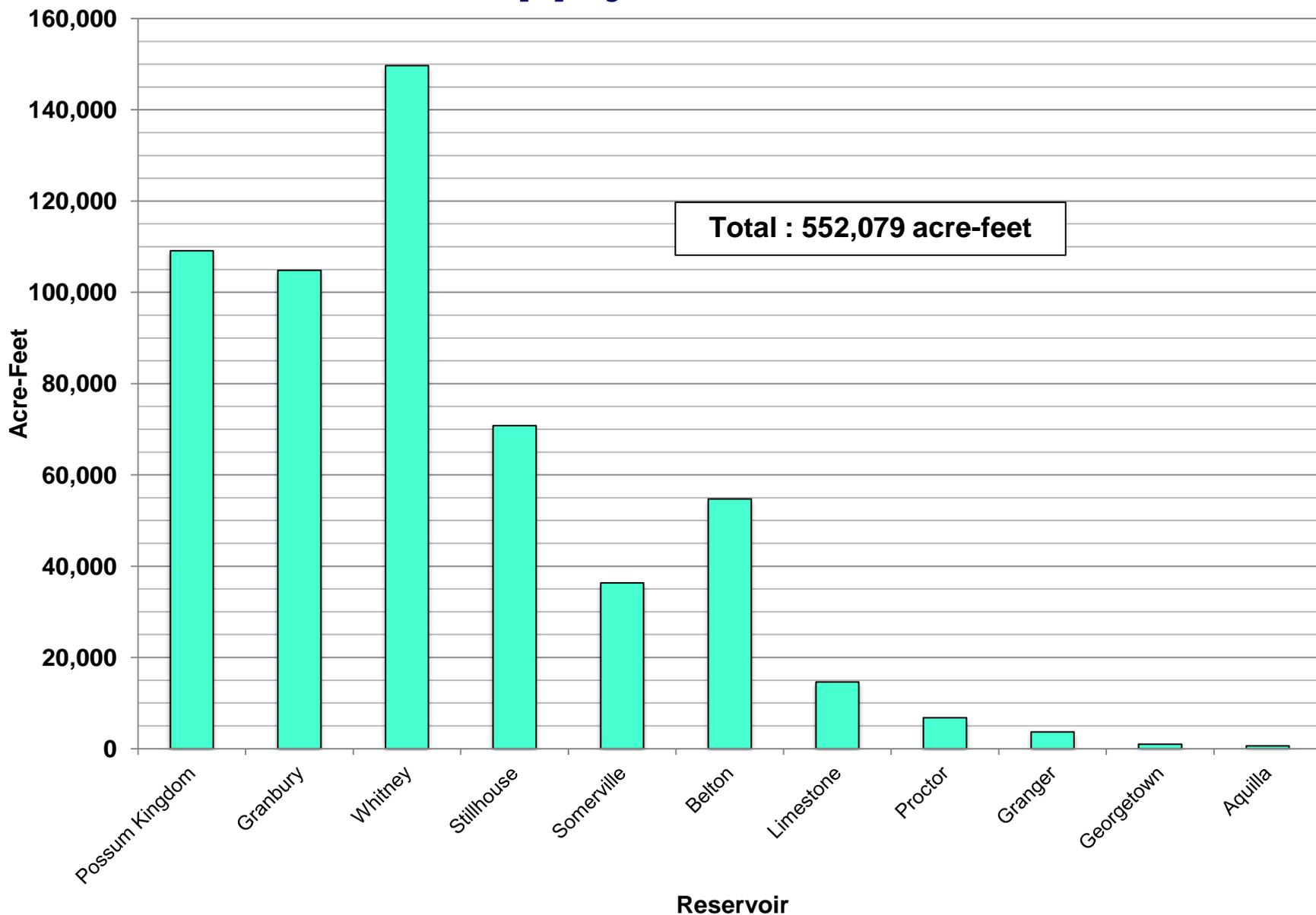
*** 730,596 acre-feet per year = (661,901 for System reservoirs + 29,895 for BRA 30% share of Allens Creek + 38,800 for old BEPC water right that BRA purchased below Lake Belton)**

•BRA percentage of total authorized diversions – about 32%

•During normal year, ~ 6,000,000 acre/feet flows out of the Brazos, into the Gulf of Mexico

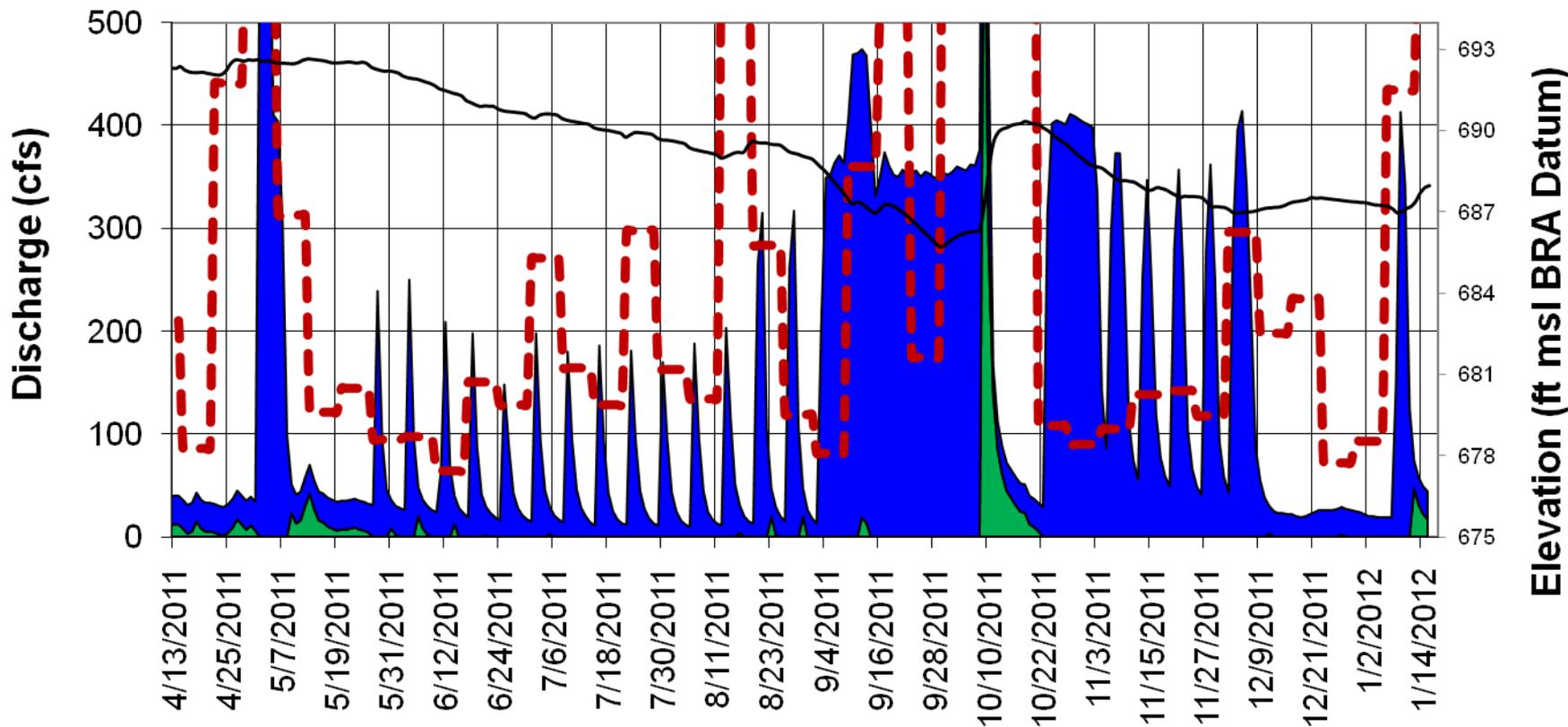


2011 Low Flow & Downstream Water Supply Releases





2011 Reservoir Releases vs. Streamflow Brazos River near Glen Rose

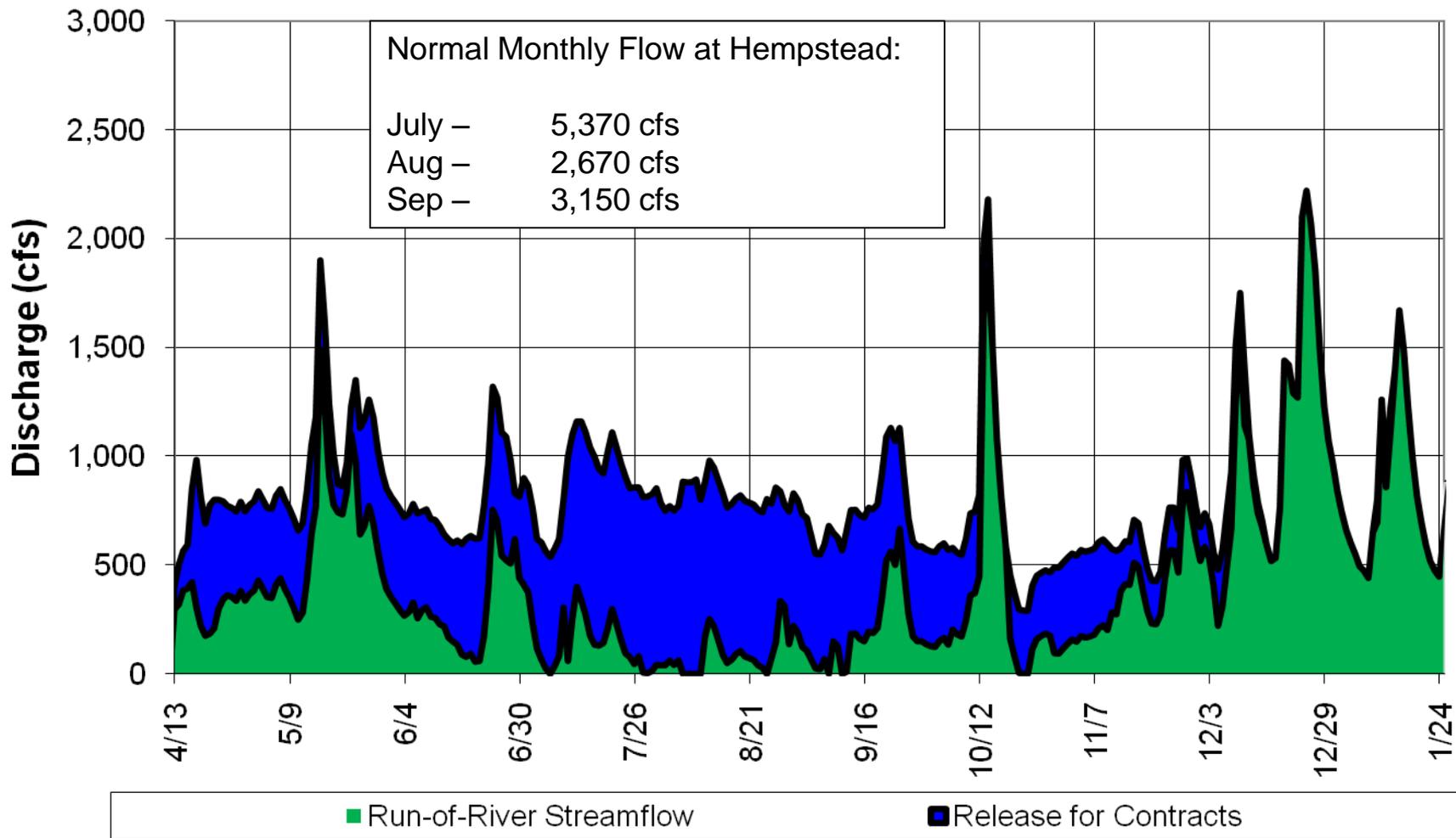


- Run-of-River Streamflow Downstream of Granbury Dam
- Routed Release from Lake Granbury
- Granbury Weekly Average Inflows
- Granbury Elevation

April -1 thru January - 15	
<u>GB Inflow</u>	<u>GB Release</u>
166,920 af	97,985 af



2011 Flow in the Brazos River near Hempstead





System Operation



Excerpt from 1960's Water Right Permit Application for Lakes Belton, Proctor, Stillhouse Hollow, and Somerville

18. It is to be expected that most of the water supply developed by the four projects will be used in the lower river basin and adjacent coastal areas. The conclusions of the U. S. Study Commission and others who have made future water requirement studies indicate huge increases in the water requirements of these coastal areas and only moderate increases in the other areas dependent upon these reservoirs for water supplies. Although studies have not been made on which to base estimates of the total firm supply that could be made available through a coordination of reservoir releases with the uncontrolled runoff at the points of diversion, it is obvious that the supply would greatly exceed the firm dependable yields of the four projects. In such an operation, there would be years when the uncontrolled runoff would essentially supply all demands, and the draft on the subject reservoirs would be small. Even during the critical drought period there would be years when much of the demand could be supplied by uncontrolled river flow. During the more extreme drought years, the reservoirs would be called upon to supply a large part of the demand. Since a coordinated operation of this nature will undoubtedly be an ultimate necessity, the BRA seeks at this hearing the right to appropriate and divert in quantities that will permit such an operation to be accomplished.



System Operation Permit

- **Economical Water Supply Source**
- **Recommended Water Supply Strategy in Brazos G and Region H Water Plans**
- **Commits Water to Texas Water Trust**
- **First Major Water Right Permit containing Environmental Flow provisions similar to SB3**



What will the System Operation Permit Authorize?

- **Use of water from BRA's existing reservoirs in conjunction with downstream river flow and wastewater return flow**
- **Recognition of availability of return flows as a source of water supply**
- **Implementation of an environmental flow regime consistent with the expectations of current and pending law**



System Operation Permit Current Status

- **TCEQ Commission Ruling (January 25, 2012)**
 - **Remand to SOAH for proceedings on WMP (Not denied)**
- **Schedule (24 months):**
 - **BRA - 10 months to file WMP with TCEQ (no extensions)**
 - **TCEQ - 7 months to review, prepare draft permit and publish notice.**
 - **SOAH - 7 months to hold contested hearing and prepare PFD for Commission consideration.**

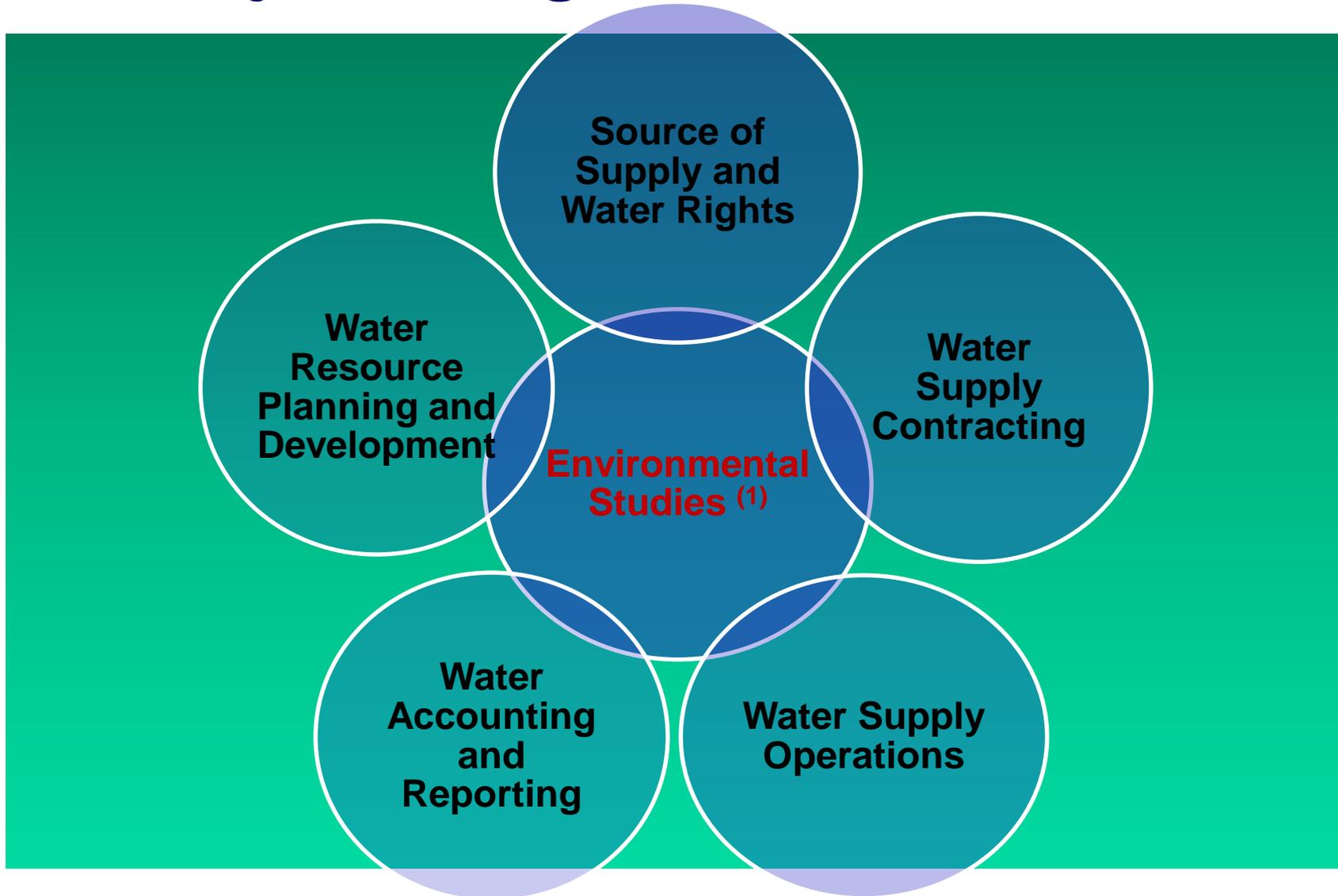


Water Management Plan (WMP)

- **Draft Permit**
 - **Requires WMP**
 - **20 Separate References**
 - **Interim Environmental Flows Special Condition**
- **Components –**
 - **14 Separate Environmental Studies**
 - **Water Rights Accounting Plan**
 - **All Water Rights plus System Operation Permit**
 - **Current and Future Diversion Points**
- **Stakeholder Process**



Major Categories of The WMP



(1) Due to compressed schedule, all Studies will not be completed prior to initial WMP filing date.

Purpose of Environmental Studies

- **Collect Additional Data for Environmental Flow Assessment**
- **Evaluate the Flow Values in the Permit**
- **Bring Information Forward to Assess and Refine the Flow Criteria**
- **Evaluate Feasibility of Future Studies**





Environmental Studies Required for WMP

Item No	Task	Permit 2010-02-11	Tier A/B	Tier A/B	Tier C	Tier D
			Status required for approval of Initial WMP			
			Scoping completed	Study methods completed	Study in- progress	Interim conditions apply (6.E)
	Develop WMP Work Plan					
WMP 00	Participate in drafting the WMP	6.D.1				
WMP-10	Adaptive management and monitoring	6.D.2 & .4.k		X		n/a
WMP-1	Reservoir levels and Fisheries	6.D.4.e	X			n/a
WMP-12	Number of seasons and months	6.E.2				X
WMP-4	Measurement points and flow levels	6.D.4.b				X
WMP-2	Uncertainty in HFPs	6.D.4.g	X			n/a
WMP-3	Revised storage triggers	6.D.4.h				X
WMP-5	Diversion rate trigger levels for HFPs	6.D.4.c				X
WMP-13	Maximum diversion rates	6.D.4.f				X
WMP-6	Standards below Richmond	6.C.12	interim	X		n/a
WMP-7	Monitoring at wq protection points	6.E.17	X			X
	-Little River		X			
	-Aquilla		X			
	-Upper Brazos		X			
WMP-8	BRIFP studies timeline	6.D.4.d		X	X	n/a
WMP-9	Little River watershed study	6.E.17	X			X
WMP-11	Conduct Instream Flow Studies	6.E.1		X	X	X
	-Lower Brazos (coord w/TIFP)			X	X	
	-Little River			X	X	
	-Upper Brazos			X	X	
	-Aquilla			X	X	
	-Navasota			X	X	
	-Yegua			X	X	



System Operation Permit Environmental Flows

- **Permit Application**
 - **3 Measurement Points**
 - Lyons Method
- **Draft Permit Special Conditions (following TPWD Negotiations)**
 - **6 Primary Measurement Points**
 - Flow requirements developed using SB3 flow-regime methodology
 - Predecessor to the HEFR model
 - Instream Flow studies (in cooperation with TIFP)
 - **8 Water Quality Protection Points**
 - 7Q2
 - Monitoring Studies (in cooperation with TPWD)



System Operations Permit Application Analysis Points



Upper Basin Region

Central Basin Region

Lower Basin Region

-  TCEQ Water Quality Protection Points
-  Mandated Measurement Flow Points
-  BRA Permit Application Points

 Primary Watersheds

Brazos Rv nr Glen Rose

Brazos Rv nr Highbank

Brazos Rv nr Richmond

Brazos Rv nr Freeport



HFP's

System Operation Permit Draft

(Glen Rose Gage)

Pulse Flows (ac-ft) BRAZOS RIVER NEAR GLEN ROSE - USGS #08091000

Hydrologic Condition	Winter	Spring	Summer	Fall
Dry	2,329.6	3,208.3	2,617.2	2,211.6
Average	7,325.0	14,915.7	7,265.5	7,565.0
Wet	31,220.8	36,144.8	33,064.5	28,682.0

Peak Flows (cfs) BRAZOS RIVER NEAR GLEN ROSE - USGS #08091000

Hydrologic Condition	Winter	Spring	Summer	Fall
Dry	403	466	394	347
Average	1,120	2,070	1,320	1,040
Wet	4,945	5,265	4,370	3,525

Pulse Flow Schedule (days/# of events) BRAZOS RIVER NEAR GLEN ROSE - USGS #08091000

Hydrologic Condition	Winter		Spring		Summer		Fall	
	Dura*	Freq**	Dura	Freq	Dura	Freq	Dura	Freq
Dry	6	2	4	3	4	2	4	2
Average	7	2	6	2	6	2	7	1
Wet	13	1	10	2	11	1	11	1

Permit Instream Flow at Glen Rose



Overbank Events												
High Flow Pulses	Qp: 4,945 cfs Frequency 1 per season Volume is 31,220.8 AF Duration is 13 days			Qp: 5,265 cfs Frequency 2 per season Volume is 36,144.8 AF Duration is 10 days			Qp: 4,370 cfs Frequency 1 per season Volume is 33,064.5 AF Duration is 11 days			Qp: 3,525 cfs Frequency 1 per season Volume is 28,682.0 AF Duration is 11 days		
	Qp: 1,120 cfs Frequency 2 per season Volume is 7,325.0 AF Duration is 7 days			Qp: 2,070 cfs Frequency 2 per season Volume is 14,915.7 AF Duration is 6 days			Qp: 1,320 cfs Frequency 2 per season Volume is 7,265.5 AF Duration is 6 days			Qp: 1,040 cfs Frequency 1 per season Volume is 7,565.0 AF Duration is 7 days		
	Qp: 403 cfs Frequency 2 per season Volume is 2,329.6 AF Duration is 6 days			Qp: 466 cfs Frequency 3 per season Volume is 3,208.3 AF Duration is 4 days			Qp: 394 cfs Frequency 2 per season Volume is 2,617.2 AF Duration is 6 days			Qp: 347 Frequency 2 per season Volume is 2,211.6 AF Duration is 4 days		
	234.0			292.8			249.5			332.0		
Base Flows (cfs)	92.0			138.0			101.5			150.0		
	39.0			45.0			33.3			62.0		
	15.3			15.3			15.3			15.3		
Subsistence Flows (cfs)	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov
	Winter			Spring			Summer			Fall		

Hydrologic Levels	High (75th %ile)
	Medium (50th %ile)
	Low (25th %ile)

Pulse volumes are in units of acre-feet and durations are in days.

Pulse events are terminated when the volume and duration criteria are met.

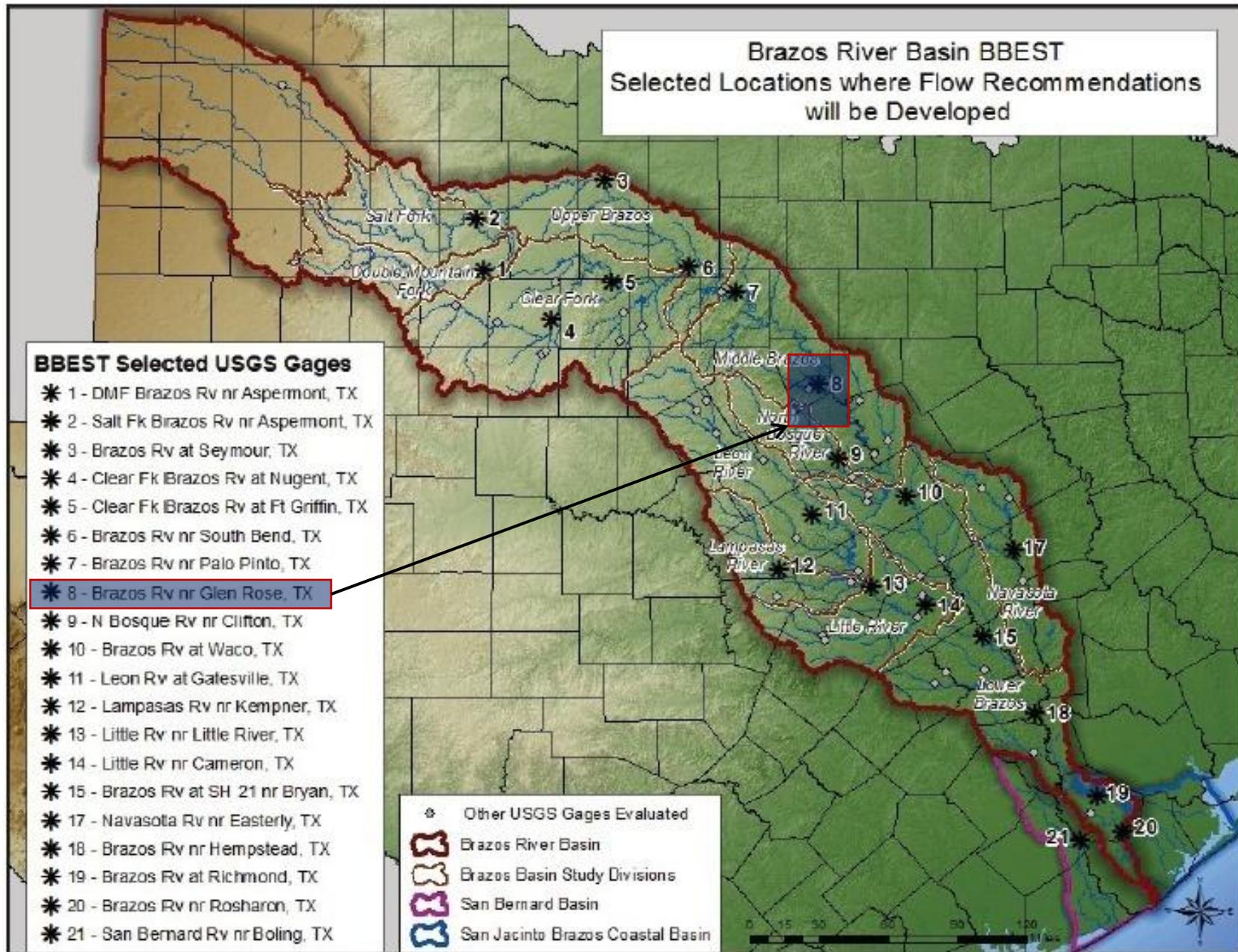


Brazos River Basin BBEST Selected Locations where Flow Recommendations will be Developed

BBEST Selected USGS Gages

- * 1 - DMF Brazos Rv nr Aspermont, TX
- * 2 - Salt Fk Brazos Rv nr Aspermont, TX
- * 3 - Brazos Rv at Seymour, TX
- * 4 - Clear Fk Brazos Rv at Nugent, TX
- * 5 - Clear Fk Brazos Rv at Ft Griffin, TX
- * 6 - Brazos Rv nr South Bend, TX
- * 7 - Brazos Rv nr Palo Pinto, TX
- * 8 - Brazos Rv nr Glen Rose, TX
- * 9 - N Bosque Rv nr Clifton, TX
- * 10 - Brazos Rv at Waco, TX
- * 11 - Leon Rv at Gatesville, TX
- * 12 - Lampasas Rv nr Kempner, TX
- * 13 - Little Rv nr Little River, TX
- * 14 - Little Rv nr Cameron, TX
- * 15 - Brazos Rv at SH 21 nr Bryan, TX
- * 17 - Navasota Rv nr Easterly, TX
- * 18 - Brazos Rv nr Hempstead, TX
- * 19 - Brazos Rv at Richmond, TX
- * 20 - Brazos Rv nr Rosharon, TX
- * 21 - San Bernard Rv nr Boling, TX

- ◊ Other USGS Gages Evaluated
- Brazos River Basin
- Brazos Basin Study Divisions
- San Bernard Basin
- San Jacinto Brazos Coastal Basin



BBEST Report Instream Flow at Glen Rose

Overbank Events	Qp: 33,600 cfs with Average Frequency 1 per 2 years Regressed Volume is 327,000 Duration Bound is 29											
High Flow Pulses	Qp: 22,200 cfs with Average Frequency 1 per year Regressed Volume is 203,000 Duration Bound is 24											
	Qp: 3,230 cfs with Average Frequency 1 per season Regressed Volume is 22,600 Duration Bound is 13				Qp: 13,400 cfs with Average Frequency 1 per season Regressed Volume is 109,000 Duration Bound is 19				Qp: 7,760 cfs with Average Frequency 1 per season Regressed Volume is 62,500 Duration Bound is 17			
	Qp: 1,700 cfs with Average Frequency 2 per season Regressed Volume is 10,800 Duration Bound is 10				Qp: 6,480 cfs with Average Frequency 2 per season Regressed Volume is 46,700 Duration Bound is 14				Qp: 3,090 cfs with Average Frequency 2 per season Regressed Volume is 21,200 Duration Bound is 12			
	Qp: 930 cfs with Average Frequency 4 per season Regressed Volume is 5,400 Duration Bound is 8				Qp: 2,350 cfs with Average Frequency 4 per season Regressed Volume is 14,300 Duration Bound is 10				Qp: 1,320 cfs with Average Frequency 4 per season Regressed Volume is 7,830 Duration Bound is 8			
Base Flows (cfs)	160				170				160			
	77				92				70			
	42				47				37			
Subsistence Flows (cfs)	16				16				16			
	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct
	Winter				Spring				Summer			
Base Flow Levels	High (75th %ile)											
	Medium (50th %ile)											
	Low (25th %ile)											

Pulse volumes are in units of acre-feet and durations are in days.
 Period of record used : 1/1/1924 to 12/31/2010.
 Episodic events are terminated when the volume or duration criteria are met, or when the flow drops below 180 cfs, or when the flow is below 920 cfs and the flow drops from one day to the next by less than 5%.

Permit Instream Flow at Glen Rose



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	Winter			Spring			Summer			Fall		

Hydrologic Levels	High (75th %ile)
	Medium (50th %ile)
	Low (25th %ile)

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TCEQ/Colorado Basin Instream Flow at Glen Rose

Overbank Events												
High Flow Pulses	Qp: 22,200 cfs with Average Frequency 1 per year Regressed Volume is 203,000 Duration Bound is 24											
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Water Management Plan (WMP)

- **On-going Tri-Agency Coordination**
 - TCEQ
 - TPWD
 - TWDB
- **Stakeholder Process**
 - 9 Separate BRA Meetings (3 x 3 Regions)
 - Website Availability
 - Documents
 - Comments
 - Advance Notifications
 - Direct Mail
 - Newspaper Ads
 - Web Postings



Accelerated Water Management Plan Timeline

Description	2012												2013												2014						
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul
TCEQ Process																															
TCEQ commission hearing	■																														
Tri-Agency Meetings		■	■	■	■	■	■	■	■	■	■	■																			
WMP stakeholder mtgs																															
TCEQ WMP review																															
TCEQ Public Meeting																															
SOAH hearing																															
SOAH PFD and exceptions																															
TCEQ commission hearing																															
Adaptive Management and WMP Update																															
Brazos Basin SB3 Process																															
BBEST Report to BBASC	■	■	■	■	■	■	■	■	■	■	■	■																			
BBASC Evaluation		■	■	■	■	■	■	■	■	■	■	■																			
BBASC Recommendations to TCEQ																															
TCEQ Rule Development																															
TCEQ Rule Adoption																															
Reassessment and Adaptive Management																															



System Operation Permit vs. SB3

AN ACT relating to the development, management, and preservation of the water resources of the state; providing penalties.

BE IT ENACTED BY THE LEGISLATURE OF THE STATE OF TEXAS:

ARTICLE 1. ENVIRONMENTAL FLOWS

SECTION 1.27. The changes in law made by this article relating to a permit for a new appropriation of water or to an amendment to an existing water right that increases the amount of water authorized to be stored, taken, or diverted apply only to:

(1) water appropriated under a permit for a new appropriation of water the application for which is pending with the Texas Commission on Environmental Quality on the effective date of this Act or is filed with the commission on or after that date;

ARTICLE 14. EFFECTIVE DATE

SECTION 14.01. Except as otherwise provided by this Act, this Act takes effect September 1, 2007.



Questions?