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# San Jacinto River Basin

## SB3 Ecological Overlay

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Presentation to: Trinity-San Jacinto BBEST  
August 13, 2009, USGS

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# Ecological Overlay - Scope of Work

- Summary of relationships with flow-dependant variables and/or flow regime
  - Focal biological components
  - Geomorphologic parameters
  - Water quality parameters
  - Nutrient and sediment loadings to the bay
- Geographic occurrence matrix of fish and mollusk species
- Summary report revealing key relationships

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# Ecological Overlay - Scope of Work

## ■ Coordinate

- Development of focal biological components
  - With state agencies/SB2 Texas Instream Flow Program
  - With BBEST
- Use of prioritized list of items (questions)
  - With Trinity-San Jacinto BBEST
- To ensure consistency with formatting
  - With Trinity River Authority
- Updates and draft results
  - With BBEST and SAC

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# Ecological Overlay - Deliverables

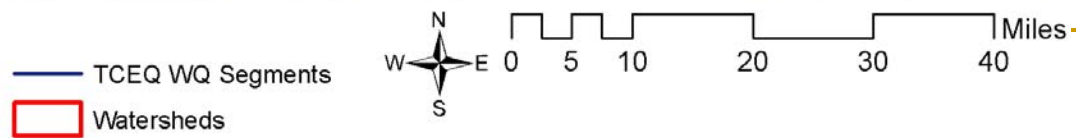
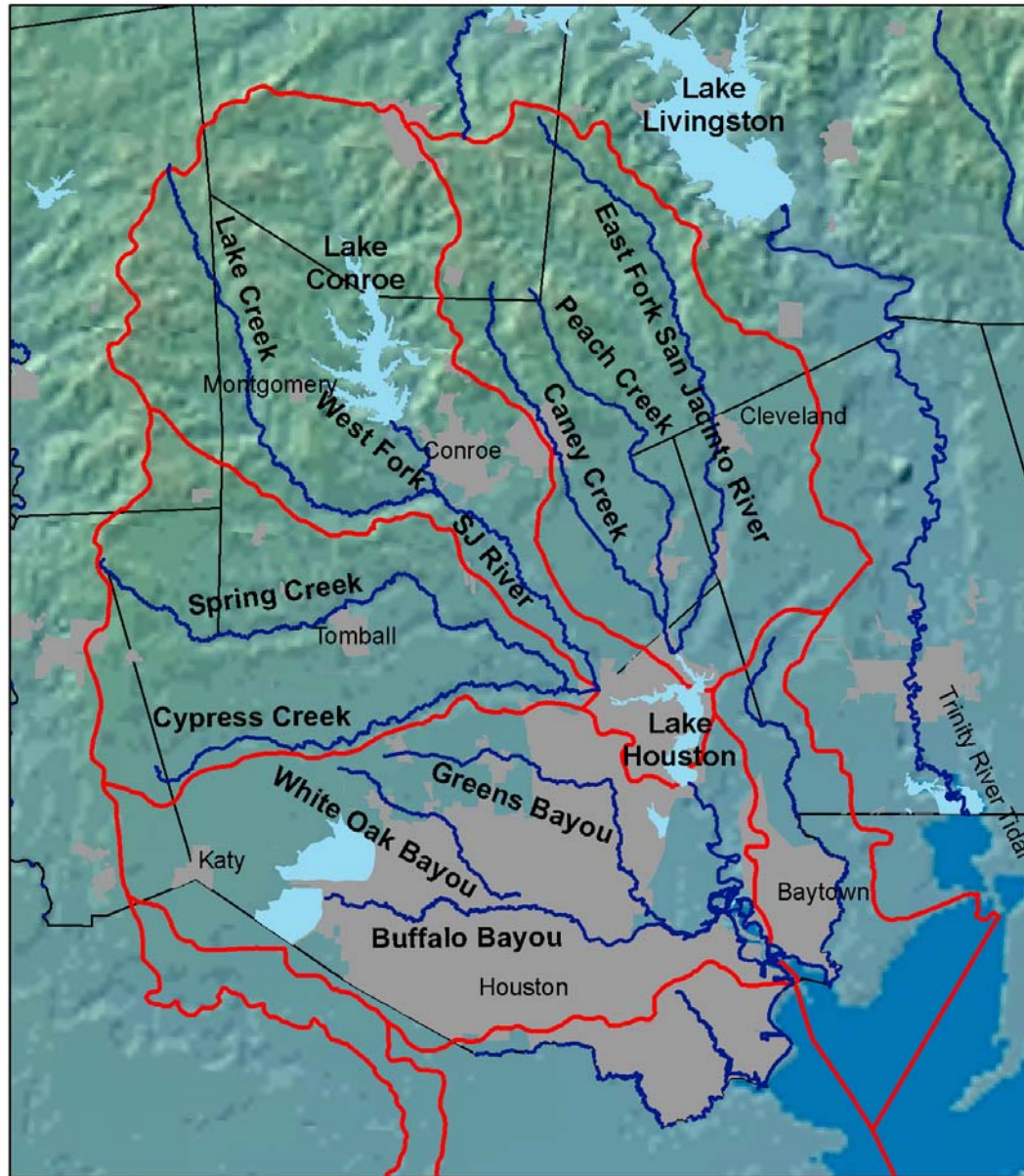
- Summary report in electronic format
  - Text summaries of key relationships
  - Graphical or tabular information revealing relationships
    - Spreadsheet matrix of occurrence of fish and mussels
    - Spreadsheet table of ecological condition by flow, organized by location
- Electronic versions of relevant source documents

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# Ecological Overlay - Timeline

- Progress report to SAC
  - Tentative meeting date – September 9, 2009
- Timeframe
  - Draft deliverable – September 4, 2009
  - Final deliverable – September 21, 2009

# San Jacinto River Basin



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# Progress to date

- Geographic occurrence matrix
  - Spreadsheet matrix of occurrence of fish and mussels in the San Jacinto River basin
    - From available reports
    - TPWD focal species
- Focal biological components
  - Gathering input from SB2 TIFP
    - Known experts in this area?
    - Specific focal components?
- Drilling-down into the literature review





Species List - Fish		Ref. 1	Ref. 2		Reference 3			Ref. 4	Ref. 5		Ref. 6	Ref. 7	Ref. 8			
San Jacinto River									TPWD							
			% Abundance		# Collected				rare							
		San Jacinto River Basin	W. Fork San Jacinto River	E. Fork San Jacinto River	E. Fork San Jacinto River	W. Fork San Jacinto River	Cedar Bayou	Cypress Creek	Dickenson Bayou	Upper Basin	Upper SJR Basin	Harris County	Lower San Jacinto River Basin	Upper San Jacinto River Basin	San Jacinto - Lake Houston Subbasin	TPWD draft focal species list 2009-08-12
Scientific Name	Common Name															
<b>Lepisosteidae</b>																
<a href="#">Atractosteus spatula</a>	alligator gar	X														
<a href="#">Lepisosteus oculatus</a>	spotted gar	X			2	3	2		2	1			4		X	X
<a href="#">Lepisosteus osseus</a>	longnose gar	X													X	
<a href="#">Lepisosteus platostomus</a>	shortnose gar					7		3							X	
<b>Petromyzontidae</b>																
<a href="#">Ichthyomyxon gagei</a>	southern brook lamprey	X	0	8.5											X	
<b>Amiidae</b>																
<a href="#">Amia calva</a>	bowfin	X		<0.1												
<b>Anguillidae</b>																
<a href="#">Anguilla rostrata</a>	American eel	X									X	X				
<b>Clupeidae</b>																
<a href="#">Alosa chrysochloris</a>	skipjack herring	X														
<a href="#">Dorosoma cepedianum</a>	gizzard shad	X			4	48		12		5			3	1	X	
<a href="#">Dorosoma petenense</a>	threadfin shad	X				8							496		X	
<b>Engraulidae</b>																
<a href="#">Anchoa mitchilli</a>	bay anchovy												10			

Species List - Fish		Ref. 1	Ref. 2	Reference 3				Ref. 4	Ref. 5	Ref. 6	Ref. 7	Ref. 8				
San Jacinto River									TPWD							
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		San Jacinto River Basin	W. Fork San Jacinto River	E. Fork San Jacinto River	E. Fork San Jacinto River	W. Fork San Jacinto River	Cedar Bayou	Cypress Creek	Dickenson Bayou	Upper Basin	Upper SJR Basin	Harris County	Lower San Jacinto River Basin	Upper San Jacinto River Basin	San Jacinto - Lake Houston Subbasin	TPWD draft focal species list 2009-08-12
Scientific Name	Common Name															
<b>Cyprinidae</b>																
<a href="#">Carassius auratus</a>	goldfish	X														
<a href="#">Ctenopharyngodon idella</a>	grass carp	X				1							3			
<a href="#">Cyprinella lutrensis</a>	red shiner	X	0.6	0.1	4	98	19	38								
<a href="#">Cyprinella venusta</a>	blacktail shiner	X	3.9	1.4	165	122	3	25		82			1	5		
<a href="#">Cyprinus carpio</a>	common carp	X											4		X	
<a href="#">Hybognathus nuchalis</a>	Mississippi silvery minnow	X														
<a href="#">Hybognathus placitus</a>	plains minnow	X														
<a href="#">Hybopsis amnis</a>	pallid shiner	X						1								X
<a href="#">Luxilus chrysocephalus</a>	striped shiner	X													X	
<a href="#">Lythrurus fumeus</a>	ribbon shiner	X	9.2	4.3										13	X	X
<a href="#">Lythrurus umbratilis</a>	redfin shiner	X	1.3	4.3										1	X	
<a href="#">Macrhybopsis hyostoma</a>	shoal chub	X														
<a href="#">Notemigonus crysoleucas</a>	golden shiner	X	0.4	0.1											X	

Species List - Fish		Ref. 1	Ref. 2	Reference 3				Ref. 4	Ref. 5	Ref. 6	Ref. 7	Ref. 8				
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Scientific Name	Common Name															
<b>Cyprinidae</b>																
<a href="#">Notropis amabilis</a>	Texas shiner	X													X	
<a href="#">Notropis atherinoides</a>	emerald shiner													8	x	
<a href="#">Notropis atrocaudalis</a>	blackspot shiner	X	3.9	4.9		4								33	X	X
<a href="#">Notropis blennioides</a>	river shiner				1											
<a href="#">Notropis buchanani</a>	ghost shiner	X													X	
<a href="#">Notropis potteri</a>	chub shiner	X														
<a href="#">Notropis sabiniae</a>	Sabine shiner	X													X	
<a href="#">Notropis shumardi</a>	silverband shiner	X														
<a href="#">Notropis stramineus</a>	sand shiner									10						
<a href="#">Notropis texanus</a>	weed shiner	X														
<a href="#">Notropis volucellus</a>	mimic shiner	X	<0.1	0											X	
<a href="#">Opsopoeodus emiliae</a>	pugnose minnow	X	0.1	0.1	1										X	
<a href="#">Phenacobius mirabilis</a>	suckermouth minnow														X	
<a href="#">Pimephales promelas</a>	fathead minnow	X					3									
<a href="#">Pimephales vigilax</a>	bullhead minnow	X	2.9	<0.1	69	106	29	210		96				53	X	
<a href="#">Semotilus atromaculatus</a>	creek chub	X														

Species List - Fish		Ref. 1	Ref. 2	Reference 3			Ref. 4	Ref. 5	Ref. 6	Ref. 7	Ref. 8					
San Jacinto River								TPWD								
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		San Jacinto River Basin	W. Fork San Jacinto River	E. Fork San Jacinto River	E. Fork San Jacinto River	W. Fork San Jacinto River	Cedar Bayou	Cypress Creek	Dickenson Bayou	Upper Basin	Upper SJR Basin	Harris County	Lower San Jacinto River Basin	Upper San Jacinto River Basin	San Jacinto - Lake Houston Subbasin	TPWD draft focal species list 2009-08-12
Scientific Name	Common Name															
<b>Catostomidae</b>																
<a href="#">Carpoides carpio</a>	river carpsucker	X				20									X	
<a href="#">Cycleptus elongatus</a>	blue sucker	X									XT					
<a href="#">Erimyzon oblongus</a>	creek chubsucker	X	0.7 (I)	1.5 (I)							X T	X T		2	X	X
<a href="#">Erimyzon sucetta</a>	lake chubsucker	X	0.2	0											X	
<a href="#">Ictiobus bubalus</a>	smallmouth buffalo	X											6		X	
<a href="#">Minytrema melanops</a>	spotted sucker	X	0.2	0.5		1	2								X	
<a href="#">Moxostoma congestum</a>	gray redhorse	X														
<a href="#">Moxostoma poecilurum</a>	blacktail redhorse	X	0	<0.1		10				9					X	X
<b>Ictaluridae</b>																
<a href="#">Ameiurus melas</a>	black bullhead	X	0.2	0.1		3									1	X
<a href="#">Ameiurus natalis</a>	yellow bullhead	X	1.6	3.6		3	4								38	X
<a href="#">Ictalurus furcatus</a>	blue catfish	X											4		X	
<a href="#">Ictalurus punctatus</a>	channel catfish	X	<0.1	0.1		6	8	15	2	2			2		X	
<a href="#">Noturus gyrinus</a>	tadpole madtom	X	<0.1	0		4	15		1	2					X	
<a href="#">Noturus nocturnus</a>	freckled madtom	X	0.4	1.3		1	1			1					X	X
<a href="#">Pylodictis olivaris</a>	flathead catfish	X				1	2	1	1				2		X	X



Species List - Fish		Ref. 1	Ref. 2	Reference 3					Ref. 4	Ref. 5	Ref. 6	Ref. 7	Ref. 8	
San Jacinto River											TPWD			
			% Abundance		# Collected						rare			
		San Jacinto River Basin												
			W. Fork San Jacinto River											
			E. Fork San Jacinto River											
				E. Fork San Jacinto River										
				W. Fork San Jacinto River										
				Cedar Bayou										
				Cypress Creek										
				Dickenson Bayou										
				Upper Basin										
				Upper SJR Basin										
				Harris County										
				Lower San Jacinto River Basin										
				Upper San Jacinto River Basin										
				San Jacinto - Lake Houston Subbasin										
				TPWD draft focal species list 2009-08-12										
Scientific Name	Common Name													
<b>Pociliidae</b>														
<a href="#">Gambusia affinis</a>	western mosquitofish	X	37.7	33.4						12			296	X
<a href="#">Gambusia sp</a>	mosquitofish				11	9	31	65	3					
<a href="#">Poecilia latipinna</a>	sailfin molly	X						2						
<b>Cyprinodontidae</b>														
<a href="#">Cyprinodon variegatus</a>	sheepshead minnow	X												X
<b>Moronidae</b>														
<a href="#">Morone chrysops</a>	white bass	X									12			X
<a href="#">Morone mississippiensis</a>	yellow bass	X									1			X
<a href="#">Morone saxatilis</a>	striped bass	X				3								

Species List - Fish		Ref. 1	Ref. 2	Reference 3						Ref. 4	Ref. 5	Ref. 6	Ref. 7	Ref. 8		
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Scientific Name	Common Name															
<b>Centrarchidae</b>																
<a href="#">Centrarchus macropterus</a>	flier	X													X	
<a href="#">Lepomis auritus</a>	redbreast sunfish	X						9								
<a href="#">Lepomis cyanellus</a>	green sunfish	X	0.8	1	7	35	2	24	4	2				3	X	
<a href="#">Lepomis gulosus</a>	warmouth	X	1.4	1.4	8	6	11	12	1	3				8	X	
<a href="#">Lepomis humilis</a>	orangespotted sunfish	X					1									
<a href="#">Lepomis macrochirus</a>	bluegill	X	2.5	1.5	24	79	40	29		32			41	35	X	
<a href="#">Lepomis marginatus</a>	dollar sunfish	X	1	0.2	5									6	X	
<a href="#">Lepomis megalotis</a>	longear sunfish	X	9.1	6.8	205	156	100	90	2	172			21	89	X	X
<a href="#">Lepomis microlophus</a>	redeer sunfish	X	<0.1	0		3				3					X	
<a href="#">Lepomis miniatus</a>	redspotted sunfish.	X														
<a href="#">Lepomis punctatus</a>	spotted sunfish		2.2	2.6		2	2			1				11	X	
<a href="#">Lepomis symmetricus</a>	bantam sunfish	X													X	
<a href="#">Micropterus punctulatus</a>	spotted bass	X	<0.1	<0.1											X	
<a href="#">Micropterus salmoides</a>	largemouth bass	X	0.8	0.3	10	25	4	19		15			30		X	X
<a href="#">Pomoxis annularis</a>	white crappie	X	<0.1	0		4		16					15	1	X	
<a href="#">Pomoxis nigromaculatus</a>	black crappie	X											11		X	

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Scientific Name	Common Name															
<b>Percidae</b>																
<a href="#">Ammocrypta vivax</a>	scaly sand darter	X													X	
<a href="#">Etheostoma chlorosoma</a>	bluntnose darter	X	0.8	1		3									X	
<a href="#">Etheostoma gracile</a>	slough darter	X	0.6	0.8		1	2							1	X	
<a href="#">Etheostoma parvipinne</a>	goldstripe darter	X	1.4	0.4										6 (I)	X	X
<a href="#">Etheostoma proeliare</a>	cypress darter	X														
<a href="#">Etheostoma spectabile</a>	orangethroat darter	X														
<a href="#">Percina caprodes</a>	logperch														X	
<a href="#">Percina macrolepida</a>	bigscale logperch	X				3										
<a href="#">Percina sciera</a>	dusky darter	X	0.3 (I)	1.2 (I)	28	15				20					X	X
<b>Sciaenidae</b>																
<a href="#">Aplodinotus grunniens</a>	freshwater drum	X	0	<0.1	4	4				1					X	X
<a href="#">Micropogonias undulatus</a>	atlantic croaker												1			
<b>Elassomatidae</b>																
<a href="#">Elassoma zonatum</a>	banded pygmy sunfish	X	0.4	2.6	1										X	
<b>Cichlidae</b>																
<a href="#">Cichlasoma cyanoguttatum</a>	Rio Grande cichlid	X														



# Mollusk list resources

**(4) A Study of Freshwater Mussels (Pelecypoda: Unionidae), Fish, and Associated Ecological Factors in Lake Creek, Montgomery County, Texas**  
**Stephen P. Ansley, 1998 Thesis, Southwest Texas State University**

**COPYRIGHT 1998**

**Site 1** - 1.5 km north of the junction of FM 1488 and FM 2978 at  
N 30 09' 07.6" latitude and W 95 20' 49.4" longitude

**(5) Texas Parks and Wildlife Dept. Annotated County Lists of Rare Species**  
**Last Revision 5/4/2009 5:54:00 PM**

<http://gis.tpwd.state.tx.us/TpwEndangeredSpecies/DesktopDefault.aspx>

X - Species Present

T - Species on the Texas Threatened List

**(7) The Effects of Timber Harvesting on Stream Water Quality in the Sam Houston National Forest: A Physicochemical, Benthic Macroinvertebrate, and Fish Analysis.**

Charles Dewey Stoffels, Stephen F. Austin State University, August 2000

Species List - Mollusks and Invertebrate		Ref. 4	Ref. 5		Ref. 7	
San Jacinto River			Rare			
		Upper Basin	Upper Basin	Harris Co.	Upper basin	TPWD draft focal species list 2009-08-12
Scientific Name	Common Name					
<b>Unionidae</b>						
<a href="#">Arcidens confragosus</a>	rock pocketbook		X	X		X
<a href="#">Tritogonia verrucosa</a>	pistolgrip		X	X		
<a href="#">Truncilla donaciformis</a>	fawnsfoot		X			
<a href="#">Villosa lienosa</a>	little spectaclecase		X	X		
<a href="#">Lampsilis satura</a>	sandbank pocketbook		X	X		
<a href="#">Fusconaia askewi</a>	Texas pigtoe	2	X	X		
<a href="#">Fusconaia flava</a>	Wabash pigtoe		X	X		X
<a href="#">Plectomerus dombeyanus</a>	mudskipper	4				
<a href="#">Lampsilis teres</a>	yellow sandshell	2				X
<a href="#">Quadrula apiculata</a>	southern mapleleaf	36				
<a href="#">Uniomerus sp.</a>					X	
<b>Corbiculidae</b>						
<a href="#">Corbicula sp.</a>					X	
<b>Sphaeriidae</b>						
<a href="#">Sphaerium sp.</a>					X	
<b>INVERTEBRATE</b>						
<a href="#">Macrobrachium ohione</a>	Ohio shrimp					X

# Sample species-specific information

- *Hybopsis amnis* (pallid shiner)
  - TPWD: inhabits medium to larger streams; intolerant of excessive turbidity; year class strength linked to stream discharge
  - Only one individual reported in one available reference
  - What specific turbidity level or threshold is excessive?
- *Erimyzon oblongus* (creek chubsucker)
  - TPWD: State threatened species; fluvial specialist; inhabits main stem and tributaries

<http://www.bio.txstate.edu/~tbonner/txfishes/>

- Range: San Jacinto drainage is at southern edge of range
- Spawning: Rock and gravel spawner, March-May at ~17`C (12-24`C)



# Sample species-specific information

- *Noturus nocturnus* (freckled madtom)
  - TPWD: flow sensitive life cycle; medium to large sized systems

<http://www.bio.txstate.edu/~tbonner/txfishes/>

- Mesohabitat: riffles over gravelly or rocky bottom; near with sticks, root masses, and submerged logs, especially along undercut banks; young individuals will shelter in beverage cans and soft-drink and beer bottles; Sulphur River unchannelized reaches
- Spawning: nests located in areas with some current, in water 10-15cm deep

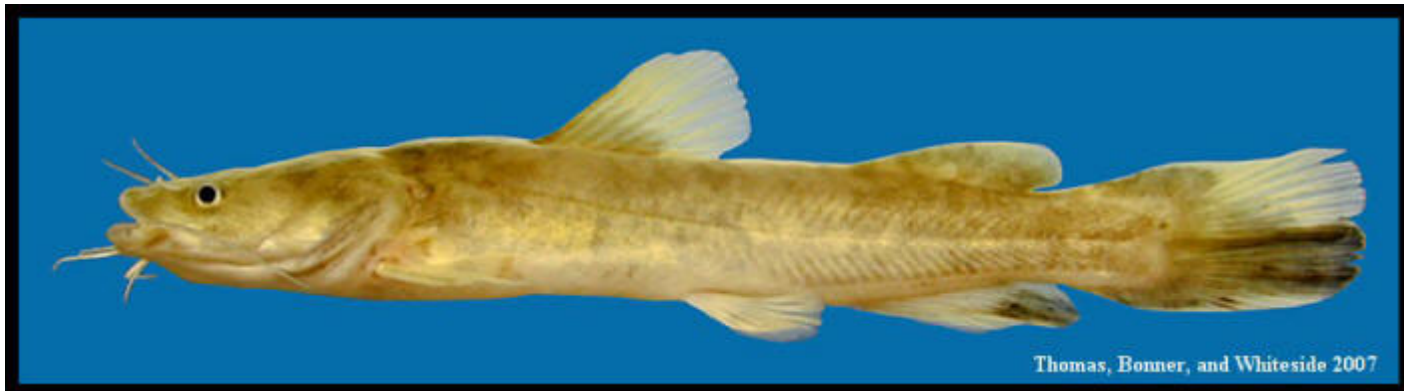


# Sample species-specific information

- *Pylodictis olivaris* (flathead catfish)
  - TPWD: long lived species; strong ties to floodplain connectivity; sportfish

<http://www.bio.txstate.edu/~tbonner/txfishes/>

- Life cycle: Young-of-the-year live in rubble bottomed riffles until between 2 and 4 inches in length



# Focal components

- **How do we use the species information?**
  - **Considering available time-frame and resources?**
- **What is a focal biological component?**
  - Focal guilds (group) rather than individual species
  - Parameter sensitive to flow variation
  - Parameter indicating ecosystem status
  - Habitat condition affecting a focal species
  - A specific flow condition, in a specific location, during a specific time of year, affecting a focal species?
    - High flow pulse
    - Baseflow in August

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# Summarize Relationships with Flow

## ■ Biology

- “Summarize relationship of...
  - behavioral, physiological, or demographic variables...
  - for focal aquatic and riparian biological components (e.g., species, communities, guilds)...
  - to short-term or long-term variation in flow velocity or flow regime.”
  
- Aquatic species - Spawning or Mesohabitat
- Riparian area inundation

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# Summarize Relationships with Flow

- Geomorphology
  - Effective Discharge
  - Suspended sediment and bedload
    - Total annual volume of sediment



# Summarize Relationships with Flow

## ■ Geomorphology

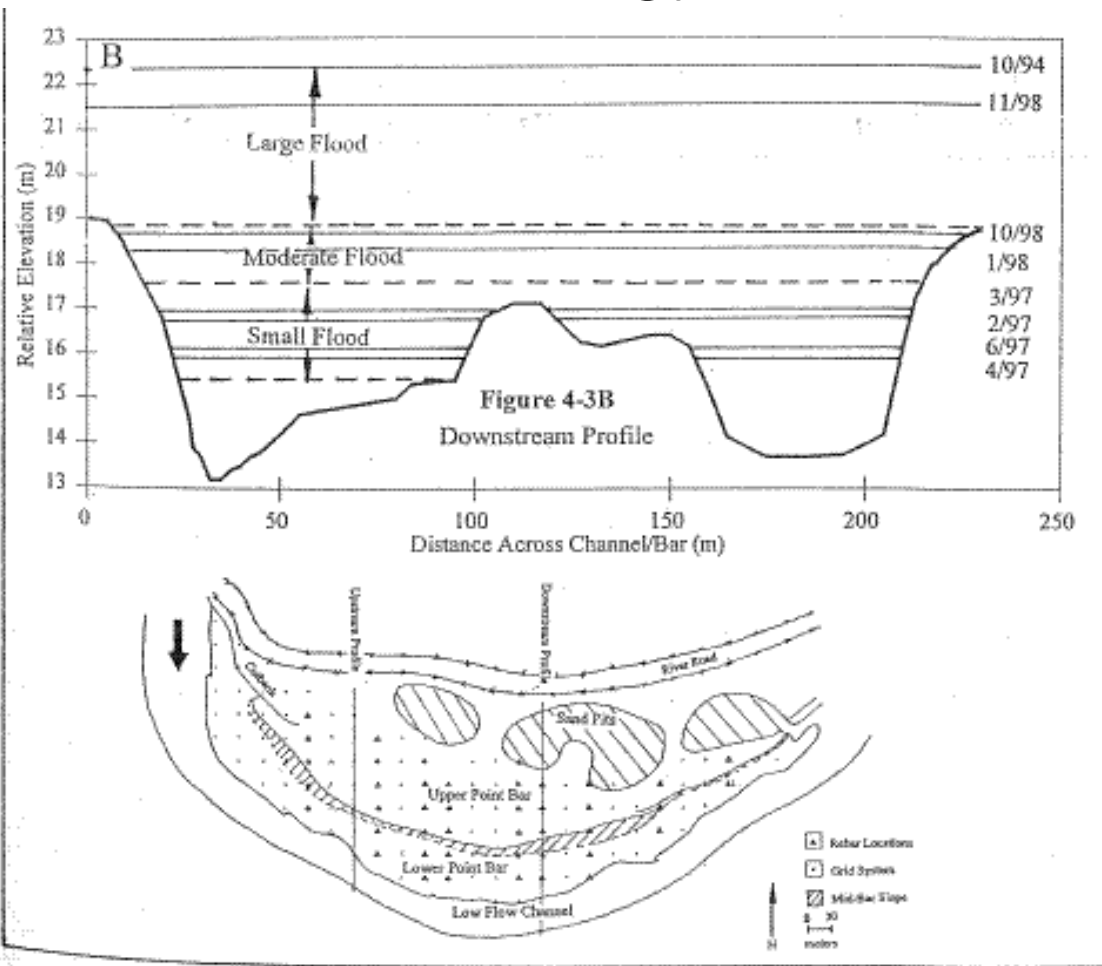


Figure 3-4: Upstream (A) and Downstream (B) Profiles across Hallett point bar showing high stage of five flood events.

Herrera, Roxana. 1999. Morphology and stratigraphy of a coarse-grained point bar on the West Fork San Jacinto River : Montgomery County, Texas. University of Houston, MS Thesis.

08068000 USGS West Fork SJR at Conroe

- Small flood <1.5 year Recurrence Interval (RI)
  - ~7,000 cfs
  - Erosion processes
- Medium flood 1.5 to 4 year RI
  - Deposition
- Large flood >4 year RI
  - Deposition

# Summarize Relationships with Flow

- 08068000 USGS W. Fork SJR nr Conroe, TX
  - Riparian/Geomorphology
    - NWS Flood Stage- 20.0' ...minor lowland flooding begins
      - <http://ahps.srh.noaa.gov/ahps2/hydrograph.php?wfo=hgx&gage=cfkt2&view=1,1,1,1,1,1,1,1>
    - USGS measurement at 20.0' = ~16,500 cfs
    - What is recurrence interval of this flow?
    - Are important wetlands inundated at this flow?
  - Hydrology
    - Seasonal characteristics
    - 08068000 TCEQ 7Q2 (1974-1996) = 20.3 cfs
    - Lake Conroe completed 1973

# Summarize Relationships with Flow

- 08068500 USGS Spring Creek at Spring, TX
  - Riparian/Geomorphology
    - NWS Action Stage- 21.0' (94.6' MSL) ...minor lowland flooding begins as flow escapes into secondary channels
    - USGS measurement at 21.0' = 8,650 cfs
    - What is recurrence interval of this flow?
    - Are important wetlands inundated at this flow?
  - Hydrology
    - Seasonal characteristics
    - 08068500 TCEQ 7Q2 (1975-1996) = 15.9 cfs
    - 7Q2 for other time periods

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# Summarize Relationships with Flow

- Water quality
  - Existing condition characterizations
    - Clean River Program
    - Drill-down
  - Dissolved Oxygen
    - Flow conditions affecting below 3mg/L?
  - Temperature requirements for focal species
    - Flow conditions affecting temperatures over 35`C?
- Bay inflows
  - Sediment and nutrient loading

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# BBEST Input requested

- Geographic areas of interest
  - Develop information for particular gauges?
- Focal biological components
  - Concentration on particular species?

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# Wrap-up

- Questions?

- Contact:

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