

Draft Study Design

Instream Flow Study of the Middle and Lower Brazos River

Draft Study Design



Prepared for
Middle and Lower Brazos River Sub-Basin Study Design
Workgroup

Prepared by
*TEXAS INSTREAM FLOW PROGRAM
AND BRAZOS RIVER AUTHORITY*

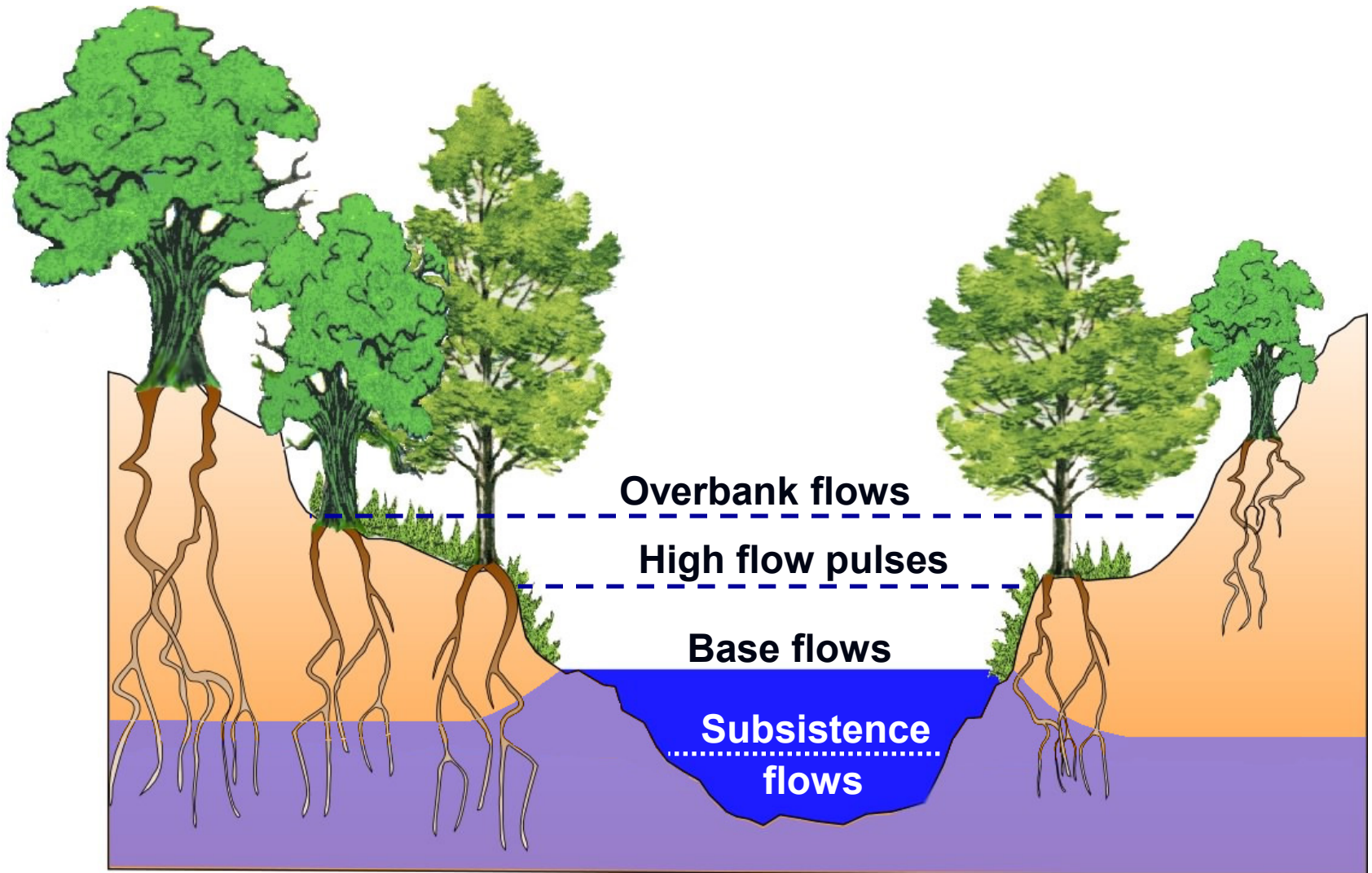
JANUARY 2010

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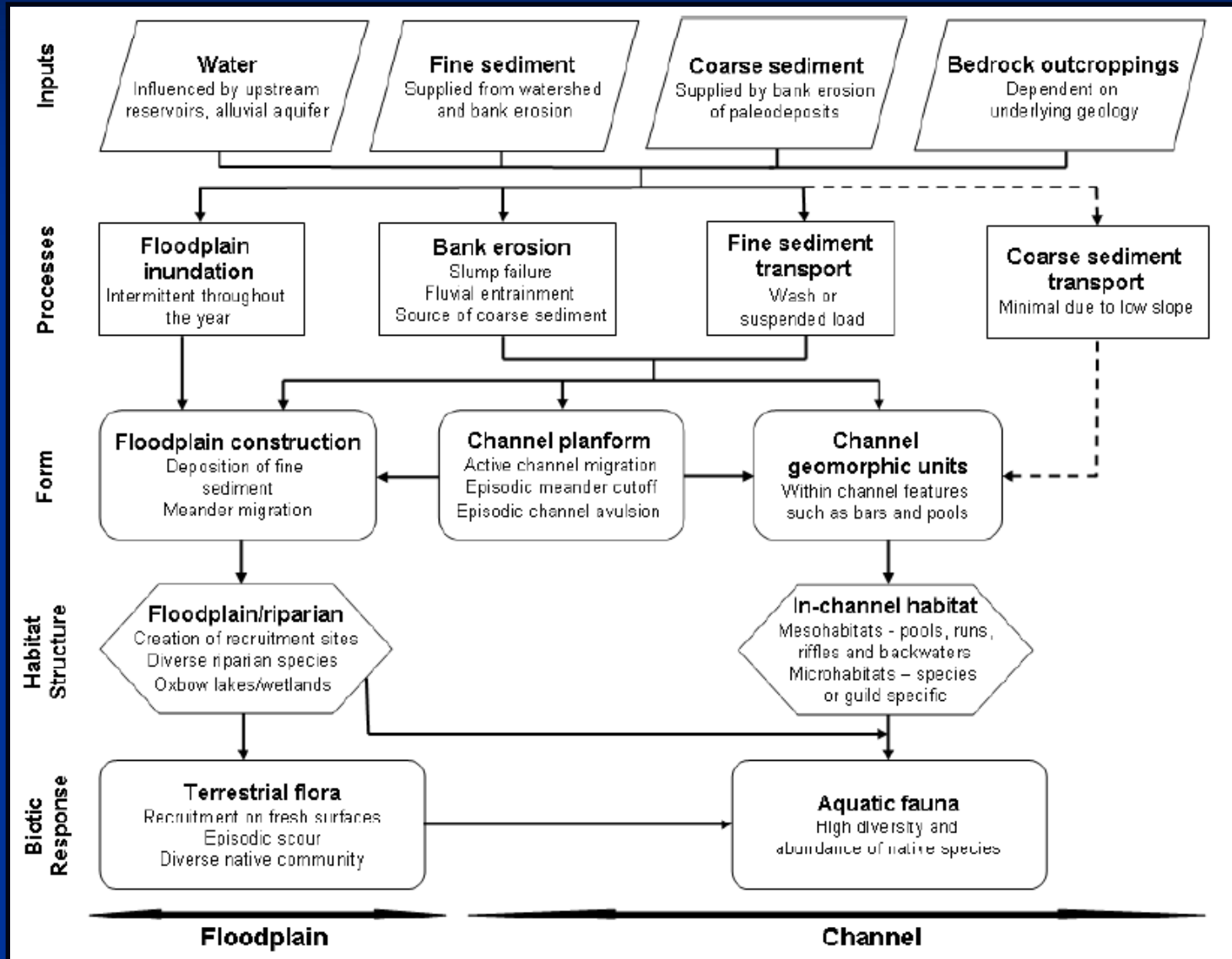
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Statewide Conceptual Model



Conceptual Model of middle and lower Brazos River

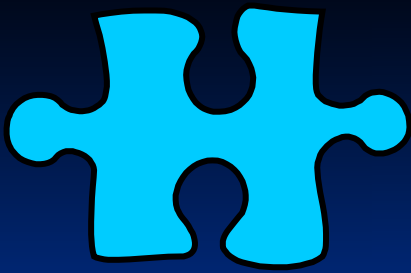


Ecological Processes/Flow Regime of middle and lower Brazos River

Component	Hydrology	Geomorphology	Biology	Water Quality	Connectivity
Subsistence flows Infrequent, low flows	Typically during summer	Increase deposition of fine and organic particles	Provide limited aquatic habitat Maintain populations of organisms capable of repopulating system when favorable conditions return	Maintain adequate levels of dissolved oxygen, temperature, and constituent concentrations (particularly nutrients)	Provide limited lateral connectivity along the length of the river May be affected by groundwater/ surface water interactions Maintain longitudinal connectivity
Base flows Average flow conditions, including variability.	Vary by season and year	Maintain soil moisture and groundwater table in riparian areas Maintain a diversity of habitats	Provide suitable aquatic habitat for all life stages of native species	Provide suitable in-channel water quality	Provide connectivity along channel corridor May be affected by groundwater / surface water interactions

Eco. Proc./Flow Regime (continued)

Component	Hydrology	Geomorphology	Biology	Water Quality	Connectivity
<p>High flow pulses In-channel, short duration, high flows</p>	<p>May be influenced by reservoir operations and land use changes</p>	<p>Maintain channel and substrate characteristics</p> <p>Prevent encroachment of riparian vegetation</p> <p>Play an important role in recovery of channel after flood events</p>	<p>Provide spawning cues for organisms</p>	<p>Restore in-channel water quality after prolonged low flow periods</p>	<p>Provide connectivity to near-channel water bodies</p>
<p>Overbank flows Infrequent, high flows that exceed the channel</p>	<p>Influenced by reservoir operation</p>	<p>Provide lateral channel movement, an important source of coarse material for channel</p> <p>Form new habitats</p> <p>Flush organic material into channel</p> <p>Transport nutrients and sediment to floodplain</p>	<p>Provide spawning cues for organisms</p> <p>Provide access to floodplain habitats</p> <p>Maintain diversity of riparian vegetation</p>	<p>Restore water quality in floodplain water bodies</p>	<p>Provide connectivity to floodplain</p> <p>Recharge the alluvium aquifer</p> <p>Provide large volumes of freshwater to estuary</p>



Hydrology and Hydraulics

Indicators

and

Activities

Flow regime components

(frequency, timing, duration, rate of change, magnitude)

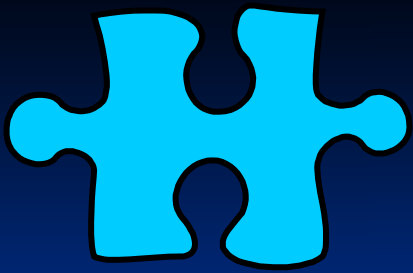
Natural variability

Gaines/losses

Hydrologic evaluation

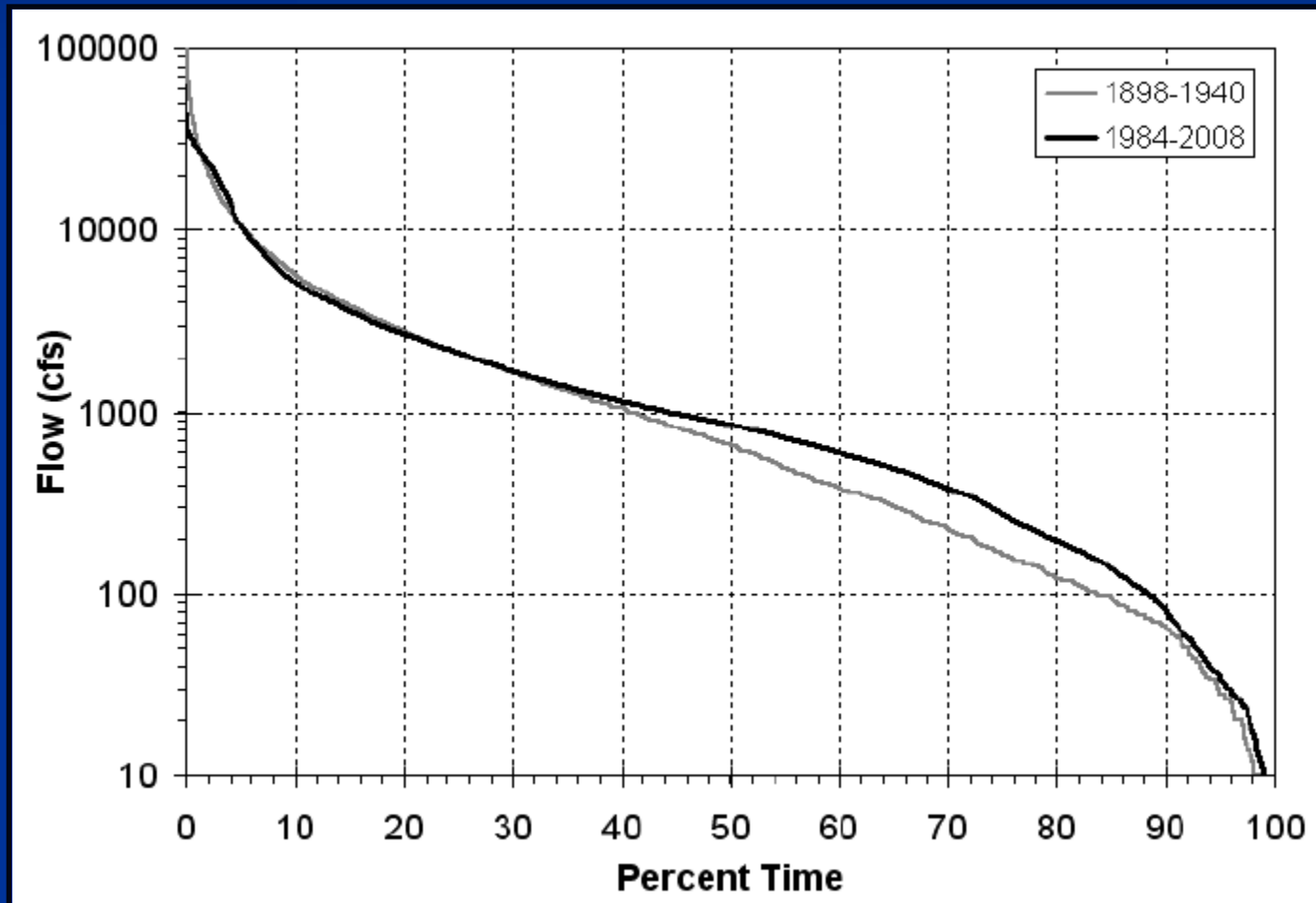
Hydrologic evaluation

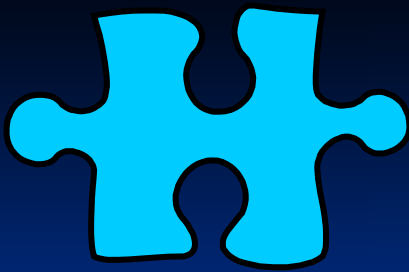
USGS studies



Hydrology and Hydraulics

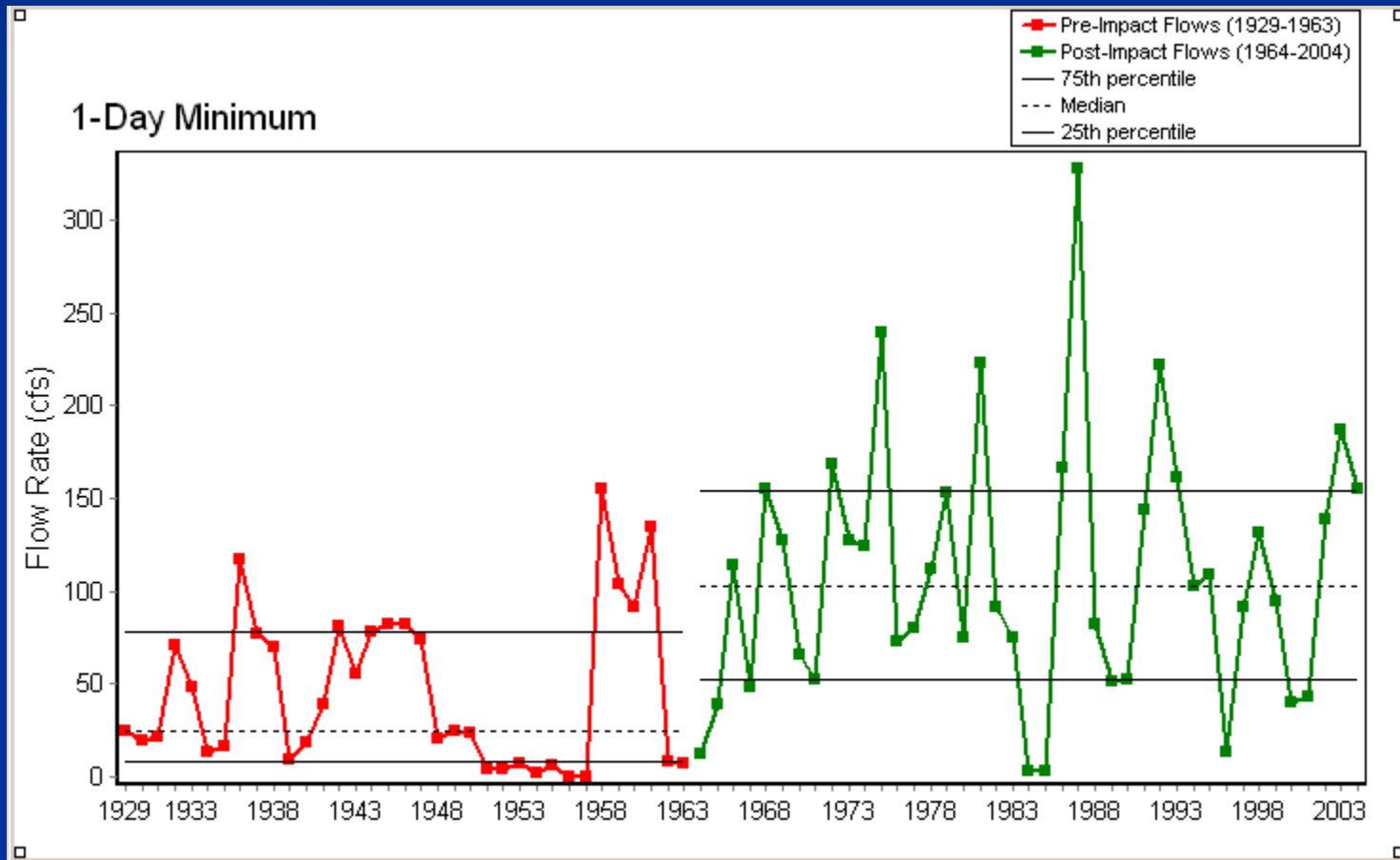
Hydrologic Evaluation

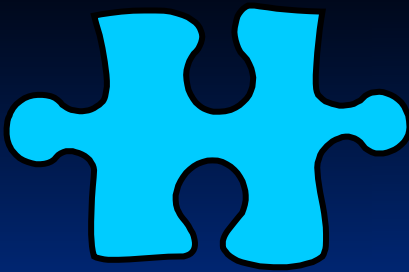




Hydrology and Hydraulics

Hydrologic Evaluation





Hydrology and Hydraulics

Activities to support Other disciplines

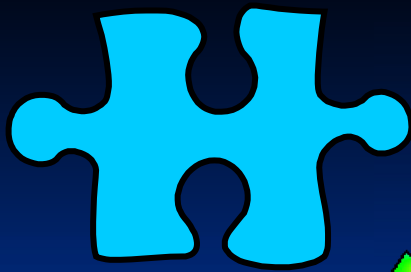
2-d hydraulic modeling

Biology
(habitat modeling)

Physical Processes
(sediment transport)

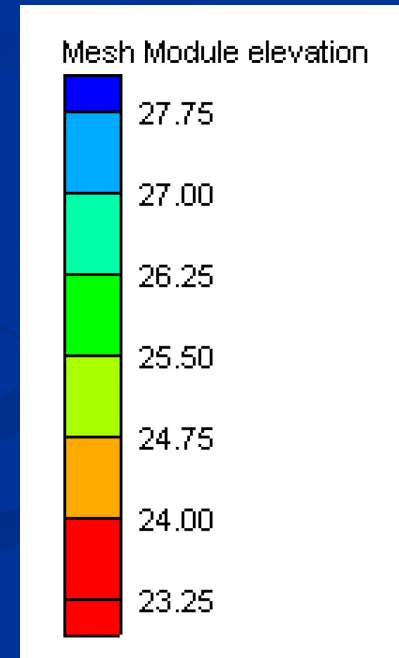
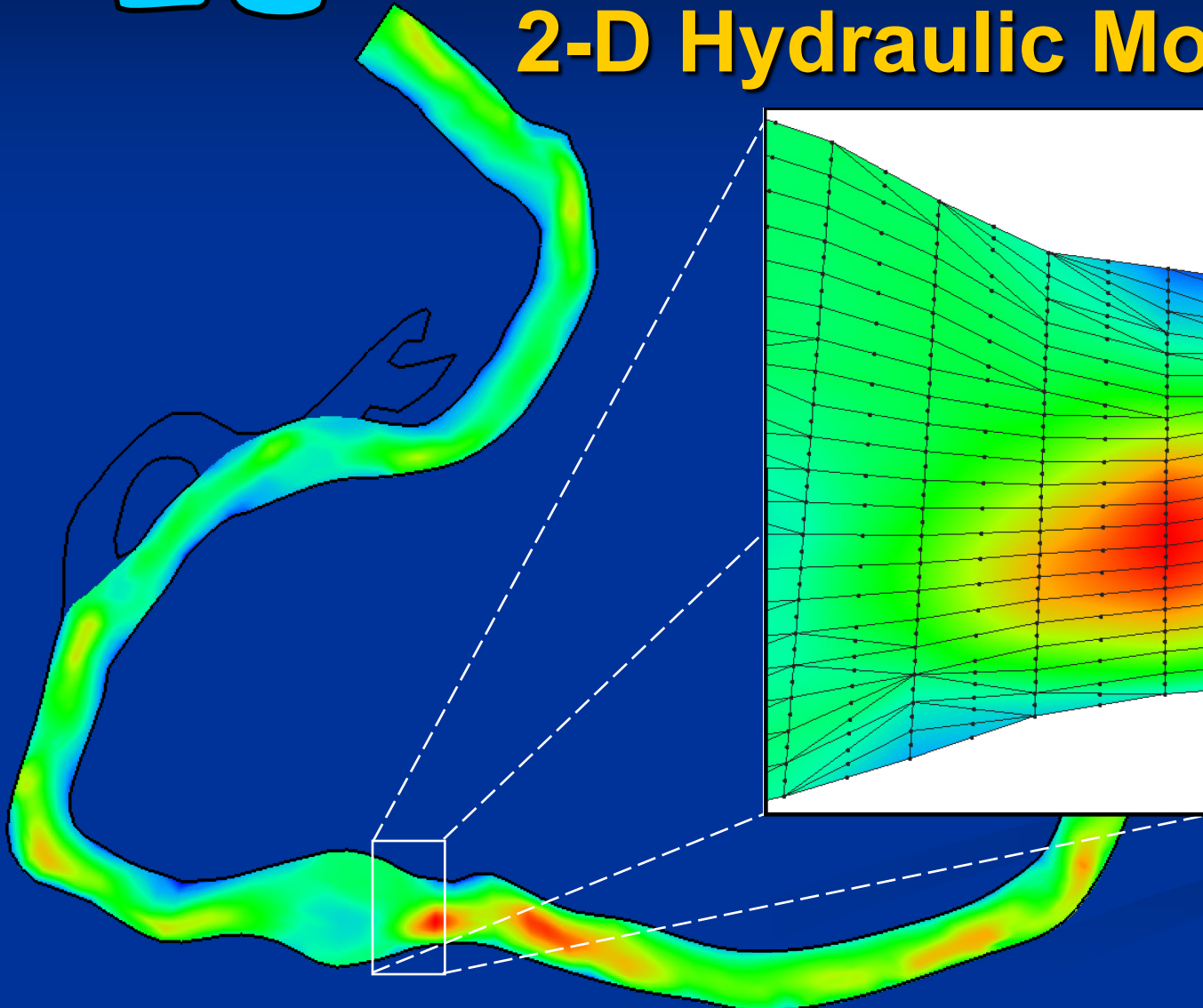
1-d hydraulic modeling

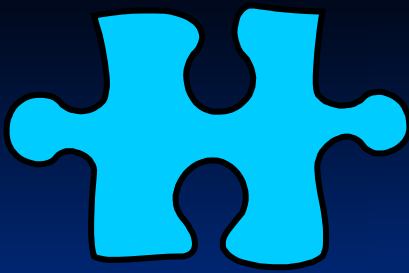
Biology
(riparian studies)



Hydrology and Hydraulics

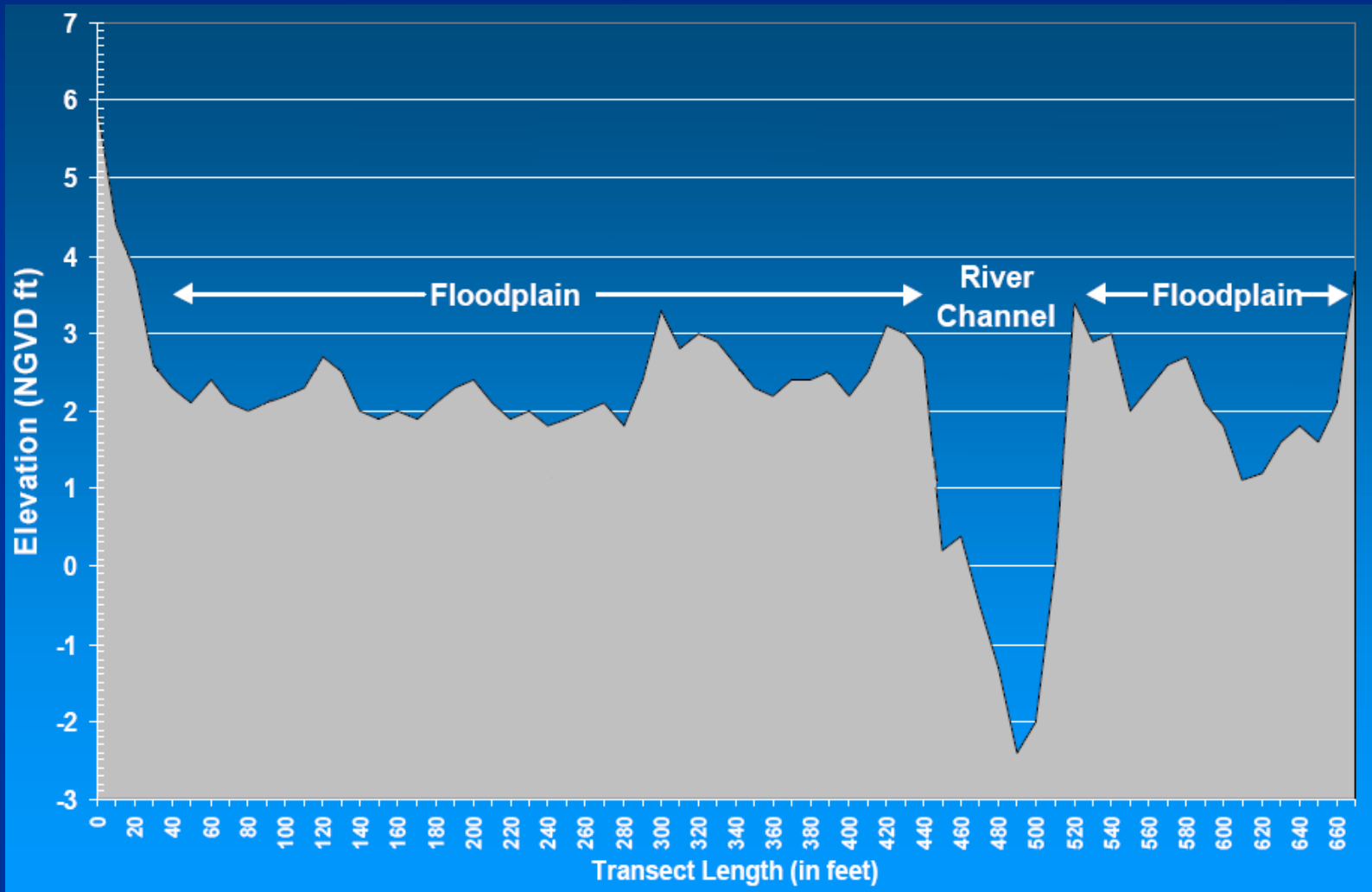
2-D Hydraulic Modeling





Hydrology and Hydraulics

1-D Hydraulic Modeling





Physical Processes (Geomorphology)

Indicators

and

Activities

Bank stability

(lateral migration, channel avulsion, bank erosion rates)

Channel maintenance

(in-channel bars, meander pools)

Aquifer interaction

Flood impacts

Analysis of aerial photos

Sediment budgeting, transport modeling

USGS gain/loss studies

NWS flood impacts



Connectivity

Indicators

and

Activities

Riparian zone
(habitat and total area)

Lateral connectivity
(frequency, duration, timing)

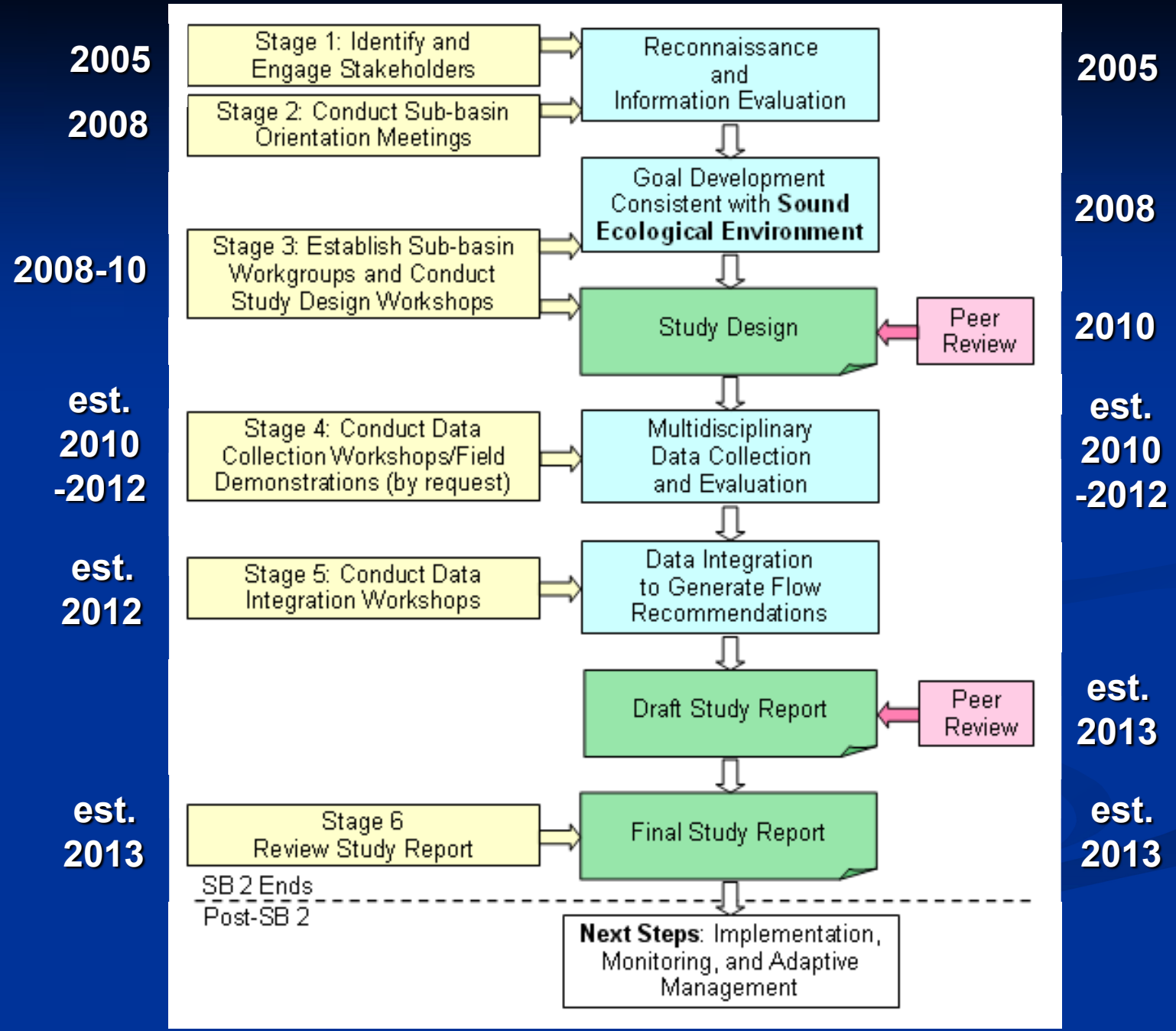
**Groundwater/Surface
water interaction**

Inundation modeling

Oxbow lake study

**USGS gain/loss
studies**

Next Steps



Comments on Draft Study Design

- **Today's meeting**
- **Send comments by Feb. 19, 2010**
 - E-mail: tifp@twdb.state.tx.us
 - Mail: Texas Instream Flow Program
P.O. Box 13231
Austin, TX 78711-3231

How to stay involved

- **Check website for updates**
 - www.twdb.state.tx.us/instreamflows/
- **Electronic/postal newsletter**
- **Contact TIFP if interested in seeing study activities in field**
- **Participate in Data Integration Workshops**
- **Review Study Report**