Brazos River Authority

Update from the Brazos River Basin Basin and Bay Expert Science Team

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Purpose

- **Article 1 SB 3/HB 3 Environmental Flows 80th Texas Legislature**
- **Senate Bill 3 and House Bill 3 set out a new regulatory system for protecting environmental flows**
- **Consensus-based regional approach involving a balanced representation of stakeholders**
- **Each river basin has as Science Team and Stakeholder Group**

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Science Team

- **Recommend an environmental flow regimes that will protect a sound ecological environment**
- **Recommendations shall be based solely on best available science**
- **Recommendations submitted to Stakeholder Group and TCEQ on March 1, 2012**

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Stakeholder Group

- **Stakeholder Group balances the environmental needs with human demand and submits a recommendation to TCEQ**
- **TCEQ develops environmental flow standards for permitting future water rights**

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Brazos BBEST Members

9 member committee appointed by the Stakeholder Group in March

- **Tom Gooch, P.E.**
- **Kirk Winemiller, Ph.D.**
- **Tim Bonner, Ph.D.**
- **Jack Davis**
- **David Dunn, P.E.**
- **Dan Gise**
- **George Guillen, Ph.D.**
- **Tiffany Morgan**
- **Phil Price, P.E.**

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Environmental Flow Regime Paradigm

- **Flows that regulate ecological processes in rivers**
- **Represent entire range of flow, floods to drought**
- **5 Critical Components**
  - **Magnitude**
  - **Frequency**
  - **Duration**
  - **Timing**
  - **Rate of change**

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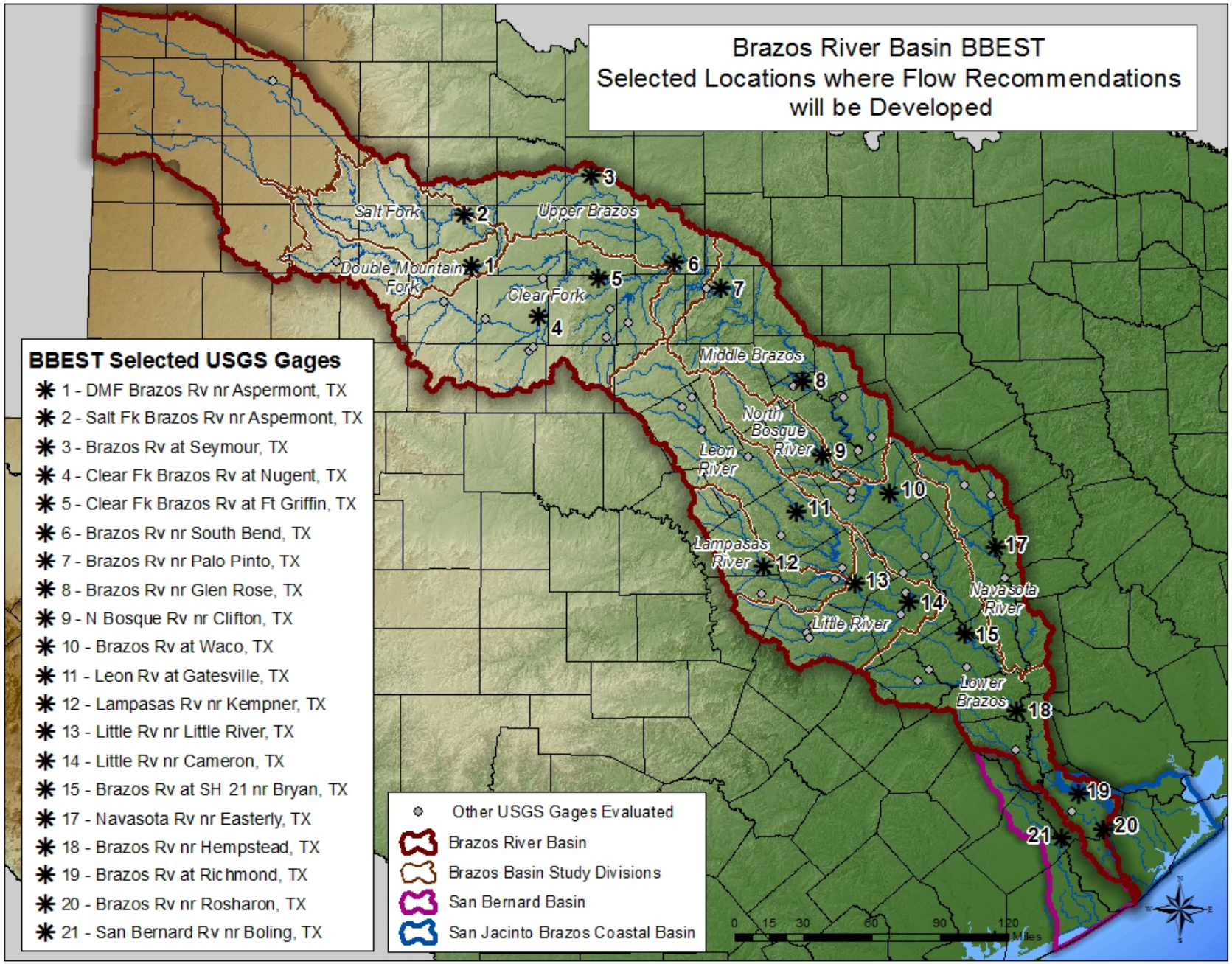

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Selection of Seasons

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Hydrology												
Cluster Analysis												
Average Monthly Median Discharge												
Hydrology Summary												
Dissolved Oxygen												
Cluster Analysis												
Monthly Average												
Dissolved Oxygen Temperature Summary												
Water Temperature												
Cluster Analysis												
CTM Eggs and Larvae - 27°C												
CTM Adults - 35°C												
Water Temperature Analysis Summary												
Riparian												
General Riparian Growing Season												
Salix nigra - seed dispersal												
Acer negundo - seed germination							Prolonged pulses not beneficial					
Fraxinus pennsylvanica - seed dispersal												
Populus deltoides - soil preparation and seed germination												
Riparian Season Summary												
Spawning Seasons												
Black bass, temperate bass, gar, suckers, crappie												
Darters												
Minnows, shad, silversides, topminnows												
Catfish												
Pupfish, Gambusia												
Spawning Summary												
BBEST Recommended Seasons	Winter		Spring				Summer				Winter	

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Definition of Hydrologic Conditions

- **Palmer Hydrological Drought Index**
- **Each Location Weighted Average of Index for Climate Zones**
- **Below 25th Percentile = Dry**
- **Above 75th percentile = Wet**

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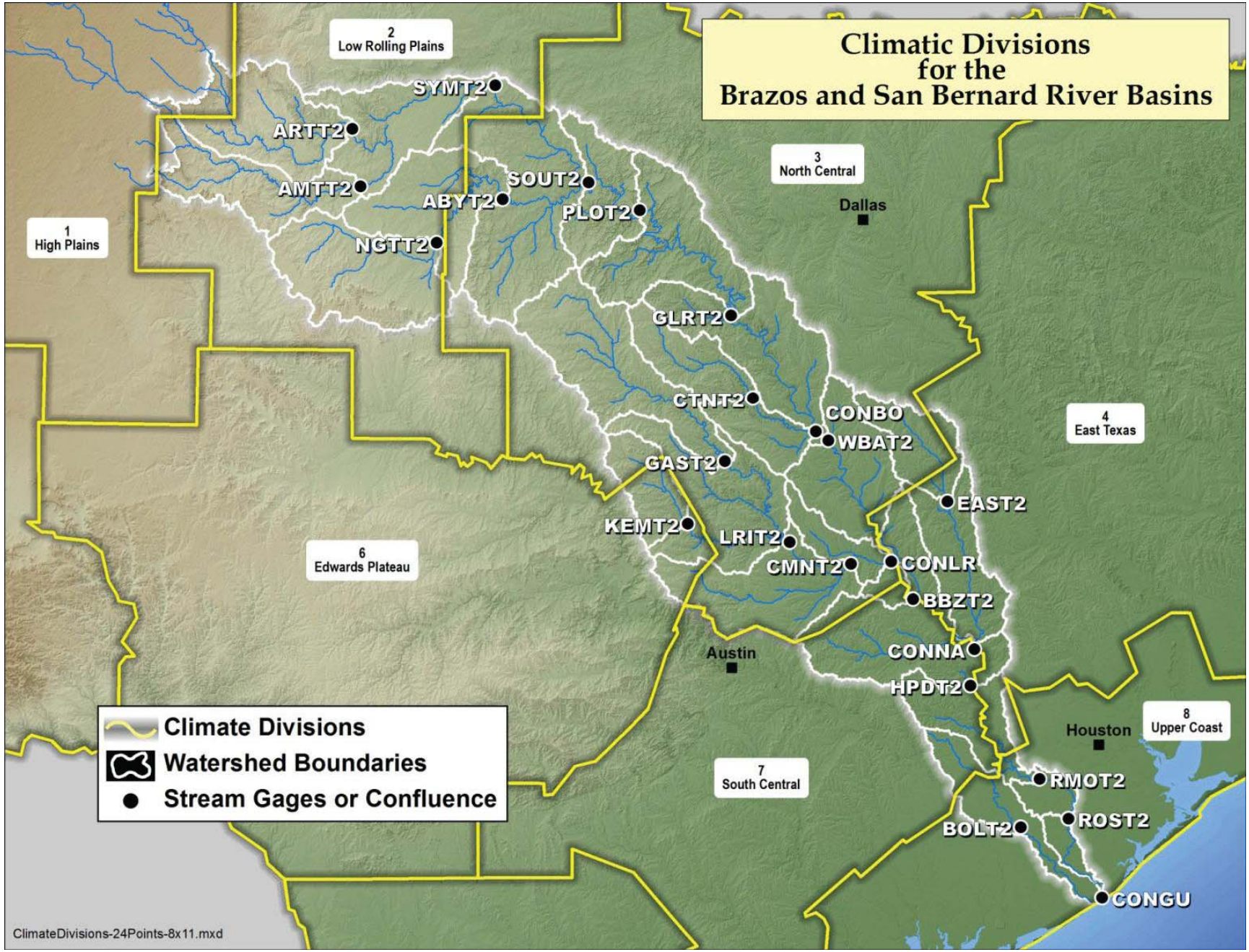

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General Flow Regime Recommendations

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Subsistence

- 5th Percentile of historic flows
- Minimum value of 1 cfs
- Subsistence flows sill support designated uses and water quality standards at selected gages
- Applies during periods of drought
- Implementation Rule - Do not increase frequency of occurrence

Brazos near Seymour at subsistence flow

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Base Flow

- Dry, average, wet recommendations by season
- Dry = below 25th percentile of historical flow
- Average = 25th to 75th percentile of historical flow
- Wet = above 75th percentile of historical flow

Clear Fork near Nugent – Base Flow - Average

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High Flow Pulses and Overbank Flows

- **Considered 8 levels for each gage**
  - **1, 2, 3 and 4 times per season**
  - **1 and 2 times per year**
  - **1 time every 2 years**
  - **1 time every 5 years**
- **Not all sites have recommendations for all 8 levels**

Brazos River near Glen Rose Spring High Flow Pulse

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Additional HFP Considerations

- **Selected high flow pulse and overbank flow levels based on ecological significance**
  - **Flow magnitude changes**
  - **Lateral connectivity**
- **Pulse connectivity with oxbow lakes in the Lower Brazos basin**

Moehlman's Slough oxbow in Brazos floodplain

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Estuary Findings

- **Brazos has no bay**
- **San Bernard has limited bay**
- **Beneficial functions of flow regimes in estuaries**
  - **Sediment supply to deltaic region**
  - **Varying the salinity regime**
  - **Nutrient loading**
- **Tested recommended environmental flows for estuaries**

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Geomorphology Findings

- **Studied at Seymour and Richmond gages**
- **Channels incising historically**
- **Modest geomorphic change**

Brazos River near Glen Rose – channel erosion in areas of riparian disturbance

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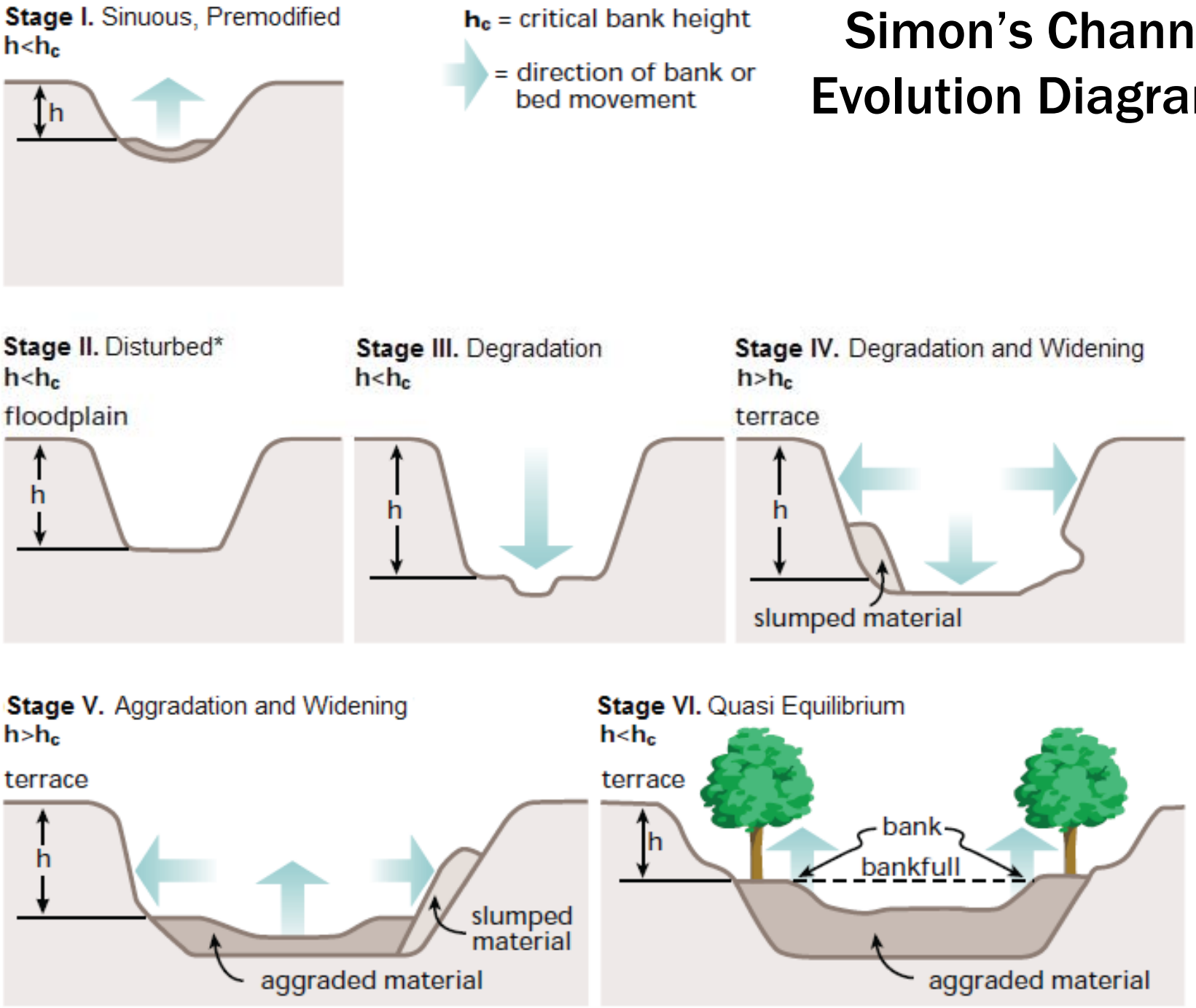
Simon's Channel Evolution Diagram



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Research Priorities

- Hydrology
- Geomorphology and Sediment Dynamics
- Water Quality
- Aquatic Fauna, Habitat, Reproductive Ecology
- Riparian Vegetation Monitoring
- Estuarine Monitoring
- Issues for Adaptive Management

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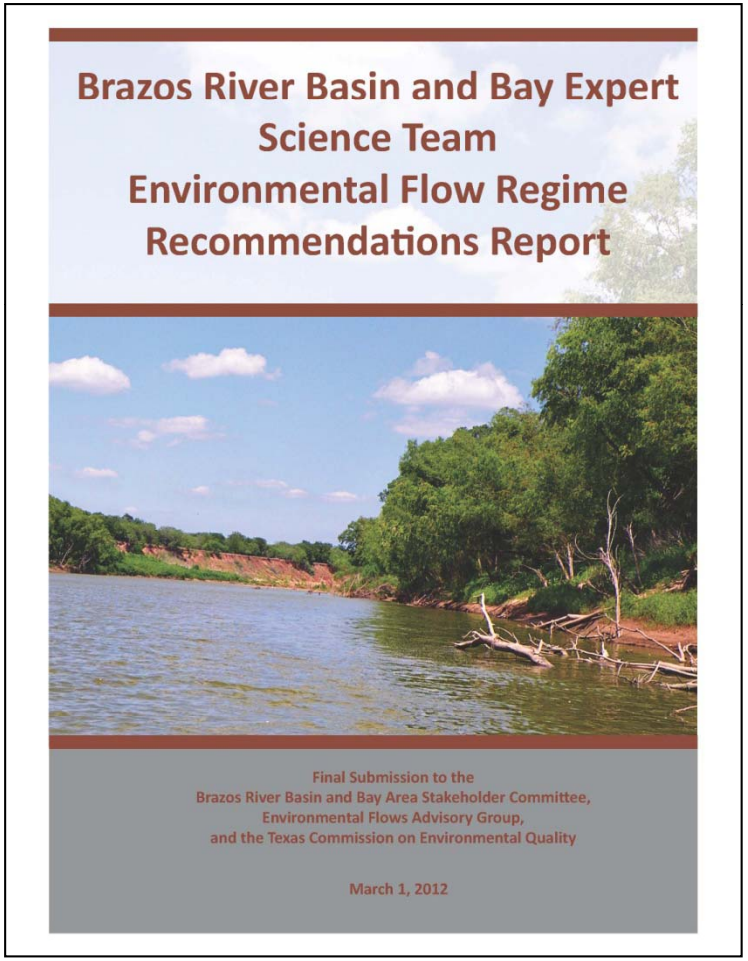
BBEST Report

- http://www.tceq.texas.gov/permitting/water_supply/water_rights/eflows/brazos-river-and-associated-bay-and-estuary-system-stakeholder-committee-and-expert-science-team



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Next Steps

- **Stakeholders Group develops their recommendations**
- **Flow Regime recommendations due to TCEQ September 1, 2012**
- **TCEQ adopts regulations for Brazos Basin – September 1, 2013**