

**Texas Instream Flow Program  
Middle and Lower Brazos River Study Design Workgroup  
Meeting Notes  
December 11, 2008**

The Study Design Workgroup met in Bryan on December 11, 2008 from 8:30 a.m. to approximately 5 p.m. The following notes capture key discussions and decisions of the group.

**Modification of Objectives/ Development of Indicators**

The workgroup discussed and made some revisions to the objectives initially developed by the workgroup at its Oct. 20, 2008 meeting. The workgroup first looked at objectives they had developed that did not relate specifically to the five disciplines. They agreed to put them on a parking lot and revisit them at the end of the meeting. Following their review of each objective, the workgroup participants discussed and developed indicators for the following disciplines:

**Biology**

**Biology Objective** (*editing shows revisions by workgroup to objective previously adopted*)

- Identify flow regimes:
  - ~~and manage flow regimes~~ for the benefit of the native ecosystem (i.e. habitat, flora, and fauna);
  - ~~Identify flow regimes to M~~aintain a diverse aquatic community and prevent the extinction of native species; and
  - ~~Identify flow regimes to P~~reserve/protect and restore/improve key habitat features for native species in river and riparian zones

**Biology Indicators** (*selected by workgroup*)

*Editing shows additions (underlined) and deletions (strike-through) from list proposed by TIFP agencies*

Category	Indicator
<i>Instream Biological Communities</i>	Native Richness
	Relative Abundance
	Fish <ul style="list-style-type: none"> <li>• Flow sensitive species</li> <li>• Sport fishes</li> <li>• Prey species</li> <li>• Imperiled species</li> <li>• Intolerant species</li> </ul>
	Other Aquatic Organisms (Benthic invertebrates, mussels, <del>river and</del> riparian plants, and limited other vertebrates may be appropriate as indicators)
<i>Instream</i>	Habitat Quality and Quantity for Key Species

<i>Habitat</i>	Mesohabitat Area and Diversity
<i>Riparian Habitat</i>	Vegetation <ul style="list-style-type: none"> <li>• Age class distribution of riparian plant species</li> <li>• Riparian species richness and diversity</li> <li>• Density</li> <li>• % Canopy cover</li> </ul>
	Soils <ul style="list-style-type: none"> <li>• Riparian soil types</li> </ul>
	Hydrology <ul style="list-style-type: none"> <li>• Gradient of inundation, base flow levels</li> </ul>

**Prioritization of biology indicators:** Agencies indicated they believe all indicators can be studied, and therefore prioritization not needed.

Notes from discussion

- Consider land species dependent on river?
- Look at declining populations
- Look at riffle species
- Native species richness: Proposed indicator is OK, but note that non-native species will be included in analysis
- Relative abundance: Proposed indicator is OK
- Instream Biological Communities: Fish
  - Imperiled = concern for declining trends
  - Flow sensitive
    - Include oxbow lake species
    - Imperiled species in Brazos are mostly flow sensitive
  - Concern for conservation status of alligator gar
- Instream biological communities: Other aquatic organisms
  - Benthic invertebrates: Keep in design and provide appropriate focus only to the extent of relying on other studies
  - Don't include river prawn
  - Mussels: O K
  - Study riparian but not river plants in this category
  - Other vertebrates: consider including alligator snapping turtle and alligator (Joan Glass agreed to check into monitoring); TPWD will report back to group.
- Instream habitat
  - Key species
    - Agencies will recommend specific species, may include recruitment of juveniles as appropriate
  - Mesohabitat
  - Oxbows
  - Wetlands habitat
- Riparian habitat
  - Look at land use relative to riparian zones

- Total riparian area
- Relate bank stability to vegetation indicators/riparian density

**Hydrology**

**Hydrology Objectives** *At the 2nd workgroup meeting in Bryan on October 20th, the workgroup developed a tentative list of objectives, and requested TWDB to further develop a more detailed proposal of these objectives that reflects the ideas provided by workgroup members. At its meeting on December 11, the workgroup revised the objectives proposed by TWDB as follows:*

- Identify flow regime components and their characteristics (~~frequency, timing, duration, rate of change, magnitude~~) of benefit to the environment in order to assist in managing the system for the benefit of the environment, economy and society
- Identify/define ~~Determine~~ current, ~~and~~ historical, ~~and~~ naturalized patterns of flows to determine ~~and~~ potential environmental consequences of changing from either of these patterns
- Identify all sources of instream flow and factors which may affect those sources

**Hydrology Indicators** *(selected by workgroup)*

*Editing shows additions (underlined) and deletions (strike-through) from list proposed by TIFP agencies*

Category	Indicator
Flow regime components	Overbank flows (frequency, timing, duration, rate of change, and magnitude)
	High pulse flows (frequency, timing, duration, rate of change, and magnitude)
	Base habitat flows ( <u>frequency, timing, duration, range of change, and magnitudes</u> )
	Subsistence flows (frequency, timing, duration, rate of change, and magnitude)
Natural variability	Natural
	Current
Sources of instream flow	Flow gain or loss in section of river

**Prioritization of hydrology indicators:** Agencies indicated they believe all indicators can be studied, and therefore prioritization not needed.

Notes from discussion

- In the third objective,
  - when identifying factors that may affect sources of instream flow, consider existing studies, including climate change
  - add precipitation to the explanation of sources of instream flow

- be consistent in listing the characteristics for each flow regime component

## Water Quality

**Water Quality Objective** (*editing shows revisions by workgroup to objective previously adopted*)

- Identify ~~Manage~~ flow-related water quality in the four flow regime components ~~to sustain ecological, economic, and social processes and productive capacity.~~

**Water Quality Indicators** (*selected by workgroup*)

*Editing shows additions (underlined) and deletions (strike-through) from list proposed by TIFP agencies*

Water quality data are used to describe the condition of a water body, to help understand why that condition exists, and to provide some clues as to how it may be improved. Water quality indicators include chemical measurements as well as certain physical and biological measurements. Some of the most common are listed here, with an explanation of why they are important to the health of a water body.

Category	Indicator
<i>Nutrients</i>	<u>Nitrogen</u> Organic Nitrate plus nitrite Ammonia Total  <u>Phosphorus</u> Filterable reactive Total
<i>Oxygen</i>	Dissolved oxygen
<i>Temperature</i>	Temperature
<i>pH</i>	<u>pH</u>
<i>Water clarity</i>	<del>Suspended solids</del>
	Turbidity
	<del>Secchi depth</del>
<i>Salinity</i>	Conductivity
<i><del>Microalgal growth</del></i>	<del>Chlorophyll-a</del>
<i>Recreational health</i>	Bacteria
<i>Metals</i>	<del>Concentration of metals in water</del>
<i>Organics</i>	<del>Concentration of organics in water</del>
<i>Biological</i>	<del>Benthic invertebrates</del>
	<del>Fish</del>
<i><del>Fish consumption</del></i>	<del>Fish tissue analysis</del>

<i>advisories and closures</i>	
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**Prioritization of water quality indicators:** Agencies indicated they believe all indicators can be studied, and therefore prioritization not needed.

Notes from discussion

- The group identified the following indicators to be flow-related:
  - Dissolved oxygen
  - Temperature
  - Nutrients
  - Turbidity
  - Bacteria
  - Conductivity
- Other water quality data that is available should be considered if/when relevant
  - Model inputs

**Geomorphology**

**Geomorphology Objective** (*confirmed by group*)

- Identify interrelationships among flows, bank stability, channel maintenance, and alluvial and associated aquifers

**Geomorphology Indicators** (*selected by workgroup*)

*Editing shows additions (underlined) and deletions (strike-through) from list proposed by TIFP agencies*

Category	Indicator
Bank Stability	Rate of lateral channel migration
	Rate of channel avulsion
	Rate of bank erosion
Channel maintenance	In-channel bars (area, configuration, sediment size)
	Meander pools (depth)
Alluvial and associated aquifers	Flow gain or loss in section of river
Flood impacts	Stage (at USGS gage locations)

**Prioritization of geomorphology indicators:** Agencies indicated they believe all indicators can be studied, and therefore prioritization not needed.

Notes from discussion

- Note if there are other reasons for change, outside of flow-related
- On overbank and pulse flows, look at historic patterns

## Connectivity

### Connectivity Objectives (revised by group)

- Identify how flow influences ~~Maintain~~ riparian zones integrity and ~~improve~~ connectivity ~~with the~~ ~~between river and riparian zone~~
- Identify ~~Maintain~~ flows that support lateral connectivity (i.e. oxbows and backwaters)
- Identify ~~Maintain~~ flows that support longitudinal connectivity

### Connectivity Indicators (selected by workgroup)

Editing shows additions (underlined) and deletions (strike-through) from list proposed by TIFP agencies

Category	Indicator
Riparian zone	Total area inundated
	Habitat area inundated
Lateral connectivity	Connection to river (frequency, duration, and timing)
Groundwater/ surface water interaction	Gain or loss in section of river

**Prioritization of connectivity indicators:** Agencies indicated they believe all indicators can be studied, and therefore prioritization not needed.

### Notes from discussion

- Consider whether longitudinal connectivity issues exist and if indicators are appropriate
- Major longitudinal connectivity issue involves dams upstream of study reach

### **Other objectives**

In light of the indicators selected and discussion about the other objectives and indicators, the workgroup examined the following objectives they had adopted at their Oct. 20 meeting, and made the noted changes to such objectives.

- Define/determine current, historical and natural conditions in each flow regime
  - The group acknowledged this objective related to all disciplines and that it was adequately dealt with in the other adopted indicators:
- Evaluate relationships between flow regimes and economic and social uses, including recreational use
  - Objective adequately covered with other indicators
- Consider how water planning studies and instream flow studies will impact and interact
  - No need to develop objectives separately for this:
    - These studies have been addressed in discussions
    - Ongoing need to coordinate with the Brazos regional water planning group and other RWPGs
    - No study targets

- SB 2 and state policy reflects the need for instream flow studies to address potential future water permitting
- Identify issues with instream flows that impact bays and estuaries
  - The group agreed to delete this objective

### **Miscellaneous discussion**

- Brazos River Authority system operation permit application:
  - The impact of the draft BRA system operation permit on the studies was raised, including the question of whether the study area should be enlarged because of the larger impact of the proposed permit. Group members noted that the flow needs of the Middle and Lower Brazos workgroup will impact the BRA permit. Agencies considered it infeasible to enlarge the study area given the work to date. They noted that other permit issues raise the same question.

### **Next steps**

- Agencies will develop criteria for study sites and send to participants for their input on sites
- Participants consider being study partners
- TIFP (three agencies and BRA) drafts a study design
- Final meeting of workgroup for participants to review study design
- Peer review
- The agencies noted there would be continued communication during this process