

**Brazos River and Associated Bay and Estuary System  
Basin and Bay Stakeholder Committee (BBASC) Meeting  
Wednesday, June 27, 2012 at 10:00 a.m.  
Brazos River Authority Offices  
Waco, Texas**

**Minutes**

**Call to order**

BBASC chair Dale Spurgin called the meeting to order. BBASC members introduced themselves.

**Review of agenda & meeting goals**

Facilitator Suzanne Schwartz reviewed the meeting agenda and goals with the BBASC. The report writing agenda items were moved up in sequence to accommodate Eddie Saucedo's availability at the Wednesday meeting.

**Public comment**

Chris Wingert with West Central Texas Municipal Water District made five points in his comments to the BBASC. His comments are posted to the BBASC web page at:

[http://www.tceq.texas.gov/permitting/water\\_rights/eflows/brazos-river-and-associated-bay-and-estuary-system-stakeholder-committee-and-expert-science-team](http://www.tceq.texas.gov/permitting/water_rights/eflows/brazos-river-and-associated-bay-and-estuary-system-stakeholder-committee-and-expert-science-team).

**Approval of May 30-31, 2012 meeting minutes**

BBASC members approved of the May 30-31, 2012 meeting minutes without changes.

**Subcommittee updates**

**Funding/facilitation**

BBASC vice-chair Tom Michel passed out an update of the contributions to the BBASC funds account administered by the fiscal agent, West Central Texas Council of Governments (WCTCOG). Several members said that additional funds should be forthcoming.

**Report writing**

Subcommittee member Eddie Saucedo summarized recent activity. He said that pieces of the report are being incorporated as they are received. Both Eddie and fellow subcommittee member Cindy Bartos encouraged BBASC members to submit personal testimonies of their experiences with the river. Dan Loomis passed around a list for members to write down their preferred titles for the report.

**Technical analysis**

No updates were given at this time. Facilitator Margaret Menicucci stressed that the technical analysis subcommittee will need input from the BBASC in the next couple of days.

**Strategies**

Strategies subcommittee member Tommy O'Brien requested input from BBASC members regarding any studies or reports on strategies that could assist them with their work. More discussion on strategies is planned on the next day's agenda.

**Report on the analysis of Double Mountain Fork and Allens Creek projects by Technical Work Group**

Phil Price (BRA and Brazos BBEST member), Brad Brunett (BRA) and Kevin Mayes (TPWD), representing the technical work group, provided analyses of the impacts on the yields of Double Mountain Fork and Allens Creek hypothetical projects if an environmental flow regime similar to the TCEQ proposed environmental flow standards for the Colorado basin were imposed on the projects. Environmental flow attainment frequency results for the projects under various environmental flow

standards were also presented. (Slides of this presentation are available on the BBASC web page). Following the presentation, the BBASC and presenters discussed the following:

- The Water Availability Model (WAM) Run 3 was used because it is the model TCEQ uses to analyze a project for permitting. After receiving the BBASC EFS proposals, TCEQ will use WAM 3 modeling to determine the effects of the proposed EFS on future permitting. WAM 3 considers existing senior water rights at their full authorization without return flows. The technical work group did not use exactly the same analysis as would TCEQ in its permitting process.
- Q: What is the impact of recommended environmental flow regime on species that are candidates for listing as threatened or endangered species?  
A: (TPWD) Species that are candidates for listing under the Endangered Species Act need base flows and pulses for spawning, and can be impacted by their alteration.
- Q: What is the scope of the Texas Tech study that looked at candidate species – did it look at specific species (prairie minnow)?  
A: (Tiffany Morgan) Multiple tiers of pulses are used to consider the shiner species. Smaller pulses are more critical to fluvial species. BBEST looked more generally at species, with the exception of looking at two shiner species in the upper basin. The shiners are found from Possum Kingdom north. Near Lubbock, Croton Creek, Double Mountain Fork and Salt Fork. Never in the Clear Fork. Sharpnose shiner has a remnant population in the lower Brazos. Smalleye shiner is not in the lower Brazos.
- TPWD indicated that a study by Dr. Gene Wilde (Texas Tech University) shows summer (May through September) average flow at the Seymour gage needs to be 227 cfs for the smalleye shiner. BBEST considered seasonal pulses to get this average discharge.
- Evaporation is a component of the firm yield analysis
- Water in the Brazos from BRA currently sells at a system rate for \$62.50/acre-foot. Allens Creek reservoir is expected to cost \$300 million to build.
- Do recommendations preclude an overbank? If an overbank flow is recommended, water rights holders subject to EFS would be required to pass it. Overbank flows will occur naturally regardless of BBASC recommendations. However, as more reservoirs and projects are built, the more water will be scalped off of overbank flows.

Cory Shockley of HDR, a consultant for City of Abilene, provided information to the BBASC about the impacts of various environmental flow standard recommendations on the City of Abilene's Cedar Ridge permit application, including the BBEST EFR, TCEQ adopted rules for the Sabine-Neches and Trinity-San Jacinto, and TCEQ proposed rules for the Colorado-Lavaca (Slides of this presentation are available on the BBASC web page.) The following provides major points from the discussion that followed:

- The proposed pulses in the City of Abilene's permit application are seasonal, based on wet, average and dry conditions, and modeled after the Sabine-Neches BBEST approach. Abilene's proposal considered the Brazos River water snake, and keyed proposed pulses to spawning cues of fish. No annual high pulse flow events were recommended. The Cedar Ridge project is located about 50-60 miles downstream of the Clear Fork at Nugent gage, and about 60 miles upstream of the Clear Fork at Fort Griffin gage. Impacts on the project were analyzed using a drainage area ratio to apply the EFR to the Cedar Ridge site.
- The resulting impact on yield is similar to those for the Double Mountain Fork.

### **Review and consider set asides**

In response to the BBASC's request, Kathy Alexander of TCEQ provided information about set-asides. She noted that the Texas Water Code allows TCEQ by rule to set-aside unappropriated water from further permitting to meet environmental flow standards. A set-aside would have the priority date of the BBEST report. However, TCEQ has not adopted nor proposed any set-asides in any basin to date. In response to a question about whether there was water in the Brazos for set-asides, she noted that the analysis is site specific. She also noted that the BBASC could recommend set-asides or TCEQ could adopt them without a stakeholder recommendation, and that TPWD could help administer any adopted set-asides. Kathy also noted that return flows or water conveyed in the watercourse for

downstream customers can be used to meet environmental permit conditions. BBASC members noted that set-asides might be considered in adaptive management in the basin. They also noted that the BBEST did not discuss set-asides.

### **BBEST/ BBASC exchange of information on BBEST report and requested BBEST input**

Tom Gooch noted that the BBEST has answered all questions submitted by the BBASC. (Answers are available on the BBASC web page.) He reviewed the procedure by which the BBEST responds to BBASC questions: Tom G. sends out the request; one or more members draft a reply, which is then reviewed, possibly modified, and approved by the BBEST. In discussing the BBEST's responses to specific questions, he noted the following:

- The BBEST proposed the 50 percent implementation for base/subsistence flows as follows: when flows are less than the base flow, a water rights holder can use one-half of the difference between base and subsistence flows. This allows more water for use in dry times. He noted that when answering the BBASC questions on the impact of using a 50 percent implementation rule keyed to average and wet conditions, BBEST assumed that a diversion would be allowed of one-half the difference between those flows and the subsistence flow.
- Relating to golden algae: lower flows may be related to toxic events. But toxic events don't always occur with low flows, and may occur with higher flows. Brad Brunett of BRA noted that there is not necessarily a correlation between flow and golden algae events. Tiffany Morgan of the BBEST and BRA noted that research doesn't firmly show a correlation. A study indicates that providing flushes once every several years assists. The EFR one-per-two year and one-per-three-year flows may be adequate. The golden algae problem also may be assisted by flushing deeper portions of the reservoir system through shallower areas, creating motion that could prevent a toxic event. But flows also can push a golden alga bloom event downstream. She noted that the SB3 process can't resolve the golden algae problem.

### **Consider use of Brazos River for other water needs: information related to the Turkey Peak project**

Scott Blaser of Palo Pinto County Municipal Water District (MWD) No. 1 provided a presentation to the BBASC about the proposed Turkey Peak project. (Slides of this presentation are available on the BBASC web page.) The following discussion followed the presentation:

- Lake Palo Pinto is a current reservoir located on Palo Pinto Creek near the Brazos River near Palo Pinto gage. Releases from the reservoir are carried down Palo Pinto Creek to a channel dam, where diversion occurs. This creates flows in the creek.
- The current permit allows storage of 44,100 acre-feet, but the reservoir only impounds 27,215. The MWD is proposing an amendment to build the downstream Turkey Peak dam to impound an additional 22,577 acre-feet, resulting in a total impoundment of 49,792 acre-feet, which is 5,692 acre-feet above the current permit. The EFS would apply only to this additional storage.
- The BBASC asked how an EFS that would be adopted at a specific gage such as Brazos River near Palo Pinto could be used to impose environmental flow restrictions on a project not located at or near such a gage. Cory Shockley noted that TCEQ can translate base flows at the 20 BBEST gages to other gages or specific project locations by using a drainage area ratio. The environmental flow condition would be based on what that area contributes to the reference gage. Pulses would be treated differently.
- Palo Pinto MWD No. 1 indicated it would like environmental flow conditions to be imposed on Turkey Peak reservoir project at the lowest one or two pulse flow levels recommended by BBEST, and either one base flow or three levels of base flows as recommended by the BBEST, with the Palo Pinto gage on the Brazos as the appropriate reference gage from which to develop such conditions
- The MWD noted that providing higher pulse flow levels would be costly and complex; there is not enough head in the reservoir to pass the larger flows, and it would cost millions of dollars to make modifications to provide the larger pulse flows. The MWD felt that biological function could still be maintained with the lower pulse flows.

- Approximately 95% of the project water is provided to residential uses (through City of Mineral Wells and the water supply corporations it supplies, as well as through other municipalities). Water also is supplied to the Brazos Electric Cooperative.

### **Develop environmental flow standard components**

Facilitators noted that the BBEST made recommendations in three areas that the BBASC could consider:

- (1) actual environmental flow standards;
- (2) implementation rules for the standards; and
- (3) selection of hydrologic triggers to determine when to apply dry, average and wet base flow conditions.

Tom Gooch of the BBEST provided a presentation regarding base and subsistence flows. (Slides of this presentation are available on the BBASC web page.) The presentation included an explanation of the hydrologic trigger proposed to determine whether a base flow condition was dry, average or wet. He also addressed the implementation rule for base flows. The implementation rule provides for additional pumping when flows fall below base-flow levels but do not yet reach the subsistence level. The following discussion points were fielded by Gooch, fellow BBEST members, or TCEQ staff:

#### ***Hydrologic trigger:***

- BBEST recommended using the Palmer hydrologic index (PHI) to determine if dry, average or wet base flow conditions would apply. This index originates from the National Weather Service, and is calculated from soil moisture and rainfall for the prior three months. It divides Texas into ten climate districts. Each proposed BBEST gage is weighted by the percentage of its drainage area in each district. The PHI is used to determine when conditions are in base dry (lowest 25% of flows), base average (middle 50% of flows) and base wet (highest 25% of flows). These percentages follow a fairly standard division in hydrology, but the determination on breaks is not exact.
- Kathy Alexander of TCEQ expressed concern that a trigger schedule that is different for 20 gages could create a situation in which a junior water right subject to EFS could divert when a senior water right subject to EFS could not. She noted that other basins have used reservoir storage or river flow as their hydrologic triggers for base flow levels.
  - BBASC members proposed the following options to continue to use the PHI while addressing TCEQ staff concerns:
    - one PHI value for the entire basin;
    - one value above Possum Kingdom and one value below Possum Kingdom
    - track the BRA upper, middle and lower basin divisions
    - have four sections
    - use only average conditions for base flow, thereby eliminating the need for a trigger
  - Kathy indicated that these approaches would eliminate some of the issues relating to senior /junior water rights.

***Possible exemptions for small users:*** BBASC members had asked for information on whether exemptions had been made in other basins for small users. Kathy Alexander of TCEQ noted that TCEQ currently imposes environmental flow conditions on all permits, including small users. TCEQ uses Lyons method to develop such conditions. She noted that TCEQ has not adopted or proposed exemptions from base-flow EFS for small-users; however, TCEQ has adopted or proposed exemptions from the pulse flow requirements for small-users in its rules as follows:

- Sabine, Neches, Trinity and San Jacinto basins: TCEQ-adopted rules exempt users of less than 10,000 acft/yr from pulse flow requirements
- Guadalupe & San Antonio basins: TCEQ proposed rules would exempt permittees if diversion rate is less than 20 percent of the pulse peak
- Colorado basin: TCEQ proposed rules would exempt users with diversion rates less than 500 cfs or impoundment of less than 2500 acre feet downstream of Lake Travis
- Lavaca basin: no exemption proposed.

***Adaptive management:*** Kathy Alexander noted that TCEQ is working on implementation issues for the Chapter 298 rules (Environmental Flow Standards for Surface Water). She also noted that the Texas Water Code provides that permits or permit amendments subject to EFS must include a provision allowing TCEQ to adjust the conditions in the permit relating to environmental flow standards, provided that the adjustment may not increase environmental flow requirements in the permit cumulatively by more than 12.5 percent of the annualized total environmental flow requirement in a permit. She also mentioned that if adaptive management showed that the EFS could be less restrictive, permits can be changed and there is no percentage restriction on how much an environmental flow standard could be lowered.

***Base flows:***

In conjunction with a discussion on whether to simplify the EFS by moving from three levels of base flow to one base flow, BBASC members considered the benefits and detriments of a simplified base flow EFS:

Benefits:

- Simpler to implement for a permit holder
- Meets the BBASC goal
- Flows could still vary, and simplification would not preclude the river flow flowing in a wet season

Detriments

- Not as protective of a sound ecological environment
- Ignores expert opinion
- Considers procedural expediency over health of the river

TCEQ adopted or proposed base flow rules for other basins are as follows:

- Sabine/Neches: derived from BBEST dry base flow plus 10%
- Trinity/San Jacinto: depending on the gage, derived from information in the science team and stakeholder reports
- Guadalupe: Derived from wet base flow with the 50% implementation rule applied between wet base flow and subsistence flow

A proposal was suggested to implement one base flow requirement of 10% above dry base flows at each of the 20 gages by season. The following major points of discussion followed:

- Torn between simplifying and also staying with the mission of a SEE
- Simplify by dividing the basin into fewer PHI and maybe seasonal
- Science shows that a SEE needs three tiers of base flow. Concern that ecology will not respond to a single flow level
- Use a high/wet base flow and apply the 50 percent implementation rule
- Use 3 levels of base flow without seasonal variation
- Median flow with 50 percent rule, and no seasonal variation
  - Concern about choosing top 25 percent of flow because you won't be there often
- Concern about 10 percent above dry is not enough water
- Median base flow with 50 percent rule, maintaining seasonable variation
  - Concern – without high base flow, could lose functionality, bank storage, etc.
  - Concern – cumulative impact of multiple projects or infinite infrastructure
  - Concern – use of 50 percent rules takes the flow condition to dry, not average
- Three base flows, using PHI at start of each season
- Simplify the recommendation, and use adaptive management if adjustments are needed later
- Water is not needed by water rights holders when the streams are running, so higher flows would naturally occur
- Base flows are not where impact to water supply occurs, but base flows are significant to the environment

Another proposal was considered: to use the high base flow with the 50 percent implementation rule, but to keep seasonal variations. The following major points of discussion followed:

- This condition only occurs 25 percent of the time
- It is too limiting on ability to take water
- This moves EFS too far and too quickly, and TCEQ might throw it out.
- Base flows won't affect big users much. There will be more impact on small users.
- There are a lot of areas where small users can't get permits now
- The motivation to use one level of base flow is its ease of operation. But maybe multiple levels aren't so difficult.
- Concern about multiple levels of base flow is that small users can unintentionally but easily violate the restrictions. Need something they can follow.
- Consider three base flows for large projects, and something simpler for small users.

#### **Public Comment**

None

#### **Adjourn**

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**Brazos River and Associated Bay and Estuary System  
Basin and Bay Stakeholder Committee (BBASC) Meeting  
Thursday, June 28, 2012 at 10:00 a.m.  
Brazos River Authority Offices  
Waco, Texas**

#### **Minutes**

#### **Call to order**

BBASC chair Dale Spurgin called the meeting to order.

#### **Review of agenda & meeting goals**

Margaret Menicucci reviewed the day's agenda.

#### **Public comment**

None.

#### **Develop environmental flow standard components**

***Presentations on pulse flows:*** The BBASC continued its discussion of environmental flow standards on Thursday, June 28. Tom Gooch presented information on the BBEST recommendations for pulse and overbank flows. (Slides of this presentation are available on the BBASC web page.)

***Interests:*** Facilitators summarized interests that stakeholders had expressed relating to base flows; BBASC members did not have any major interests to add:

- Providing a sound environment
- Providing sufficient water for human need
- Can be implemented by small users
- Supporting science
- Not getting ahead of science: have a sound science-based decision

**Cedar Ridge presentations:** Cory Shockley of HDR, a consultant for City of Abilene, provided information to the BBASC regarding the impact pulse flows have on the City's proposed Cedar Ridge reservoir project. (Slides of this presentation are available on the BBASC web page.) Following the presentation, the following discussion points occurred:

- The two species that are candidates for listing under the Endangered Species Act are not present in this stretch, but the recommendations would not change if they were present.
- High flow pulse 2 provides one half the impacts on the yield.
- Channel stability is not an issue in the Cedar Ridge area because the channel is very stable.

Ed Oborny with Bio-West (consultant for City of Abilene) gave a presentation regarding site-specific studies being carried out to determine if the City's proposed environmental flow regime for the Cedar Ridge reservoir project would be protective of the Clear Fork Brazos River. Slides of the presentation are available on the BBASC web page.

**Brainstormed ideas:** BBASC members then brainstormed the following ideas for possible models for establishing base flow and pulse flow environmental flow standards:

- Wet base flow with the 50% rule
- Average base flow with 50% rule
- Cedar Ridge (CR) template for the basin above Possum Kingdom
- Different template for the middle and lower Brazos
- Eliminate top pulse flow
- One high base flow and some pulse flows
- Same as above with 50% rule
- Different approaches for large and small users
- Treat low integrity areas differently
- 3 levels of base and high pulses
- Specific considerations to account for candidate species
- Recommend flows at Turkey Peak as proposed yesterday

#### **Consensus:**

BBASC agreed by consensus to adopt the following recommendations to TCEQ relating to the subsistence flow element and overbank flow element of an EFS:

- Adopt all BBEST recommended subsistence flows for all gages
- Eliminate all overbank flows for all gages, but acknowledge in the report: (1) their importance, including for connectivity to oxbows; (2) why the group is not recommending them, including that TCEQ has not approved overbank flows in EFS rules and because of liability issues; and (3) the need for more studies (work plan item) relating to specific physical connection for oxbows

The BBASC then continued its discussion of the remaining issues about pulse flows and base flows.

- High flow pulses have a significant impact on water supply projects' yield and cost/infrastructure. Concern about ability of a structure to pass the flows and cost of doing so
- Concern about assumption that high flow pulses will continue to occur. It needs to occur, but the cumulative effects of multiple projects can impact this assumption
- High flow pulses have different ecological values. We can't assume exceptions we might make won't have an impact
- System Operation permit application would provide water without development of a reservoir, and would include environmental flow provisions.
- Adaptive management – if we set the bar too high, how can we change it? Setting high environmental flow standards could eliminate opportunity to provide for future water needs, especially if based on science about which we still have questions
  - Statute allows for adjustment of permit conditions relating to EFS
- In middle basin (Brazos at Palo Pinto gage and the Brazos at Glen Rose gage), using other than BBEST standards could worsen what is already a segment with low biotic integrity

- Use the proposal for Turkey Peak at that location and upstream:
- Use the Cedar Ridge template with one base average flow and the 50 percent rule
- Include a small-user exception for some pulses, based on percentages of the smallest peak flow.
- Use the PHI tied to two or three regions rather than to each of 20 gages.

#### Issues:

- Why change the frequency of the pulse flows from the BBEST recommendation?
  - Site specific study at Cedar Ridge does not show any benefit from four pulse flows. One pulse flow in dry times satisfies the species.
- Concern about target species. Need to be able to convince US Fish and Wildlife Service that species are protected. Lower pulse flows are of greatest importance to those species.
- Ed Oborny, biology consultant for City of Abilene, thinks that if the target species were in the Clear Fork, it would be protected with the proposed Cedar Ridge template of flows. But he can't say that for another location. Any project would be evaluated against its impact on threatened or endangered species.
- TPWD indicated that while the rate of flow proposed for pulses may be sufficient for shiner spawning pulses, they would like information about the impact of the proposed reduced frequency of pulses, and a less frequent number of pulses, and that none were recommended in the winter. Perhaps the BBASC could keep the frequency of occurrence but at the lower levels proposed at Cedar Ridge.
  - Cedar Ridge would lose 30 percent of its yield if the frequency of the lower pulses were increased.
- Be more protective at Aspermont, with the idea of adaptive management
- Be less protective with the idea of adaptive management.
- Consider Nugent, Fort Griffin and South Bend gages
- Consider strategies for target species

#### Proposal:

Apply Cedar Ridge template for gages from Double Mountain Fork near Aspermont downstream to the Brazos River near South Bend, but use base average flow with the 50 percent implementation rule (gages 1-6).

#### Concerns:

- Don't have detailed studies on all these gages, as we do for Cedar Ridge, so we should use our best available data – the BBEST recommendation
- Shiners are in the Double Mountain Fork

#### Consensus:

For gage No. 4 (Clear Fork Brazos River at Nugent), No. 5 (Clear Fork Brazos at Ft. Griffin), and No. 6 (Brazos River at South Bend), use the Cedar Ridge template with its three levels of base flow and pulse flows.

*(See attachment 1 for adopted environmental flow standards for these gages)*

#### Tentative agreement

For hydrologic trigger:

- Use the Palmer Hydrologic Index imposed on either two zones (with Possum Kingdom Lake dam as boundary) or three zones (with Possum Kingdom Lake dam and Lake Whitney dam as the boundaries) to determine dry, average and wet conditions (final decision pending TCEQ and BBEST input)
- Use PHI at the date immediately preceding the first day of the season

Preparation for next meeting:

- Technical work group will coordinate with Cory Shockley, who will prepare an analysis of the Double Mountain Fork Project and the Little River on-channel project yields of including various levels of pulse flows to the Cedar Ridge template.
- Cindy Loeffler to obtain opinion of Texas Tech biological expert about how the reduction of pulse flows at the Double Mountain Fork project, under the scenario proposed by the Cedar Ridge project, would impact species that might be listed as threatened or endangered.
- Phil Price to supply new hydrologic trigger information for three areas (above Possum Kingdom, between PK and Whitney, and below Whitney).
- Check with Kathy Alexander about (1) any TCEQ concerns if basin divided into two or three areas, (2) if the division needs to be at a reservoir, and (3) to get an example of the junior-senior issue when multiple gages are used for hydrologic trigger.

**Work Plan: Items that might be considered when developing the work plan** (*cumulative from prior meetings*)

- Additional studies for the area from Possum Kingdom to Whitney, including the golden algae issue
- Develop a schedule for review of environmental flow standards
- Oxbow and overbank information

**Report** (*cumulative from prior meetings*)

Include in the report the following:

- A statement that BBASC recommendations are based on an understanding that it affects future permitting only
- Goal
- Technical analysis requested

**Future Agenda Items:**

- Hear from Cory and Technical Working Group on yield analysis for different flow conditions DMF and Little River on-channel
- Strategies
- Hydrologic triggers (information and decisions)
- EFS\Draft Report and steps to finalize

**Upcoming meetings:**

July 17, BRA headquarters

July 30-31, City of Waco Riverside Water Treatment Plant

August 15-16, BRA headquarters

August 28, BRA headquarters (date changed from August 29)

**Public comment**

None

<b>Action Items</b>	<b>Who</b>	<b>When</b>
Send to Tom Conry your personal stories relating to the river: a few sentences, include river location	BBASC members	ASAP
Analyze yield of Double Mountain Fork and Little River project under various levels of pulse flows using Cedar Ridge template	Cory in conjunction with Technical workgroup	Before July 17 meeting
Biological impact of less frequent pulses than BBEST recommendation on gages 1, 2 and 3	Cindy Loeffler ask Texas Tech biologist with expertise	Before July 17 meeting
Information on hydrological trigger (1) any TCEQ concerns if basin divided into two or three areas, (2) if the division needs to be at a reservoir, and (3) to get an example of the junior-senior issue when multiple gages are used for hydrologic trigger.	Kathy Alexander	Before July 17 meeting
Provide Matt Phillips (strategies subcommittee) any information on reports that might provide ideas for strategies	BBASC	ASAP
Comments on draft report to Tom Conry (report subcommittee)	BBASC	ASAP

**ATTACHMENT 1**

**Adopted Environmental Flow Standards**  
*(need to confirm at June 17 meeting that BBASC has adopted Notes on tables)*

**Clear Fork Brazos River near Nugent Stream Gage - Adopted by BBASC**

Clear Fork Brazos River near Nugent Stream Gage - Adopted by BBASC													
High Flow Pulses	Wet	Qp: 26 cfs with Average Frequency 1 per season Regressed Volume is 160 Duration Bound is 9			Qp: 590 cfs with Average Frequency 1 per season Regressed Volume is 2800 Duration Bound is 12			Qp: 390 cfs with Average Frequency 1 per season Regressed Volume is 1890 Duration Bound is 12					
	Avg	Not Recommended			Qp: 180 cfs with Average Frequency 2 per season Regressed Volume is 860 Duration Bound is 9			Qp: 100 cfs with Average Frequency 2 per season Regressed Volume is 460 Duration Bound is 8					
	Dry	Not Recommended			Qp: 180 cfs with Average Frequency 1 per season Regressed Volume is 860 Duration Bound is 9			Qp: 100 cfs with Average Frequency 1 per season Regressed Volume is 460 Duration Bound is 8					
Base Flows (cfs)	Wet	13			12			9					
	Avg	8			6			4					
	Dry	5			3			1					
Subsistence Flows (cfs)		1.0			1.0			1.0					
		Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct
		Winter				Spring				Summer			
Flow Levels		High (75th %ile)			Medium (50th %ile)			Low (25th %ile)					
		Notes: 1. Period of Record used :. 2. Volumes are in acre-feet and durations are in days. 3. Episodic events are terminated when the volume or duration criteria are met, or when the flow drops below 6 cfs, or when the flow is below 25 cfs and the flow drops from one day to the next by less than 5%. 4. 50% rule applied as defined by BBASC. 5. Wet, Average, Dry defined by hydrologic season.											

## Clear Fork Brazos River near Fort Griffin Stream Gage - Adopted by BBASC

High Flow Pulses	Wet	Qp: 61 cfs with Average Frequency 1 per season Regressed Volume is 430 Duration Bound is 11	Qp: 1230 cfs with Average Frequency 1 per season Regressed Volume is 7310 Duration Bound is 15	Qp: 110 cfs with Average Frequency 1 per season Regressed Volume is 620 Duration Bound is 10									
	Avg	Not Recommended	Qp: 360 cfs with Average Frequency 2 per season Regressed Volume is 2120 Duration Bound is 12	Qp: 110 cfs with Average Frequency 2 per season Regressed Volume is 620 Duration Bound is 10									
	Dry	Not Recommended	Qp: 360 cfs with Average Frequency 1 per season Regressed Volume is 2120 Duration Bound is 12	Qp: 110 cfs with Average Frequency 1 per season Regressed Volume is 620 Duration Bound is 10									
Base Flows (cfs)	Wet	34	27	20									
	Avg	17	13	5									
	Dry	8	4	1									
Subsistence Flows (cfs)		1.0	1.0	1.0									
		Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct
		Winter				Spring				Summer			
Flow Levels		High (75th %ile)		Medium (50th %ile)		Low (25th %ile)		Notes:					
								1. Period of Record used : .					
								2. Volumes are in acre-feet and durations are in days.					
								3. Episodic events are terminated when the volume or duration criteria are met, or when the flow drops below 6 cfs, or when the flow is below 25 cfs and the flow drops from one day to the next by less than 5%.					
								4. 50% rule applied as defined by BBASC.					
								5. Wet, Average, Dry defined by hydrologic season.					

## Brazos River near South Bend Stream Gage - Adopted by BBASC

Brazos River near South Bend Stream Gage - Adopted by BBASC													
High Flow Pulses	Wet	Not Recommended	Qp: 2480 cfs with Average Frequency 1 per season Regressed Volume is 15700 Duration Bound is 13				Qp: 1180 cfs with Average Frequency 1 per season Regressed Volume is 7050 Duration Bound is 11						
	Avg	Not Recommended	Qp: 1260 cfs with Average Frequency 2 per season Regressed Volume is 7280 Duration Bound is 10				Qp: 580 cfs with Average Frequency 2 per season Regressed Volume is 3140 Duration Bound is 8						
	Dry	Not Recommended	Qp: 1260 cfs with Average Frequency 1 per season Regressed Volume is 7280 Duration Bound is 10				Qp: 580 cfs with Average Frequency 1 per season Regressed Volume is 3140 Duration Bound is 8						
Base Flows (cfs)	Wet	120	100				95						
	Avg	73	60				46						
	Dry	36	29				16						
Subsistence Flows (cfs)		1.0		1.0				1.0					
		Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct
		Winter				Spring				Summer			
Flow Levels		High (75th %ile)		Medium (50th %ile)				Low (25th %ile)					
		<p>Notes:</p> <ol style="list-style-type: none"> <li>1. Period of Record used: .</li> <li>2. Volumes are in acre-feet and durations are in days.</li> <li>3. Episodic events are terminated when the volume or duration criteria are met, or when the flow drops below 6 cfs, or when the flow is below 29 cfs and the flow drops from one day to the next by less than 5%.</li> <li>4. 50% rule applied as defined by BBASC</li> <li>5. Wet, Average, Dry defined by hydrologic season.</li> </ol>											