

**Colorado and Lavaca Rivers and Matagorda and Lavaca Bays
Basin and Bay Area Stakeholder Committee (BBASC)**

Wednesday, June 29, 2011 at 9:30 a.m.
LCRA Dalchau Service Center, Austin, TX

Meeting Minutes

BBASC Members Present: Chair Patrick Brzozowski, Vice-Chair Myron Hess, Bruce Arendale, Jim Dailey, Ronald Gertson, Carroll Hall, Andy Hennessey (alternate for David Hill), Dan Hall (alternate for Deedy Huffman), Joe King, Frank Lewis, Teresa Lutes, Jack Maloney (alternate for Dick Ottis), Bob Pickens, L.G. Raun, Andrew Sansom, Clarence Schomburg, Buddy Treybig, Suzanne Zarling

1) Call to order and introductions

BBASC chair Patrick Brzozowski called the meeting to order.

2) Discussion and agreement on agenda

Suzanne Schwartz, facilitator, went over the meeting agenda and goals. No changes were made.

3) Public comments (limit 3 min.)

None.

4) Administrative business: Approval of minutes from June 16 meeting

Draft minutes from the June 16th meeting were approved without changes.

5) Work Plan update and discussion

Patrick gave a summary of Work Plan development to date. BBEST chair Dave Buzan said that stakeholder feedback is valuable and requested any comments by July 5th. After comments are received, a revised Work Plan will be distributed to the group. Dave said that any comments on prioritization of the Work Plan items are also welcome. Patrick stated that the work plan subcommittee will convene next week and stakeholders can send their comments to them to pass on to the BBEST.

6) Develop preliminary bay and estuary environmental flow standard recommendations

Assessing whether BBASC changes maintain a sound ecological environment (SEE). At the June 16 BBASC meeting, the BBEST had agreed to try to explore a process for assessing how changes to freshwater inflow recommendations may maintain the SEE. Dave Buzan of the BBEST provided handouts (**Attachment 1**) and made a brief presentation on this matter. He indicated it would cost significant time and money to run additional assessments on Matagorda Bay to make such determinations. He indicated that while a system can be healthy even when receiving more salinity (example of the Laguna Madre), it would not be the same type of a healthy system as exists now for Matagorda Bay. He also noted the BBASC probably could alter the BBEST recommendations by plus or minus two to three percent and not impact the system, just by virtue of the accuracy of the numbers. He provided a handout (**Attachment 2**) that showed the BBASC could round the numbers (up or down) by two significant figures and state the values as accurate to plus or minus .05 of the place of the lowest significant figure.

BBASC discussion of possible bay and estuary environmental flow standards. The BBASC then began exploring the following questions: Why would we not endorse the BBEST recommendations? How do we find something implementable? What would a standard for this flow regime look like? Discussion included the following:

- Concern that the numbers in the BBEST regimes don't match natural variation, aren't met 100% of the time.

Response: Environmental flow standards don't have to be met 100 percent of the time

- Put this into context to see the impacts – e.g. against a current permit or future project.
- How do we characterize this regime in the report?

Response: Put this as a target.

Dave Buzan: BBASC could say in its report that the environmental flow regime of the BBEST for bay and estuaries is appropriate for protection of bays and estuaries. In reality, for Lavaca Bay, the instream flow at the most downstream point will protect the bay, but it still is important to put a bay and estuary recommendation into the report. If a water availability model says sufficient water is in the stream to meet instream flow standards, a proposed diversion would not impact the bay and estuary.

- Permittee doesn't have to "create" water or release stored water to "mimic nature"

BBEST responses to questions about permitting:

- Over what period is percent achievement guideline/frequency of occurrence (attainment frequency) being analyzed for permitting? WAM period of record shows frequency of occurrence.
- Instream flow likely to be the permit condition with a little tweaking.

Views:

- Given the declining percentage of meeting achievement guidelines in the future, would it be better to specify achievement guidelines at the time of permitting, rather than adopting them for Matagorda as BBEST recommends? Should there be more study?
- Percentage achievement guidelines are what are expected over time.
- In Matagorda, expect attainment frequency to reduce below BBEST environmental flow regime even without any new permits.
- Achievement guidelines are important for Permit 5731. Test was whether the proposed permit made attainment frequency worse.
- Strategies can be used to increase the attainment frequency.
- Could we accomplish the same thing by setting strategies for meeting the achievement guidelines, without putting the achievement guidelines in standards?
- Achievement guidelines have relevance in BBEST. Could omit from BBASC recommendations, but discuss why in report.
- We should get as close to a SEE as we can while meeting human needs. The percentage of achievement under WAM 3 does not create a SEE. We should aim higher for standards, and seek to meet achievement guidelines through strategies.
- Look at 2020 WAM 3 as possible achievement guidelines.
- Dave Buzan: Would like BBASC to endorse BBEST environmental flow recommendations as supporting health of the bay and estuaries. Standards can be different. Could set an acceptable deviation from the achievement guidelines.
- Bryan Cook: (in response to a question): The percentage achievement guideline for West Matagorda is the percent of time water went past the Bay City gage. Before the early 1990s, not necessarily all of this water would go into the bay because of physical

conditions. Since the 1990s, when water was diverted into West Matagorda Bay, more habitat and species have developed, including oysters.

Question posed: Do you want to include percentage achievement guidelines in environmental flow standards?

- Guidelines won't be met with human use under existing permits
- Concern over the number.
- How do we take into account the fact that this water for West Matagorda didn't all get there in the past. What should the number be?

Differences were noted between percentage frequency of occurrence and percentage achievement guidelines.

For West Matagorda Bay, there was concern that WAM 3 yields very limited water. Should have report language reflecting that concern.

Possible use of 2020 numbers:

With expected water use under existing permits in 2020, the achievement predicted to occur is:

MBHE 1	MBHE 2	MBHE 3	MBHE 4
77%	60%	46%	39%

If BBASC used this, it would not be tied to science, but can be used in “balancing” – which is in the BBASC’s jurisdiction. Would need to explain in reports why and how you got here.

- Concern that the 2020 numbers are not based on science.

Adaptive approach discussion: Rate of change is important. Consider an adaptive management approach, by adopting percentage achievement guidelines at a set date with the understanding that we will need to review.

Facilitator question:

- (1) Do you want percentage achievement guidelines in environmental flow standards?
- (2) If not, how do we reflect in the report?
- (3) If so, at what level: BBEST, 2020, WAM3?

Concerns about achievement guidelines/frequency of occurrence standards:

- Concern about impacts such numbers will create in regional water planning on existing permits that might be subject to the environmental flow standards. Numbers may be misused in the regional water planning process.
- Diversions for permitted human need may change the bay system back to what it was before the 1990s. Do we recognize the change will occur? Do we want to recognize that as our desired goal?
- The 2020 numbers say we don't get to full bay protection
- Disagree: you can't say this wouldn't be protective.
- Recognize that the Colorado is permitted beyond a healthy environment, that fresh water inflows will be reduced, can only manage rate of change.
- Are there work plan items that address how to adjust the numbers?
- There will not be new permits upstream of Matagorda Bay. BBASC could say we're assigning attainment frequency and they'll need to be revisited. That we're choosing

numbers that balances human and environmental need. The number will need further revisions. Also, look at strategies.

Recognize that the Colorado and Lavaca are different.

Proposal suggested for adopting percentage achievement guidelines for West Matagorda based on:

- 2020 WAM
- Balancing the recognize human need
- Adaptive management – revisit and consider as work plan items
- Strategies to meet or control rate of change
- Term: plus or minus 10 years
- Need for caution when using the numbers for long-term planning

Discussion:

- Can have strategies without having achievement guidelines
- Concern about achievement guidelines in standards could be used in regional water planning in evaluating water supply strategies.
 - Myron: Law is clear that permit amendment like those described by LCRA are not subject the environmental flow standards
 - Seeking answers from TCEQ and TWDB on the following questions:
 - Would regional water planning groups use environmental standards in the current permit?
 - Should standards of BBASC be used to evaluate water supply strategies even if it is an amendment to an existing permit?

Proposal suggested for Matagorda Bay environmental flow strategy recommendations:

Adopt the original BBEST recommendation except for the following two parts (which were not rejected, but reserved for a future decision), and with recognition that strategies may be needed for their long-term achievement:

- percentage achievement guidelines
- long-term volume and variability

Discussion: Environmental flow standards (EFS) are an assessment tool for issuing permits. Once a permit is issued, there may be permit conditions imposed, but the permit holder is no longer being weighed against the EFS.

Concerns:

- A need for more understanding of the concepts
- need percentage achievement guidelines
- want flexibility – a range shown on the chart.
- Information needs:
 - How were achievement guidelines for Galveston developed?
 - How attainment frequencies and environmental flow standards will be used in permitting.

No final decisions on this item were made. Discussion will continue on Thursday.

7.) Continue developing riverine environmental flow standard recommendations including discussion of balancing needs

Subsistence flows (deferred to June 30)

Lavaca River (deferred to June 30)

Pulse flows (deferred to June 30)

Channel maintenance flows

Dave Buzan discussed a hand-out provided by the BBEST at the prior BBASC meeting (**Attachment 3**), which explains and provides a suggested BBASC approach on developing recommendations for pulse flow and channel maintenance flows. In regard to channel maintenance, Dave suggested:

- address the importance of channel maintenance in the report, and note it is primarily impacted from big diversions;
- if a proposed project reduces the annual average flow (based on historical period of record 1940-1998) by more than 10 percent, the applicant should be required to conduct a study of the impact of the permit on sediment transport. Other permit applications would not have to address channel maintenance.

Addressing questions, BBEST and Texas Water Development Board staff noted:

- Channel maintenance was explained: water flow erodes some areas, builds other areas. Channel maintenance tries to keep the habitats in the relative amount as they are now;
- Channel maintenance may occur at the lower end of pulse flow, not only at high pulse. Even at high base flow. It varies place-by-place;
- The 10% proposed cut-off is reasonable given what we know. This would exempt most small applicants.

Myron Hess provided a proposal, similar to the ideas from the BBEST, and containing possible rule language to propose to TCEQ. (**Attachment 4**) A question arose about the meaning of “adverse change” to channel morphology as described in the proposal. This item was discussed on June 30, and it appended to those minutes.

Hydrological Triggers (for determining levels of base flow)

Dave Buzan explained that the hydrologic triggers are designed to allow permit holders to determine when various levels of base flow conditions would be applicable.

In response to a question about subsistence flow, it was suggested that it might be possible to develop a drought condition trigger – e.g. no diversions below base low except in certain drought conditions

Dave provided a handout that showed how such a hydrologic trigger might work. (**Attachment 4**). The example in the attachment is uses reservoir level on the last day of the previous season to inform a permit holder what the base flow would be for purposes of determining ability to divert in the next season. Stream flow also could be a hydrologic trigger.

Lake Texana levels could be used as hydrologic triggers for the proposed off-channel reservoir diverting from the Lavaca River, since the drainage area for the Lavaca and Navidad are comparable. USGS may maintain gage sites online that would be helpful for small diverters.

Potential issues:

- If you don't identify triggers, then TCEQ may adopt one base flow
- BBEST believes you need hydrologic variability and triggers
- Hydrologic condition trigger could include:

- reservoir storage;
- reservoir elevation;
- cumulative stream flow.

- Compare triggers to what occurred historically: Kirk can do the analysis

Action: Do analysis using Highland Lakes with two base flow triggers

For June 30: what trigger to use in Upper Colorado.

Lower Colorado gages (deferred to June 30)

Other (deferred to June 30)

8) Public Comment

None

9) Meeting wrap-up and adjourn

Suggestions for improving the next day's meeting:

- Break decisions into small pieces
- More break-out time as we start to come to decisions

ACTION ITEMS AND PARKING LOT WILL BE APPENDED TO THE NOTES FROM THE JULY 30 MEETING.

Lavaca-Matagorda Freshwater Inflow Recommendations

Stakeholder questions:

How much can freshwater inflow recommendations be changed without affecting sound environment in the bays?

- In the case of Matagorda Bay freshwater inflow recommendations, it would be extremely time-consuming (estimated minimum of year) and complicated to determine how much the freshwater inflow regime can be modified without harming a sound environment. This would be an analysis that could not be done by the BBEST because of the complexity and magnitude of the original analysis.

Will different levels of freshwater inflow and different attainment frequencies protect sound environments?

- The regimes proposed for Matagorda Bay and Lavaca Bay are certainly not the only values that will protect sound environments. However in order to change them in the future, there would need to be new and different analysis. For example in Lavaca Bay, it is likely that any reasonable analysis of freshwater inflow to protect oysters would result in similar freshwater inflow regime values. New and different analysis on another key habitat like marsh would involve different assumptions and data availability and would almost certainly result in a different set of values.

Matagorda Bay freshwater inflow Recommendations Background

In the process of deriving the flow regime values, millions of dollars and thousands of hours were spent. Additionally, thousands of decisions, interpretations, rounding of values, etc. were done in the process of arriving at these 14 values and 5 sets of achievement frequencies. This means that if a team of scientist were to reanalyze the data and identify decisions, interpretations, rounding of values, new data, that were involved in the initial analysis, they could probably identify areas where they might change values. **However because there are so many factors and decisions involved in the process, it is highly unlikely that making a few changes would significantly change any of the MBHE flow regime values.**

If changes are made objectively, those changes would be based on 2 assumptions:

- The MBHE flow regime we included in our report was judged to support a sound environment
- Any change in the analytical process might result in new values that would be considered to support a sound environment. **If the changes in analytical approach are conducted objectively, it is equally likely they could increase in value as decrease in value.**

It doesn't seem appropriate for the BBEST, TCEQ, or anyone else to attempt an analysis to change the MBHE flow regime without demonstrating they were involving among the best scientists, and had adequate time and money for the process (probably years and millions of dollars).

If someone applied for a permit that would cause the MBHE flow regime values to be changed by less than one percent, it is unlikely anyone could prove even with additional analyses that the change would affect sound environment. Ex. The MBHE 4 Spring value is 433,200 ac-ft during 3 months. We know that scientists could spend a life time and not be able to say that 428,868 ac-ft (a 1% reduction in the regime value) was any less healthy than 433,200.

There is one easy way to provide additional opportunity for flow and that is to use the frequency of occurrences for the period of record in the MBHE report instead of using the achievement guideline frequencies.

Table 22. Recommended achievement guidelines. POR Recommended Occurrence Achievement Guideline

MBHE 4 Historical = 35% Achievement guideline = 35%

MBHE 3 Historical = 58% Achievement guideline = 60%

MBHE 2 Historical = 72% Achievement guideline = 75%

MBHE 1 Historical = 86% Achievement guideline = 90%

Threshold 100%

This is a long way of saying, regarding the MBHE flow regime, that it would be very difficult within the resources available to conduct any meaningful analysis of different environmental flow regimes.

Feasible, Quick Adjustments to Lavaca Bay and Matagorda Bay freshwater inflow recommendations

Round flow regime values to 2 significant figures and state the value is accurate to the ± 0.5 of the place of the lowest significant figure.

Ex. The MBHE 4 spring value is 433,200. Round to 430,000. The lowest significant figure is 3 and it is the ten thousands place. Describe the MBHE 4 spring value as $430,000 \pm 5,000$ which would mean the MBHE 4 spring value could be as low as 425,000 or as high as 435,000. We would be stating that there is not an ecologically significant difference between 425,000 and 433,200.

Suggested Hydrologic Condition:

Reservoir storage in Lake Texana for Lavaca Bay
Highland lakes reservoir storage for Matagorda Bay

Freshwater Inflow Regimes

Lavaca Bay:

Onset Month	Subsistence	Base Low	Base Medium	Base High
Spring Feb-May Long-term ave of 43% of total annual flow	13,500 for 3 consecutive months 13,000-	55,080 for 3 consecutive months 53,000-	127,980 for three consecutive months 122,000-	223, 560 for three consecutive months 210,000-
Fall Aug-Oct Long-term ave of 32% of total annual flow	9,600 for 3 consecutive months 9,100-	39,168 for 3 consecutive months 37,000-	91,080 for 3 consecutive months 86,000-	158,976 for 3 consecutive months 152,000-
Intervening 6 months	6,900 6,600-	28,152 27,000-	65,412 62,000-	114,264 105,000-
% Frequency of occurrence (1940- 2009) ¹	97 92-	86 82-	56 53-	37 35-
450,000 acre-feet in 30 days in any season, once at least every 10 years				

Matagorda Bay:

Onset Month	MBHE 1	MBHE 2	MBHE 3	MBHE 4
Spring Jan-July	114,000 for 3 consecutive months 105,000-	168,700 for 3 consecutive months 162,000-	246,200 for three consecutive months 240,000-	433,200 for three consecutive months 410,000-
Fall Aug-Dec	81,000 for 3 consecutive months 77,000-	119,900 for 3 consecutive months 110,000-	175,000 for 3 consecutive months 170,000-	307,800 for 3 consecutive months 300,000-
Intervening 6 months	105,000 100,000-	155,400 150,000-	226,800 220,000-	399,000 380,000-
% Achievement Guideline ¹	90 86-	75 71-	60 57-	35 33-
Threshold: minimum of 15,000 acre-feet per month (100% of months)				
Long-term Volume and Variability: Average at least 1.4 to 1.5 million acre-feet per year as a long-term average (100%)				

¹ % Frequency of occurrence and % Achievement guidelines are similar but not exactly the same. % frequency of occurrence is based strictly on how frequently these combinations of values occurred. Achievement guidelines

are also based primarily on how frequently these combination of values occurred however there were additional considerations involved in determining achievement guidelines.

Lavaca Bay

Hydrologic Condition: Lake Texana storage for Lavaca Bay

New diversion:

- Is the stream meeting instream flow regime requirements after the downstream-most diversion?
 - If yes, freshwater inflow requirements to the estuary are not applied to the diversion

Thoughts:

- Lake Texana environmental flow pass-through is 346,000 ac-ft. If Lake Texana passes through 346,000 ac-ft in a year, the long-term estimated flow to the bay would be 680,000 ac-ft since Lake Texana releases have been about 51% of the average inflow to the bay.
- Subsistence bay inflow recommendation:
 - 30,000 ac-ft. The long-term average freshwater inflow if just instream base flows are met is 93,000 ac-ft.
- Base low bay recommendation: 120,000 ac-ft:
- Base medium bay recommendation:
 - 280,000 ac-ft. The long-term bay inflow if just instream base flows and seasonal pulse flows are met with one per season pulses counting for a one per season pulse and one two per season pulse is 328,457 ac-ft.
- Base high bay recommendation: 500,000 ac-ft: The long-term bay inflow if instream base flows, seasonal pulse flows, and the annual pulse flow are met. With the annual pulse flow replacing one, one-per-season pulse and one, two-per-season pulse, and one per season pulses counting for a one per season pulse and one two per season pulse. Is 526,000 ac-ft.

Pulse Flow and Channel Maintenance Flow Regime Components: Dave Buzan, Kirk Kennedy, and Bryan Cook (not reviewed by the entire BBEST)

Pulse flow regime:

- Five levels of pulse flow: two pulses per season, one pulse per season, one pulse per year, one pulse per two years, and one pulse per five years
- Implementation suggestion: Pulse starts when flow exceeds the flow trigger and lasts until the volume is passed or the duration transpires, whichever comes first. If flow increases above a higher pulse trigger during a pulse event, the volume and duration of the higher pulse apply. For example, if the first pulse in a season is the one per year pulse flow, that pulse satisfies the requirements for the one per season and one, two per season pulse.

Concho River (p. 2-57)

Example 1: In the winter, the flow rises above 61 cfs and the “2 Pulses per season” trigger is passed. If the flow never rises above 160 cfs which is the “1 Pulse per season” trigger, 61 cfs is allowed to pass until 400 acre-feet passes or 10 days transpire, whichever comes first.

Example 2: In the summer, the flow rises above 32 cfs, the trigger for “2 Pulses per season” and keeps rising past 110 cfs, the trigger for “1 Pulse per season” and keeps rising more until it passes 5,200 cfs, which is the trigger for a “1 Pulse per 2 years”. In this case, 5,200 cfs is allowed to pass until the volume of 23,400 acre-feet is passed or 23 days transpire, whichever comes first. Once this “1 Pulse per 2 years” passes, there is no more requirement for a “1 Pulse per season” or for one of the “2 Pulses per season” in that summer. The requirement for a “1 Pulse per year” in that year is also considered achieved.

Pulse flow recommendation:

- BBEST believes it is important that stakeholders understand pulse flows are important to maintain a sound environment at all the sites.
- Stakeholders communicate to TCEQ that pulse flows are important to maintain a sound environment at all sites.
- Pulse flow regime recommendations which are exceeded by the maximum possible diversion rate of a permit application, may apply to that permit.
- Proposed diversions that are substantially lower than any pulse flow recommendation may not have a pulse flow standard apply to their permits.
- Concho River Ex.
 - If an applicant requests a permit to take water and the applicant’s maximum possible diversion rate is 10 cfs, pulse flow requirements would not apply to the permit because the lowest pulse flow trigger is 32 cfs and the applicant could not divert the entire amount of any pulse flow.

Channel Maintenance Flow

Channel Maintenance Flow regime: “A quantity of flow in addition to flows provided by subsistence, base, pulse, and overbank flows proposed here would be needed to maintain channel morphology. Analysis by the BBEST at 3 sites across the basins (upper Colorado, lower Colorado, and Lavaca) and within the bounds of the analysis in this report indicates a range of average annual flows on the order of 77-93% of the average annual flow from 1940-1998 with the variability characteristic of the period of record maintains existing channel morphology. The specific flow needed to maintain the channel and its ecological functions will need to be determined on a project and site-specific basis.

Channel Maintenance flow recommendation to TCEQ:

- BBEST believes it is important that stakeholders understand channel maintenance flows are important to maintain a sound environment at all the sites.
- Stakeholders communicate to TCEQ that channel maintenance flows are important to maintain a sound environment at all sites.
- If an applicant requests an amount of water, the use of which will reduce the total annual flow by more than 7%, the applicant will evaluate the effect of the requested diversion on channel maintenance downstream of the proposed diversion. Based on that evaluation, the permit may require the applicant to take appropriate action to prevent significant degradation of the channel shape.

Attachment 4
From BBEST

Colorado-Lavaca BBASC Example Application of Flow Chart: Lavaca River at Edna

Step 1: Unappropriated water is available (based on Water Availability Modeling Run 3 analysis for 1940-1996)

- Annual average unappropriated water is 201,454 acre-feet
- 6 of 57 years had zero flows

Step 2: Lake Texana volume proposed by the BBEST as the hydrologic condition and reviewed by the stakeholder WAM subcommittee

Step 3: Hydrologic condition triggers proposed by the BBEST. Base flow condition determined by:

- High base flow protected when Lake Texana full, volume = 170,300 acre-feet
- Medium base flow protected when Lake Texana is less than 170,300 acre-feet and above 132,460 acre-feet (77.78% reservoir full)
- Low base flow protected when Lake Texana is below 132,460 acre-feet and above 93,298 acre-feet (54.78% reservoir full)
- Subsistence flow protected when Lake Texana is below 93,298 acre-feet

Step 4: An off-channel reservoir proposed project that would use a 200 cubic feet per second pump to divert water from the Lavaca River and which would provide up to 15,875 acre-feet

Step 5: BBEST calculated how much water would remain in the stream when considering the BBEST environmental flow regime for the Lavaca River, and the information in steps 2-4.

Step 6: BBEST calculated how frequently the different levels of base flow would occur and compared those frequencies to the HEFR/Hydrological Analysis table frequencies. For detailed comparison, see Kirk Kennedy’s “Summary of Compliance Results With CL BBEST Eflow Recommendations” (5/24/2011).

	Historical Frequency	Frequency (applying steps 2-5)	Difference between frequency of occurrence historically and with project in place
High base flow	39	30	9% less
Medium base flow	55	48	7% less
Low base flow	73	67	6% less

Step 7: Stakeholders ask the BBEST to evaluate whether a sound environment would continue to exist if the base flow frequencies were reduced by the percents shown in the table above.

**Colorado and Lavaca Rivers and Matagorda and Lavaca Bays
Basin and Bay Area Stakeholder Committee (BBASC)**

Thursday, June 30, 2011 at 8:30 a.m.

City of Austin Learning and Research Center, Austin, TX

Meeting Minutes

BBASC Members Present: Chair Patrick Brzozowski, Vice-Chair Myron Hess, Jim Dailey, Ronald Gertson, Carroll Hall, Andy Hennessey (alternate for David Hill), Dan Hall (alternate for Deedy Huffman), Joe King, Frank Lewis, Teresa Lutes, Jack Maloney (alternate for Dick Ottis), Bob Pickens, Caroline Runge, Andrew Sansom, Buddy Treybig, Karen Bondy (Suzanne Zarling)

1) Call to order and introductions

BBASC chair Patrick Brzozowski called the meeting to order.

2) Discussion and agreement on agenda

Patrick gave an overview of the day's agenda. No changes were made.

3) Public comments

None

4) Develop preliminary bay and estuary environmental flow standard recommendations

General Discussion, Bay and Estuary environmental flow standards

Discussion continued from the prior day about bay and estuary flows. Kathy Alexander from TCEQ addressed questions from the BBASC. Addressing questions from the BBASC about how TCEQ determined bay and estuary flows in its rules for the Sabine and Neches BBASC and the Trinity-San Jacinto BBASC she noted: TCEQ used an approach that attempted to balance between the need for bay and estuary environmental flows, and future permitting. These basins had water available to appropriate. TCEQ iterated between volumes & frequencies of environmental flows to leave some water available for appropriation, using WAM Run 3 for current permit values.

- TCEQ backed off on both seasonal flow and frequency, which were problematic to meet. Annual flow and frequency was not really an issue to achieve.
- TCEQ adopted these rules absent a consensus BBASC recommendation.
- A consensus SH recommendation from the Colorado-Lavaca BBASC that is also balanced between environmental and other needs might lead TCEQ to a different approach.
- Strategies may be used to meet environmental flow standards (EFS).
- In response to questions about how TCEQ would analyze whether permit applications met frequency guidelines once environmental flow strategies are in place, she noted that TCEQ would put subsistence base and pulse flows from the EFS into WAM 3, along with the proposed permit. This would result in a number showing water output at the bay. This would be put into another model to see if the bay and estuary target frequencies would be met.

Discussion among the BBASC followed:

- Need to balance BBEST regimes and determine what we can live with
- The TCEQ rules are not necessarily protective of a sound ecological environment. We need to consider what is the best we can do to protect a sound ecological environment consistent with meeting human needs. TCEQ numbers are scary in terms of protecting bay. TCEQ numbers do not reflect role of strategies: it's so low we don't need strategies to achieve it. This is not acceptable for us- we can do better.
- Can strategies be used to raise the number above a number that is adopted in rules?
- Should BBASC set a number as a target to encourage strategies?
- Question to Kathy: How do EFS apply to reuse permits?
 - TCEQ said in the rule preamble that a return flow permit is not a new appropriation. But that issue is pending at the State Office of Administrative Hearings.
- The EFS apply only to new appropriations. But we want standards to be 'aspirational'- so strategies can be developed. We realize the currently healthy bay is from underutilization.
- For there to be strategies, EFS need to be higher than water available for appropriation. Consider a two-step approach that addresses:
 - Where we can to be (aspirational, for strategies)
 - Allows new permits if they do not make conditions worse than WAM 3
 - Kathy: Be very clear about such intent! Provide a recommendation of what proposed rule language would say. BBASC recommendation would have great weight
- How does this work with regional water planning?

Kathy: Standards only apply to a new appropriation of water. Using existing permits, even with amendments, isn't considered a 'new appropriation,' and standards don't apply. But TCEQ can put flow restrictions on amendments. Amendments of existing permits may be subject to new flow requirements (and existing environmental analysis) when coming in for amendment. Examples

 - Moving existing diversion point 100 ft.- not likely to require
 - Moving 27 miles upstream – May require
 - Moving from tributary to mainstream is changing source of water so subject to instream flow requirements
- Why do we need standard high enough to "motivate" strategies?
 - If standards are too low, not 'balanced' and strategies are not necessary under statute, which talks about strategies to meet standards
 - Can help get money and mechanism to achieve standards if legally required or recognized
 - Interest in both protecting frequency of flows and developing strategies

Matagorda Bay Environmental Flow Standards

Myron Hess made the following proposal (**Attachment 1**):

- Use the BBEST report (Table 2.7.4, page 2-234) as the starting point.
- Set frequency standards (percentage achievement guidelines/frequency of occurrence is this attainment frequency) that are protective of the bay. These become part of the environmental flow standards, and are goals.

- But say a new permit will be weighed against test of not making the bay and estuary worse than the current WAM 3 conditions.

Discussion

- Can we do 2 lines for attainment frequency in the rule -
 - a line based on WAM 3 for permitting (WAM 3 line), which could move upward as strategies are implemented; and
 - a line for strategies (strategies line) based on BBEST recommendation.

This will address the following concerns:

- If there is only one line (e.g. the BBEST recommendation), the WAM 3 standard will be hidden in the permitting process
- Might help with regional water planning
- Might help with adaptive management
- What should frequency be for the strategy line?
There was concern about how the strategy line would impact regional water planning if it was set at the more aspirational, BBEST number, since many proposed water supply projects could not meet such a target.
 - TWDB will require a regional water planning group to adhere to what TCEQ requires – e.g. the permitting standard, [reported by Ron Gertson based on a conversation with Carolyn Brittin].
- Discussion about using the attainment frequencies from the 2020 regional plan as a test for a new permit.
 - Not sure if protective
 - BBEST hasn't evaluated. Just thrown out to show expectations
 - Has return flows
 - Would be no chance for a new permit
- Are these targets, as opposed to absolutes?
A: Permits won't have the condition in them; it's a test to see if permit issues.

In the report

- note that bays (would be different/are in peril) and we must find strategies to help
- for operational purposes, would like the ability to have small departures if a permittee misses a season

CONSENSUS.

The BBASC agreed on the following Matagorda Bay freshwater inflow regime:

Use the BBEST regime numbers found in Table 2.7.4 with the following exceptions:

- For achievement guidelines, adopt the Hess proposal in concept for Matagorda Bay with 2 lines:
 - a strategy achievement guideline using BBEST regime numbers,
 - a new permitting achievement guideline using WAM 3 numbers
- Use WAM 3 numbers for threshold
- No decision made on long-term volume and variability: discussion tabled

Members noted they may need to run this proposal through their organizations

Lavaca Bay Environmental Standards

Could the approach used for Matagorda Bay be used for Lavaca Bay?

CONSENSUS:

Following the structure of the proposal for Matagorda Bay, the BBASC agreed on the following Lavaca Bay freshwater inflow regime:

- Adopt the BBEST recommendations in Table 2.8.8
- For percentage frequency occurrence of flow, use two lines:
 - the BBEST recommendation at table 2.8.9
 - WAM 3 with Texana 2 in the model.
- Include the BBEST recommended high flow pulse described as 450,000 acre-feet in 30 days in any season, once at least every 10 years (found on page 2-250 of the BBEST Report). Clarify in the BBASC report that this is a target for 10 years on an average period of record, and is flexible.

East Matagorda Bay (EMB) Environmental Flow Standards

- Concern on EMB were discussed as relating to a reduction of circulation of fresh water inflows, the subsequent loss of oysters, and further concern that oyster loss will result in loss of larger species
- Work plan reflects possible new projects or studies to assist EMB
- What to do in the BBASC report?
 - Draft a statement
- BBEST struggled with EMB because there are no gauged flows and ungauged flows could be caught in the intercoastal waterway
- Recognition that EMB is in peril and something may need to be done, but there is not sufficient information to determine what to do
- Concern- maintaining current levels of inflows would impair permits upriver that result in irrigation return flows
- Desire to be more specific about permitting in coastal basins

CONSENSUS:

A proposal was brought back after a break, and the BBASC agreed on the following recommendation for EMB:

Strategies to maintain and increase freshwater inflows should be pursued to support a sound ecological environment within East Matagorda Bay

5) Riverine Environmental Flow Standard Recommendations

San Saba at San Saba gage: subsistence

The group considered the subsistence flow level for the San Saba at San Saba gage, which was postponed from the last meeting to give Caroline Runge time to get more information.

CONSENSUS: The group reached consensus to use the Q95 with implementation as proposed by BBEST for the subsistence numbers at this gage.

Channel maintenance

Myron Hess provided a proposal on how to implement the BBEST recommendation (**Attachment 2**). Discussion and questions followed about the proposal, and possible channel maintenance recommendations.

- What would the study look like under the proposal?
 - Effect of the permit on the immediate area/reach downstream. Sediment yield and effective discharge
 - Study would be based on modeling
- The size of the exemption was discussed, both from a perspective of it excluding permits that should be analyzed, but also including some that don't need to be analyzed:
 - Small permits might exceed the 15% impact which exempts applications from the channel maintenance conducting a channel maintenance study. Do we want them exempt?
 - Are channel maintenance flows important on small, intermittent streams?
A: They are shaped more by large flows

Members suggested ideas about the size of the threshold for the study for small permits:

- 200 af/yr (based on D&L exemption)
- <.5% of average annual volume (from Nolan Raphael- TWDB)
- 8 cfs diversion rate
- Study cost:
 - A study would cost \$10,000- for a small and straight-forward study using existing data – to \$25,000 (Nolan Raphael)
 - Is this too high a bar for some small permittees?
- Does TCEQ current permit process consider channel maintenance, geomorphology or include permit conditions based on channel morphology?
Kathy: Not generally. In the other rules, TCEQ used a 10,000 af cut-off:
 - >10,000 af, pulse flow and all flow requirements apply
 - < 10,000 af, only subsistence and base flow applies
 - Based on spreads of size of water rights.
- Ideas for the BBASC recommendation:
 - State that channel maintenance flows are important for geomorphology
 - Do we need a standard? BBEST says important. Hard to analyze
 - BBASC seeking to find a way to exempt small permits
 - Maintaining base and pulse does not necessarily provide adequate channel maintenance

CONSENSUS: The BBASC agreed by consensus that it wanted to recognize the need for channel maintenance flows.

- Remaining questions included whether to include an exemption by size as well as percentage.

To consider for next meeting relating to channel maintenance flow:

- Information: The BBASC sought additional support from the BBEST on using WAM 3 v. historical flows for comparing the permit application impact on channel maintenance flow

- A metric to fill in the first blank in Myron’s proposal (which identifies large projects that will be further analyzed for impact on pulse flows): Acre-feet? cfs? percentage?
- Action: For next meeting, revise the proposed channel maintenance flow recommendation, working with BBEST. Who: Myron, Patrick, Karen, Carroll, Dan Opdyke, Teresa

Review of Pedernales Project

Kirk Kennedy of the BBEST presented information on a proposed project that he had analyzed on the Pedernales River, to show the impacts of the BBEST environmental regime on a theoretical aquifer storage and recovery permit (ASR). (**Attachment 3**). This was done to assist the BBASC in doing its balancing analysis between environmental flow needs and other needs. Summaries of the presentation and responses to BBASC follow:

- Hydrologic triggers for environmental flow were based on Highland Lakes’ storage. “trigger in which engaged” is the maximum value for the trigger
- Analysis allows BBASC to get an idea on how pulse requirements will impact a project
- Showed w/ or w/o high flow pulse. There was low incremental difference- largest incremental difference is between no environmental flows and full environmental flows.
- Whole answer is constrained in this fact situation by the fact that you will go 10 years initially without available surface water
- Noted close range in numbers
- Q: How applicable is this project basin-wide in the Colorado?
A: Quite applicable because of the low level of unappropriated flows throughout the Colorado

Pulse flow standards: one/two-year and one/five year

Myron Hess reviewed his recommendation on pulse flows, passed out at the meeting of June 16. (**Attachment 4**). He noted that permit applications would be reviewed as to whether it would impair pulse standards, and only then would TCEQ impose a pulse flow condition. He noted that to control TCEQ workload, he recommended a minimum size for even considering whether pulse flows are analyzed. BBASC comments and questions:

- The plan overall is not of concern, but some concern about duration of pulses. Recognize that much water used comes from pulses- is there a more valid number for duration?
- Why does the BBEST use an upper bound for the Lavaca but a lower bound for the Lower Colorado?
A: Dan Opdyke and Bryan Cook explained that the MBHE for the Lower Colorado was very different in how it required flows to be met than the analysis for the Lavaca. The MBHE requires that the pulse flows be met every day of a shorter duration time period. The HEFR, used for the Lavaca, requires that either the volume or duration of the pulse flow must be met, whichever is achieved first. There also were differences in timing.
- Report: BBASC Report should be very explicit that the Lavaca requires volume or duration

- How do we put in management for high pulses?
 - It is attainment over historical period. If more than a 10% threshold, permit may need provisions to avoid capturing highest pulses.
 - To impact these big flows, we're probably talking about an on-channel reservoir

Decisions on these pulse flows will be deferred to the next pulse agenda.

Lower Colorado at Bastrop, Columbus and Wharton

The BBASC held a general discussion on the report numbers for the Lower Colorado. It was noted that channel maintenance flow in the Lower Colorado is different from the rest of the Colorado. It is more like high flow pulse in HEFR:

- The Lower Colorado's base dry is a little higher than the base low in the Upper Colorado. Its base average is a little higher than Upper Colorado base medium
- These are not HEFR derived, but based on protecting certain levels of actual physical habitat
- Intended to be applied a little differently and with different levels of frequency engagement

Bryan Cook noted that the LSWP report said this regime is protective of the river

CONSENSUS:

The BBASC agreed to adopt the BBEST recommendations for the Lower Colorado at Bastrop, Columbus and Wharton gages at the subsistence, base dry, and base average figures.

Future items on Lower Colorado gages:

Action: LCRA will draft proposed language on channel maintenance and pulses for the Lower Colorado, and send it to the BBASC by July 18

Report: Will report of Lower Colorado look different because of its managed rather than free-flowing nature? How will the recommendations be set up?

Information: Bob Pickens asked about information that would indicate how much releases and return flow contribute to environmental flow downstream, noting that LCRA actions impacting those flows could greatly impact their ability to meet environmental flow requirements. There was some discussion of whether this information would assist the BBASC making decisions. Do we need strategies, permit amendments to address these issues?

Lavaca @ Edna

The BBASC explored the potential for simplifying the requirements at this gage by making them similar to Lower Colorado. It was noted that the Lower Colorado is based on field data. The numbers for the Lavaca use different data and would need to be rerun

CONSENSUS:

The BBASC agreed to accept the BBEST recommendations at the Lavaca River at Edna:

- through the base high recommendation; and
- with Q95 values using BBEST implementation for subsistence.

Future items for the Lavaca at Edna:

- All pulse flows: Patrick to develop a proposal to distribute to BBASC before next meeting.

Hydrologic Conditions for Triggers

The BBEST has proposed in Chapter 6 that the BBASC might consider using hydrologic conditions to determine when a gage is at various base flow conditions, for the purpose of making recommendations to TCEQ for implementation of the base-flow levels of the environmental flow standards.

Action items:

- Caroline, Karen and Kirk will send out a proposal on triggers for the Upper Colorado to the BBASC by July 18.
 - Discussion included whether to consider lake levels for streams like Pedernales and Llano near Highland Lakes
 - Kirk suggested a possible approach: Use historic gage flow for 12 month periods. Instead of lake levels, you have a volume. At the beginning of a season, look at the 12 month cumulative flow. This smoothes out hydrograph
- Triggers: Get one package each for Upper Colorado, Lower Colorado, and Lavaca

6) Report

Joe King noted the following on behalf of the Report Subcommittee relating to drafting of the BBASC report

- He provided a refined table of contents for the Colorado-Lavaca BBASC, and also a draft table of contents for the Guadalupe-San Antonio BBASC (**Attachment 5**)
- Joe will start writing the bay FWI recommendations and the current decisions on riverine components. Will provide a draft to the report committee on Monday, July 11, and to the BBASC on Monday, July 18.
- Caroline will begin drafting strategies section, having received some input from the BBASC
- Steve Box will begin drafting the section on the BBEST overview

7) Strategies

The BBASC talked briefly about strategies, noting there could be both general strategies and site-specific strategies. A few ideas were generated in a brief brainstorm session, but were not evaluated:

- No out of basin transfers?
- Water rights which implement conservation would not be subject to cancellation?
- \$ for off-channel reservoirs to supply water for bays and estuaries
- Dedication of return flow

Include strategies in work plan

8) Public comments

None.

9) Meeting Wrap-up

BBASC Schedule:

July: Tested availability of July 20/21st- 12/13 members indicated available. E-mail confirmation about quorum will be sent to all BBASC members.

- Finish decisions
- Channel maintenance
- Pulse
- Finish Lower Colorado and Lavaca gages
- Finalize bays:
 - long-term averages - variability for Matagorda.
 - Threshold- need #
- Strategies: Brainstorm
- Hydrologic conditions as triggers
- Balancing: off-channel reservoir and aquifer storage & recovery projects
- Report language

Aug 3: Working on words/nuances

Aug 18: Final adoption

ACTION ITEM	WHO	WHEN
Provide items due on July 18 to Gregg Easley who will send to BBASC		
Write a summary of hydrologic triggers (existing) for the four streams related to Lake Texana; send to BBASC	Patrick	July 18
Work plan subcommittee prioritize items on work plan draft into high, medium and low categories	Work plan subcommittee	July 20
Send comments and questions on work plan to BBEST ; Send suggested priorities on work plan items (high, medium, low) to BBEST	BBASC members	NOTE: This may be deferred until after the July meeting, but would be due by July 25
Provide achievement guidelines/attainment frequency numbers for WAM 3 (threshold numbers)	Kirk	July 18
Long term variability in WAM for Matagorda Bay	Kirk	July 18
Facilitator notes circulated to BBASC	Facilitators	July 11
Inform organizations/constituents of any decisions or potential decisions for which you will need their approval	BBASC members	Ongoing and timely
Channel maintenance: circulate recommendation before next meeting	Myron, Patrick, Teresa, Karen, Carroll, Dan O.	July 18
LNRA recommendations on remaining components of an environmental flow standard for Lavaca at Edna	Patrick	July 18
LCRA proposal on pulse and channel maintenance	Karen/Suzanne	July 18
Analysis using Highland Lakes with two base flow triggers – for consideration by Karen B and Carolyn R in making a proposal to BBASC (see below)	Kirk	July 18
Proposed hydrologic triggers for Upper Colorado	Caroline, Karen, Kirk	July 18
Report drafting <ul style="list-style-type: none"> ▪ Joe will start writing the bay FWI recommendations and current decisions on riverine components. ▪ Caroline will begin drafting strategies section ▪ Steve Box will begin drafting BBEST overview section 	Joe, Caroline, Steve	Drafts to report committee: July 11; Drafts to BBASC: July 18

Report Ideas, Parking Lot

Report Ideas (cumulative from all meetings)

- The BBASC discussed that the charts from presentations on 5-25 showing unappropriated water available with and without EFR might be useful in the report to show how the BBASC gets to its recommendations.
- For Matagorda Bay:
 - note that bays (would be different/are in peril) and we must find strategies to help
 - for operational purposes, would like the ability to have small departures if a permittee misses a season
- BBASC Report - Lavaca pulse flows -- should be very explicit that the Lavaca requires volume or duration
- Will report of Lower Colorado look different because of its managed rather than free-flowing nature? How will the recommendations be set up?

Parking Lot

- Matagorda Bay long-term volume and variability regime element (Table 2.7.4): discussion tabled (added July 29/30)
- Understanding the mass balance of the Colorado systems – currently – understanding impacts of return flows, delivery commitments. How much water is available to meet environmental needs
- Discussion item for report: value of return flows – positive and negative
- Permits to which pulse flows would apply
- Hydrologic conditions as triggers
- How to implement subsistence flow

CONCEPTUAL PROPOSAL FOR MATAGORDA BAY INFLOWS

- Use Table 2.7.4 on page 2-234 of BBEST report as the starting point for defining the standard.
- For an application to which the standard applies, the application may not reduce the frequency of compliance for the listed monthly, seasonal, or annual volumes when compared to baseline conditions.
- Baseline conditions are based on WAM Run 3 but with adjustments to account for any strategies implemented to benefit environmental flows.

Possible Rule Language:

A water right application to which this Subchapter applies that seeks to increase the amount of water authorized to be stored, taken or diverted shall not contribute to an impairment of any criterion listed in Table 2.7.4. For purposes of this subsection, an application would contribute to an impairment if the authorization, subject to any applicable special conditions and considered in combination with any prior authorizations subject to this Subchapter, when modeled over the period of record with all rights at full authorized use is predicted to decrease the frequency of compliance for any listed monthly, seasonal, or annual volume in Table 2.7.4 below the frequency of compliance predicted under baseline conditions. For purposes of this Subsection, baseline conditions refers to modeling that includes only permits as they existed at the time of adoption of this Subsection at full authorized use but with adjustments to reflect any strategies that have been implemented to benefit environmental flows.

CHANNEL MAINTENANCE FLOW PROTECTION

BASIC CONCEPT:

- Apply to applications to divert or impound more than _____ acre-feet/year
- Using the WAM, compare predicted annual average flows with requested permit and all existing permits under WAM Run 3 scenario (full use and no return flows) to historical annual average flows for 1940-1998.
- If the predicted average annual flow under WAM Run 3 is less than 85% of historical average annual flow then permit is presumed to have potential to adversely affect channel morphology. If predicted flow is equal to or greater than 85% of historical average flow than no further analysis is needed on this issue.
- If application presumed to have potential to adversely affect, applicant must implement adequate studies to assess effect on annual sediment yield and effective discharge.
- Based on those studies, TCEQ to include any additional permit conditions, beyond those otherwise required by flow standards, needed to avoid adverse changes to channel morphology.

POSSIBLE RULE LANGUAGE:

A water right application to which this Subchapter applies that seeks authorization to divert or impound more than _____ acre-feet per year shall not result in a significant impairment of flows needed to maintain channel morphology. In order to assess the potential for significant impairment, a water right application to which this Subchapter applies that seeks authorization to divert or impound more than _____ acre-feet per year shall include an assessment, based on use of the WAM for the period of 1940-1998, of potential impact on average annual flow. If the average annual flow as predicted to occur with the authorization, subject to any anticipated special conditions and considered in combination with all prior water right authorizations at their full authorized diversions and no return flows, would result in a reduction of average annual flow at a location a reasonable distance downstream of the diversion or impoundment point to less than 85% of the average annual flow as recorded for that location for the period from 1940-1998, then the authorization shall be considered potentially to result in a significant impairment of flows needed to maintain channel morphology and further analysis by the applicant shall be required. Such further analysis shall include an assessment of the effect of the proposed authorization on annual sediment yield and effective discharge. Based on that further analysis, the Commission shall include in any authorization granted any additional special conditions, beyond those otherwise provided for in this Subchapter, that are appropriate to avoid causing significant adverse changes in channel morphology.

PEDERNALES NEAR JOHNSON CITY SUMMARY OF RESULTS FOR BBEST APPLICATION OF ASR PROJECT					
INPUT PARAMETERS					
		SCENARIO			
		1-NO EFLOW	2-FULL BBEST EFLOW	3-BBEST BUT NO HFPS	4-BBEST WITH SEASONAL PULSES ONLY
(1)	RIVER PUMP RATE INTO TREATMENT RESERVOIR (OCR)				
(2)	SIZE OF TREATMENT RESERVOIR		1,000 CFS (60,000 AC-FT/MONTH)		
(3)	PUMP RATE FROM TREATMENT RESERVOIR (used to meet project demand then inject the balance)		10,000 ACRE-FEET		
(4)	AVAILABLE SPACE IN AQUIFER TO STORE WATER		50 CFS (3,016 AC-FT/MONTH or 36,198 AC-FT/YR)		
			100,000 ACRE-FEET		
SIMULATION RESULTS					
		1-NO EFLOW	2-FULL BBEST EFLOW	3-BBEST BUT NO HFPS	4-BBEST WITH SEASONAL PULSES ONLY
(5)	Beginning Storage in Aquifer	35,000	52,000	42,000	46,600
(6)	Diversions from River into OCR (1000 cfs diversion trying to keep the treatment reservoir full)				
(7)	Maximum Annual Diversion (ac-ft/yr)	31,222	30,342	30,342	30,342
(8)	Average Annual Diversion (ac-ft/yr)	9,213	8,284	8,646	8,378
(9)	Minimum Annual Diversion (ac-ft/yr)	0	0	0	0
(10)	Diversions from OCR to Meet Demand then Inject Balance into ASR (50 cfs diversion from treatment reservoir to be used or injected)				
(11)	Annual Demand from OCR (ac-ft/yr)	36,198	36,198	36,198	36,198
(12)	Percent of Years Full Demand Met	1.7%	0.0%	0.0%	0.0%
(13)	Percent of Years at least 75% of Full Annual Demand Met	11.9%	8.5%	8.5%	8.5%
(14)	Percent of Months Full Monthly Demand Met	23.7%	20.6%	21.2%	20.9%
(15)	Percent of Months any Water Pumped	36.198	26.1%	27.0%	26.4%
(16)	Maximum Annual Diversion (ac-ft/yr)	9,383	34,862	36,112	34,862
(17)	Average Annual Diversion (ac-ft/yr)	0	8,454	8,616	8,547
(18)	Minimum Annual Diversion (ac-ft/yr)	9,560	0	0	0
(19)	Firm Yield of ASR Project (af4/yr)	13.2	8,900	9,100	8,900
(20)	Firm Yield of ASR Project (cfs)	36.8	12.3	12.6	12.3
(21)	Maximum Rate Water Injected into ASR (cfs)	351	314	221	37.7
(22)	Minimum Storage in ASR (ac-ft)	96,569	99,792	99,516	407
(23)	Maximum Storage in ASR (ac-ft)				96,885

ASR = Aquifer Storage and Recovery ac-ft = acre-feet

OCR = Off-Channel Reservoir

SUMMARY OF COMPLIANCE RESULTS WITH CL BBEST EFLOW RECOMMENDATIONS							
PEDERNALES NEAR JOHNSON CITY SITE FOR VARIOUS BBASC ANALYSES							
PEDERNALES ASR PROJECT (SUBSISTENCE CHANGED TO Q85)							
6/28/2011							
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
FIRM YIELD (AF/Y)	NA	NO PROJECT	NA	9,550	8,900	9,100	8,900
PROJECT IN / OUT	WITH PROJECT IN PLACE (RUN NUMBER - SEE BELOW)						
EFLOW COMPONENT	HISTORICAL	WAM RUN3 USED FOR BBEST REPORT	WAM RUN3 USED FOR PROJECT	RUN 1	RUN 2	RUN 3	RUN 4
	(4) NON-PULSE FLOWS (PERCENT OF TIME FLOW EQUALS OR EXCEEDS BBEST RECOMMENDATIONS.						
(5) SUBSISTENCE	92%	na (3)	93%	92%	93%	93%	93%
(6) BASE LOW	72%	71%	71%	69%	71%	71%	71%
(7) BASE MEDIUM	55%	54%	54%	51%	54%	54%	54%
(8) BASE HIGH	37%	37%	37%	34%	36%	35%	36%
(9) PULSE FLOWS (NUMBER OF QUALIFYING PULSE EVENTS PASSED.							
(10) 2PER SEASON (HFP1)	92	93	93	88	90	87	91
(11) 1PER SEASON (HFP2)	46	46	45	44	45	44	45
(12) 1 PER YEAR (HFP3)	46	46	46	46	46	46	46
(13) 1 PER 2 YEARS (HFP4)	27	27	24	24	24	24	24
(14) 1 PER 5 YEARS (HFP5)	11	10	10	10	10	10	10

RUN NUMBER	DESCRIPTION OF EFLOW REQUIREMENTS IMPOSED ON PROJECT
1	NO EFLOW REQUIREMENTS.
2	CL BBEST RECOMMENDATIONS.
3	CL BBEST RECOMMENDATIONS BUT NONE OF THE HIGH FLOW PULSE RECOMMENDATIONS IMPOSED.
4	CL BBEST RECOMMENDATIONS BUT ONLY SEASONAL PULSES IMPOSED.

NOTE 1: ATTAINMENT FREQUENCIES FOR SEASONAL RECOMMENDATIONS (ALL NON-PULSE RECOMMENDATIONS AND FIRST 2 PULSE RECOMMENDATIONS) SUMMARIZED BY AVERAGING RESULTS FOR ALL FOUR SEASONS INTO SINGLE VALUE FOR ALL COMPARISONS.

NOTE 2: INFORMATION IN COLUMNS 2 AND 3 ARE REPORTED IN BBEST REPORT (PAGES 5-6 AND 5-10). NOTE THAT SUBSISTENCE COMPLIANCE FROM BBEST REPORT NOT STATED BECAUSE BBEST REPORT STATISTICS WERE NOT BASED ON Q85 VALUE. INFORMATION IN COLUMN 4 WAS DETERMINED USING A MORE RECENT VERSION OF THE TCEO RUN3 WAM MODEL AND WITH LCRA'S PERMIT 5731 INCLUDED.

NOTE 3: ALL BBEST SCENARIOS (COLUMNS 6, 7, 8) USE HIGHLAND LAKES SYSTEM STORAGE AND BBEST PROPOSED IMPLEMENTATION PLAN AS SIGNAL TO DESIGNATE WHICH NON-PULSE LEVEL OF FLOW IS REQUIRED TO BE PASSING PROJECT LOCATION BEFORE DIVERSION CAN OCCUR. PULSE RECOMMENDATIONS ARE APPLIED AT TIMES FOR ALL CONDITIONS.

ONE-PER-TWO-YEAR AND ONE-PER-FIVE-YEAR PULSE FLOW STANDARDS
IMPLEMENTATION

Basic concepts:

1. Applies only to applications for right to divert or impound at least 10% of volume of smallest applicable one-per-two-year pulse flow standard.
2. Except to the extent required under step 6, permits to which this provision applies would not include a condition spelling out the one-per-two-year or one-per-five-year pulse flow requirement.
3. Applications to which this provision applies would be evaluated to see if an applicable one-per-two-year or one-per-five-year pulse flow requirement would be impaired.
4. A one-per-two-year or one-per-five-year pulse flow requirement would be considered impaired if the permit, in combination with other permits subject to the standards, would reduce the frequency of attainment of an applicable one-per-two-year or one-per-five-year pulse flow by 10% or more or would reduce the average volume of protected pulses by 10% or more.
5. The baseline for comparison would be permits in effect at the time of adoption of the standards and the analysis would consider the period of record.
6. If an impairment is indicated, any permit issued would be adjusted/conditioned in an appropriate manner to avoid the impairment.

Possible rule language to implement the concepts:

A water right application to which this Subchapter applies that seeks authorization to divert or impound in a calendar year more than 10% of the volume of an applicable one-per-two-year pulse flow standard shall not result in impairment of an applicable one-per-two-year or one-per-five-year pulse flow standard set out in Figure _____ [*this would be a table with the 1-per-2-year and 1-per-5-year pulse flows for each gage*]. For purposes of this subsection, an impairment of an applicable one-per-two-year or one-per-five-year pulse flow standard would result if, when modeled over the applicable period-of-record, the authorization, subject to any applicable special conditions and considered in combination with other authorizations subject to this Subchapter, is predicted to result in a reduction of ten percent or more in either the frequency of attainment with, or the average volume of pulses protected by, the relevant pulse flow standard when compared to the baseline predicted to occur under permits as they existed at the time of adoption of this subsection.

Example Application of Modeling Approach for One-Per-Two-Year
and One-Per-Five-Year Pulse Flow Standards

Llano River at Llano

1 Pulse Per 2 Years: Trigger = 17,400 cfs
Volume = 89,300 af
Duration= 22 days

1 Pulse Per 5 Years Trigger = 41,100 cfs
Volume = 214,000 af
Duration= 27 days

Application of concepts:

1. 10% of 89,300 af = 8,930 af, so would apply only to application to divert or impound at least 8,930 af/yr; smaller applications need not receive assessment for this component.
2. For applications to which the provision applies, a modeling assessment would be undertaken and impairment found if:
 - a. Frequency of attainment of either the 1-per-2-year or 1-per-5-year pulse flow standard would be reduced by 10% or more compared to permits in effect when standards adopted; or
 - b. Average volume of pulses protected by either the 1-per-2-year or 1-per-5-year pulse flow standard would be reduced by 10% or more compared to permits in effect when standards adopted.
3. If no impairment found, when considering cumulative impacts of permits subject to the standards, permit could be issued without permit conditions addressing the 1-per-2-year or 1-per-5-year pulse flow standards.
4. If impairment is found, when considering cumulative impacts of permits subject to the standards, permit could only be issued with the inclusion of appropriate conditions to achieve compliance with the 1-per-2-year and 1-per-5-year pulse flow standards.

*Guadalupe, San Antonio, Mission, and Aransas Rivers and
Mission, Copano, Aransas, and San Antonio Bays
Basin and Bay Area Stakeholders Committee (BBASC)*

Recommendations Report

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 - 1.1 BBASC Members
 - 1.2 Charge of the Basin and Bay Area Stakeholders Committee
 - 1.3 Introduction

- 2 Resources of Interest within the Basin and Bay Area** (narrative of what is important within each particular area)
 - 2.1 Guadalupe River Basin
 - 2.2 San Antonio River Basin
 - 2.3 San Antonio-Nueces Coastal Basin
 - 2.4 San Antonio Bay
 - 2.5 Mission, Copano, and Aransas Bays

- 3 Development of BBASC Recommendations**
 - 3.1 General Comments on the Guadalupe, San Antonio, Mission, and Aransas Rivers and Mission, Copano, Aransas, and San Antonio Bays Basin and Bay Expert Science Team Recommendations Report (comments upon reading and understanding of the BBEST report)
 - 3.1.1 Comments from BBASC Members (Individual likes and dislikes discussion from the last meeting and other comments made in previous meetings)
 - 3.1.1.1 Sound Ecological Environment
 - 3.1.1.2 Instream Flow Recommendations of the BBEST
 - 3.1.1.3 Estuarine Inflow Recommendations of the BBEST
 - 3.1.2 Comments from Science Advisory Committee (summary of comments made by the SAC)
 - 3.1.3 Comments from Texas Parks and Wildlife Department (summary of TPWD's letter)
 - 3.2 Consideration of Present and Future Water Needs Related to Water Supply Planning (narrative of human/other needs from past reports)
 - 3.2.1 Regional Economies Dependent on Water
 - 3.2.2 Regional Water Demand Projections
 - 3.2.3 Regional Water Plan Strategies and Costs
 - 3.2.4 Trinity Aquifer and Upper Guadalupe River Streamflow
 - 3.2.5 Effects of Climate Change on Streamflow and Freshwater Inflow
 - 3.2.6 Effects of Invasive Plant Species on Streamflow

- 3.3 **Analyses Performed for the BBASC** (the write up of the analyses HDR/BW/KRC performed for the BBASC. It will incorporate all the various simulations, tables, graphics that have been presented)
 - 3.3.1 **Freshwater Inflow Scenario Analyses**
 - 3.3.2 **Example Firm Yield Water Supply Projects¹**
 - 3.3.2.1 **BBEST Recommendations**
 - 3.3.2.2 **Increasing of Subsistence Flows (Q95 and Draft SB2 Values)**
 - 3.3.2.3 **Application of the Structure of TCEQ Adopted Rules from East Texas Basins** (including a narrative of what TCEQ decided for the East Texas Basins and application of structure to our basin)
 - 3.3.3 **Example Run-of-River Water Supply Permits**
 - 3.3.3.1 **Water Available for Diversion and Resulting Flow Regime**
 - 3.3.3.2 **Ecological Assessments (Instream and Estuary)**
 - 3.4 **Texas Instream Flow Studies (SB2) Interim Report** (a summary of the latest SB2 interim report)
- 4 Recommendations Regarding Environmental Flow Standards**
- 4.1 **Environmental Flow Standards for Instream Measurement Points** (details of the BBASC recommendations for the 16 instream flow sites. It will include narrative with HEFR-type tables of flows. Where the BBEST recommendation is also the BBASC recommendation, the BBEST HEFR table will be presented with text stating that the BBASC recommendation is identical to the BBEST recommendation [see page 4]. Where the BBASC recommendation differs from the BBEST recommendation, both HEFR-type tables will be presented with a highlight showing the difference and a narrative describing that difference [see page 5])
 - 4.1.1 **Environmental Flow Standards**
 - 4.1.2 **Schedule of Flow Quantities by Gauge**
 - 4.1.2.1 **Subsistence Flows**
 - 4.1.2.2 **Base Flows**
 - 4.1.2.3 **High Flow Pulses**
 - 4.1.2.4 **Overbank Flows**
 - 4.1.2.5 **Hydrologic Conditions**
 - 4.2 **Environmental Flow Standards for the Guadalupe and Mission-Aransas Estuaries** (details of the BBASC recommendations for the estuaries. Again, descriptions will include the differences/similarities between the BBEST and BBASC recommendations)
 - 4.1.3.1 **Addressing Seasonal Inflow Estuary Recommendations G1 and G2 (Spring and Summer)**
 - 4.1.3.2 **Riverine Instream Flow Recommendations for Remaining Months**
 - 4.3 **Water Right Permit Conditions** (this section may be where BBASC can expand upon eflow standard recommendations addressing permit conditions that were specific recommendations and/or comments shared in the BBEST report or other recommendations directly from BBASC.)
 - 4.2.1 **50% Rule**

¹ Includes Firm Yield and Resulting Flow Regime, Unit Cost of Firm Water Supply, and Ecological Assessments (Instream and Estuary) Results.

- 4.2.2 Environmental Flow Recommendations for On-Channel Reservoirs and Run-of-River Diversions
- 4.2.3 Geomorphology Overlay
- 4.4 Other BBASC Flow Recommendations
- 5 Recommendations Regarding Strategies to Meet Environmental Flow Standards**
 - 5.1 Strategies Addressing Environmental Flow Standards under Baseline Conditions (Potential Near-term Strategies that could affect the baseline – full permits being utilized)
 - 5.1.1 Dry Year Options
 - 5.1.2 Dedication of Wastewater Return Flows from Current Permits
 - 5.1.3 Donation/Purchase/Lease of Under Utilized Water Rights
 - 5.1.4 Others (i.e., Voluntary Operational Changes to Existing Diversions)
 - 5.2 Strategies Addressing Future Permit Applications (strategies that could be implemented with projects to help achieve the environmental flow recommendations)
 - 5.2.1 Additional Storage
 - 5.2.2 Permit Conditions to Operations
 - 5.3 Status of Workplan Report (a short summary of the workplan development and process)

Appendices

Decisions of CLBBASC as of June 30, 2011 (consensus unless noted otherwise)

April 27

Authority of WAM subcommittee to analyze numbers:

The WAM subcommittee should put gauges into groups, to analyze in different ways depending on conditions. The analysis should be presented in a way the BBASC can understand.

May 13

Goal statement for the Colorado and Lavaca Rivers and Matagorda and Lavaca Bays BBASC:

Develop implementable recommendations that provide for a sound ecological environment in the basins, including the rivers, bays and estuaries, balanced with sufficient water for other beneficial uses and which include an adaptive management process that provides for future sustainability.

May 25

Preliminary EFS for various gauges: See attached chart of gauges reflecting agreements reached beginning at the March 25 meeting.

June 16

Work plan format:

The members agreed that, at this point, the Work Plan could be included at the end of the report in a format that would allow it to stand alone, if needed.

Substituting Q95 flow for 7Q2 flow:

For the gages with 7Q2 as the subsistence flow component (with the exception of the San Saba gage at San Saba) the BBASC would adopt the Q95 flow with the BBEST implementation recommendations.

- San Saba gage to be considered later.
- See chart attached for BBEST implementation recommendations.

June 30

Matagorda Bay freshwater inflow regime

Use the BBEST regime numbers found in Table 2.7.4 with the following exceptions:

- For achievement guidelines, adopt the Hess proposal in concept for Matagorda Bay with 2 lines:
 - a strategy achievement guideline using BBEST regime numbers,
 - a new permitting achievement guideline using WAM 3 numbers
- Use WAM 3 numbers for threshold
- No decision made on long-term volume and variability: discussion tabled

Members noted they may need to run this proposal through their organizations

June 30 (con't)

Lavaca Bay freshwater inflow regime

- Adopt the BBEST recommendations in Table 2.8.8
- For percentage frequency occurrence of flow, use two lines:
 - the BBEST recommendation at table 2.8.9
 - WAM 3 with Texana 2 in the model.

Include the BBEST recommended high flow pulse described as 450,000 acre-feet in 30 days in any season, once at least every 10 years (found on page 2-250 of the BBEST Report). Clarify in the BBASC report that this is a target for 10 years on an average period of record, and is flexible.

East Matagorda Bay report language

Strategies to maintain and increase freshwater inflows should be pursued to support a sound ecological environment within East Matagorda Bay

San Saba at San Saba subsistence recommendation

Use the Q95 numbers with implementation as proposed by BBEST for the subsistence numbers at this gage.

Channel Maintenance

Recognize the need for channel maintenance flows.

- Remaining questions included whether to include an exemption by size as well as percentage.

Lower Colorado gauges

Adopt the BBEST recommendations for the Lower Colorado at Bastrop, Columbus and Wharton gages at the subsistence, base dry, and base average figures.

Lavaca at Edna

Accept the BBEST recommendations at the Lavaca River at Edna:

- through the base high recommendation; and
- with Q95 values using BBEST implementation for subsistence.

BBASC consensus agreement on preliminary environmental flow standard recommendations. (Decisions through June 30, 2011)

BBEST Report	Gage	BBASC Preliminary EFS Recommendation	Special discussion notes Items still to do are highlighted
Upper Colorado			
2- 11	Colorado River above Silver	Adopt BBEST EFR beginning with subsistence through one-pulse/year.	Consider prior season for triggers Remaining: How to handle BBEST recommendations: <ul style="list-style-type: none"> ○ 1 pulse per 2 years ○ 1 pulse per 5 years ○ Channel maintenance ○ Triggers (for long-term engagement frequencies)
2- 23	Colorado River at Ballinger	Same as Silver recommendation	Desire to understand downward trend in water over time. Remaining: Same as Silver
2- 34	Colorado River near San Saba	Same as Silver recommendation (1)	Desire to understand downward trend in water over time. Remaining: Same as Silver
Colorado Tributaries			
2- 45	Elm Creek at Ballinger	Same as Silver recommendation	Remaining: Same as Silver
2- 57	Concho River at Paint Rock	Same as Silver recommendation	Desire to understand downward trend in water over time. Remaining: Same as Silver
2- 67	South Concho River at Christoval	Same as Silver recommendation	Recommendation is specific to current site of the gage. There is potential to move this gage downstream, which will warrant an adjustment to EFS. The downstream change would capture return flows of irrigation districts Remaining: Same as Silver
2- 77	Pecan Bayou near Mullin	Same as Silver recommendation (1)	Remaining: Same as Silver
2-87	San Saba River at San Saba	Same as Silver recommendation (1)	Remaining: Same as Silver
2-98	Llano River at Llano	Same as Silver recommendation (1)	May be impacted by BBEST review of subsistence numbers Remaining: Same as Silver
2- 108	Pedernales River near Johnson City	Same as Silver recommendation (1)	<ul style="list-style-type: none"> • Does NOT show decreased water flow • Might be analyzed with potential project Remaining: Same as Silver
2- 119	Onion Creek near	Same as Silver recommendation	<ul style="list-style-type: none"> • Low flows go to the Edwards Aquifer

	Driftwood		<ul style="list-style-type: none"> • Not a good location for a project • Shorter gage period of record <p>Remaining: Same as Silver Remaining: Same as Silver</p>
Lower Colorado			
2- 129	Colorado River at Bastrop	Adopt BBEST EFR for subsistence, base dry and base average.	<p>Regime looks different: part of study; sucker habitat</p> <p>Remaining: How to handle BBEST recommendations:</p> <ul style="list-style-type: none"> ○ pulse flow - base ○ pulse flow – high ○ Channel maintenance ○ Overback ○ Triggers ????(for long-term engagement frequencies)
2- 139	Colorado River at Columbus	Same as Bastrop	Remaining: Same as Bastrop
2- 148	Colorado River at Wharton	Same as Bastrop	Remaining: Same as Bastrop

Lavaca-Navidad			
2- 158	Lavaca River near Edna	Adopt BBEST EFR beginning with subsistence through base high. (1)	<ul style="list-style-type: none"> • May be impacted by BBEST review of subsistence numbers • Flows may be missing in underlying data. BBEST has been informed. <p>Remaining: How to handle BBEST recommendations:</p> <ul style="list-style-type: none"> ○ 2 pulses per season ○ 1 pulse per season ○ 1 pulse per year ○ 1 pulse per 2 years ○ 1 pulse per 5 years ○ Channel maintenance ○ Triggers (for long-term engagement frequencies)
2- 167	Navidad River at Strane Park	Use BBEST for subsistence and base flow. (1)	<p>Lake Texana as a possible trigger (see notes below)</p> <p>Remaining: Same as Lavaca near Edna</p>
2- 175	Sandy Creek near Ganado	Same as Navidad at Strane Park, with further information about return flow	<ul style="list-style-type: none"> • Lake Texana as a possible trigger • BBEST to look at irrigation return flows <p>Remaining: Same as Lavaca near Edna</p>
2- 183	East Mustang Creek near Louise	Same as Navidad at Strane Park	<ul style="list-style-type: none"> • Lake Texana as a possible trigger • Concern with data provided to BBEST <p>Remaining: Same as Lavaca near Edna</p>
2- 192	West Mustang Creek near Ganado	Same as Navidad at Strane Park	<p>Lake Texana as a possible trigger</p> <p>Remaining: Same as Lavaca near Edna</p>
Coastal Streams			
2-201	Garcitas Creek near Inez	Use BBEST EFR subsistence through 1 pulse/year	<ul style="list-style-type: none"> • Goes to Lavaca Bay • Unsure about existence of water rights • Pulses are important as inflow for the bay • Data issue on flows • Possible project location <p>Remaining: How to handle BBEST recommendations:</p> <ul style="list-style-type: none"> ○ 1 pulse per 2 years ○ 1 pulse per 5 years

			<ul style="list-style-type: none"> ○ Channel maintenance ○ Triggers (for long-term engagement frequencies)
2-210	Tres Palacios Creek	Use BBEST EFR through 1 pulse/year, with a further look at subsistence numbers (1)	<ul style="list-style-type: none"> ● Data question ● Was there an adjustment made to subsistence? What was the thought process? Likely 7Q2 level. Need to look at subsistence flow. <p>Remaining: same as Garcitas Creek</p>

Notes to decisions:

(1) Subsistence numbers in the BBEST report are based on the maximum of the Q95 or 7Q2. However, the Science Advisory Committee recommended using the Q95 because of its grounding in science rather than the 7Q2, which is a regulatory number. BBEST reviewed the seven gages for which subsistence numbers were controlled by the 7Q2, and concluded they could be altered to the lower Q95 number and still protect a sound ecological environment, provided the following implementation guidance is followed:

- If instream flow is less than the subsistence flow, no instream flow could be diverted or impounded;
- If instream flow is less than the low base flow, no instream flow could be diverted or impounded;
- During exceptionally dry conditions, a drought contingency hydrologic trigger would allow flows that are lower than the low base flow but higher than the subsistence flow to be diverted down to the subsistence flow but no flows below the subsistence flow could be diverted or impounded. (See BBEST handout dated June 16, 2011 and BBASC meeting notes of June 16, 2011).

For these seven gages, the BBASC adopted the Q95 flow with the BBEST implementation recommendation.