Colorado/Lavaca BBEST's Hydro workgroup met on May 4, 2010 at Joe Trungale's office from 1-5 pm. Those in attendance included: Joe Trungale, Richard Hoffpauir, Kirk Kennedy, Thom Hardy, David Bradsby, Dan Opdyke, Paul Jensen, and David Buzan. Joe Trungale led the meeting.

General notes:

- Joe reviewed flow data he had compiled and conducted analysis on for 7 sites the BBEST and the Hydro workgroup had identified.
- Richard suggested the group consider developing ranges for environmental flow regime values.
- Thom recommended that the group be as consistent as possible in its analytical approach (as long as it seems ecologically appropriate to be consistent) to facilitate use of the information by the stakeholders. It is important to not try to get too "cutesy" and take approaches that are too difficult for others to follow and/or utilize.
- Joe recommended that the group start with the base flow separation and he recommended that the group identify a threshold percentage or value, above which everything would be a part of a pulse flow and below which everything would be part of a base flow. He suggested as a starting point using the daily average flow that exceeds 75 % of the daily average flows and then evaluating the output based on ecological characteristics and adjusting the threshold value.
- **Point of consensus: Joe, Kirk, Thom and Richard agreed it was appropriate to start by using the same approach at all 7 sites and applying a threshold value for the base flow separation.**
- Joe demonstrated the use of IHA with a data set from the Colorado River at Columbus. He focused on the different selections in IHA and their relationships to HEFR. Dan contributed substantially since he is working on a revision of HEFR.
- Dan and Thom discussed using the LCRA-SAWS study on the Colorado River as a "state of art" study and calibrating HEFR to generate values for the lower Colorado similar to those generated by the LCRA-SAWS study, then applying the calibrated HEFR to another site and evaluating the data.
- Kirk and Joe both stated it seemed like a good idea to use the LCRA-SAWS environmental flow regime values for the lower Colorado rather than the BBEST trying to develop a different environmental flow regime for that reach.
- Thom stated that we are charting a rationale process forward. He suggested talking with Kevin Mayes, TPWD, to get Kevin's opinion as to what he thought was lacking.

Period of record:

- **Point of consensus: Joe, Kirk, Thom and Richard agreed it would be appropriate to start by calculating a flow regime for each site for a pre-development period, the entire period of record, some consistent/comparable period between sites, the Water Availability Modeling (WAM) period, and the LCRA-SAWS period.**
- The group discussed defining a representative period of time. Thom suggested focusing on a range of flows that represent a range of conditions and protect mesohabitats. Richard again stated the potential value in providing a range of possible flow regime values. Kirk cautioned against choosing a period of record that did not include the drought of the 1950's.
- **Action item: Kirk will analyze WAM flows with Richard's help. They will communicate their efforts with Kathy Alexander, TCEQ.**
- Joe offered to come up with a way of determining the period of record for analysis.

Seasons:

- Dan suggested using seasons for pulse flow recommendations.
- **Action item: Dave will look at season separations for three of the 7 stations in order to guide the group on choice of months for seasons. Will look at temperature, low flow days, spawning seasons.**

Pulse Flows:

- Kirk raised the issue of differentiating peak flows from daily average flows and used the example of a pulse on the Llano River where the peak flow for a day was 13,000+ cfs and the daily average flow for the same day was only 5,600 cfs.
- **Action item: Richard will look at data to evaluate the relationship between peak flows and daily average flows in the flow records.**

Hydrologic/climatic condition:

- The Hydro work group needs to think about this however Thom thought it would be most appropriate to think about this in the context of coordinating instream flows regimes with freshwater inflow regimes. The Hydro work group agreed it was important to discuss this concept with the BBEST.
- Flow Regime Components Characteristics Delineated:

- Dan suggested we need to think about things like the rate of change of rising and falling limbs of the hydrographs.
- **Action item: Dave will direct the BBEST to review Section 4 of the SAC's guidance on hydrological analysis prior to the May 11 meeting.**
- **Point of consensus: Joe, Kirk, Thom and Richard agreed to use the default selections in HEFR as the starting point in their analyses**

Here are the decision points in Section 4 of the "SAC Use of Hydrologic Data in the Development of Instream Flow Recommendations guidance" combined with discussion by the Hydro work group:

1. Number of instream flow regime components: The statewide science advisory committee supports the use of 4 components: subsistence (enough water to keep fish alive), base (flows higher than subsistence but not substantially affected by high pulses), high pulse (rises in flow caused by rainfall runoff) and overbank flows.
    a. Joe presented these at our meeting on April 20. We need to confirm these are acceptable flow regime components to start with
2. Geographic scope of instream flow recommendations and spatial extent of individual instream flow recommendations
    a. As you remember we identified about 19 sites to begin identifying instream flow recommendations at our April 20 meeting.
    b. We did not discuss the spatial extent of the flow regime recommendations we might develop at the 19 sites. We will need to describe that spatial extent (but probably not on May 11)
3. Hydrologic period of record: Analysts typically consider using the "natural" period (usually pre-dam or other significant flow impact); the "post-human" impact period; or the entire period of record.
    a. The Hydro work group discussed using the pre-development period, the entire period of record, some consistent/comparable period between sites, the Water Availability Modeling (WAM) period, and the LCRA-SAWS period.
4. Hydrologic/Climatic condition: This decision relates in part as to whether or not the BBEST should identify one or more base flows, for example a base flow during years or periods that are drier than normal (but not extremely dry like those that cause subsistence flows); a base flow during years or periods with "normal" flows; and/or a base flow during wet years or periods. The two earlier BBESTs have identified:
    a. Dry base flows as those base flows that are higher than subsistence but occur 25% or less of the time
    b. Average base flows as base flows that occur between 25 and 75 % of the time, and
    c. Wet base flows as base flows that occur more than 75% of the time
    d. The Hydro work group has decided to start with the HEFR default values that define dry, average and wet base flows as described above (however there is a possibility that we may consider identifying base flows on more of an ecological basis than on the basis of frequency of occurrence.
5. Assignment period: Assignment period refers to the period of time we want flow regime components to apply. For example, the two previous BBESTs have recommended seasonal (winter, spring, summer, and fall) values for subsistence, base and some pulse flows; and annual or biannual periods for certain high pulses and overbank flows. Assignment periods could be as short as a month. I think the Hydro work group is going to suggest starting with the traditional seasons.
6. Memory: This applies to whether or not there will be carry-over from one season to the next for a flow regime recommendation. So far I think the BBESTs have calculated flow regime recommendations without carryover from one season to the next. Consequently each season's environmental flow regime recommendations stands alone.
7. Flow regime component characteristics delineated: This refers primarily to pulse and overbank flows. For example, the previous two BBESTs have identified the peak, duration and volume of high pulse and overbank flows. Peak, duration, and volume are all characteristics of the flow regime component. Other components that may be important include the rates of change of the rising and falling limbs of the pulses.
8. Subsistence flows less than 7Q2. The TCEQ has established 7Q2's (the lowest flow that would occur over seven consecutive days during a two-year period) for use with water quality standards and wastewater permitting. TCEQ expects water quality standards to be met or exceeded whenever flow is equal to or greater than the 7Q2. In some cases the 7Q2 flow is higher than the subsistence flow calculated by HEFR (subsistence is calculated as the median of the flows that are exceeded 90% of the time). The HEFR subsistence flow is usually a value that is exceeded about 97% of the time. The Trinity/San Jacinto BBEST used the flow that is exceeded 95% of the time (based on work done on the lower Colorado River) as the subsistence flow rather than the HEFR-calculated subsistence flow.

Number and location of control points: This is somewhat similar to #1. Each of the 19 locations we chose, was a control point, i.e. it was a site with credible stream flow data.