Review Comments for the Instream Flow Study of the Lower San Antonio River and Lower Cibolo Creek, Draft Study Design

Reviewer 3

The study design is well organized and well written, and I found the Introduction very informative. I hope my comments and suggestions are constructive and please contact me or any other of the reviewers with any questions you have or clarifications on any of our review comments.

General comments

I found more detail in general in the Technical Overview Report regarding the various methodologies discussed in the study design with the exception of the section on riparian vegetation. The author(s) should reference the tech. overview report or other sources where appropriate or include more detail in the study design.

More discussion regarding criteria used for site selection is needed. Specifically, there seems to be a lack of any systematic selection process to locate the most representative site(s) in each reach. If the site selection procedure is intended to be non-random and biased by site access, control points for surveying, etc. … I think this is even more reason to offer more explanation why this approach was taken versus a more systematic site selection process. The selection of segments and reaches was very systematic and unbiased following a stratification by natural setting. Why not include something similar for site selection with criteria such as site access and control points used as screening criteria? Maybe this was done and simple not stated clearly in the text.

Given plans to intensively sample fish and mussels at each site will sample size be sufficient for selected species of fish or mussels to be used to evaluate size/age structure to have some idea about recruitment. This could be an important and possibly more responsive (in the short term) biological indicator.

Consider adding at least some reference to exotic or invasive aquatic plants in Table 8 in the 'Other Aquatic Organisms' section.

3.1 Study Site Selection

Tier 2

LSAR Segment 1, Reach 2

Are there flow-weighted bacterial indicator data for this reach within the range of flows typical for contact recreation, and if not, authors should consider sampling during higher pulse flows or

at least be prepared to explain to the public the relation of high flows that are deemed necessary to maintain a sound ecology to the presence of bacterial indicators and the potential presence of water-borne pathogens.

Tier 3

I certainly understand that site access and suitable control points/targets for surveying often drive the bias involved in the selection of study sites. If the study sites are to be representative of the reaches they are in including information about the selection of these study sites (similar to the manner in which reach information was listed in the Tier 2 section) and the physical, biological, and chemical characteristics of these site is appropriate.

3.2.2. Biology

1st paragraph

The reference to 'maintain flows necessary to support" (1) Native species …. .' is an important statement. Is the intent to consider sport fishes as a biological indicator (Table 8) based on a desire to maintain a sport fisheries in these streams which seems counter to a desire to maintain or improve the native species present or is the reference to sport fishes simply to highlight that the occurrence and abundance of these fishes is important to consider?

Consider revising 2nd sentence to "…community **and species level** indicators… ."

Reach scale habitat mapping

More detail on the types (types of pools, backwater, margin, etc. …) and characteristics of mesohabitats, and on the methodology to be used to map mesohabitats and other features is needed. Also, under what flow conditions will the reach-scale mapping take place. I believe the characteristics of the various mesohabitats are included later in the design doc, but some discussion and definition is needed where these are first introduced in text.

Fish surveys

Suggest including detail on how 'backwater' or other non-traditional mesohabitats will be defined/typed and how will these definitions vary under different flow conditions if at all.

Should a maximum and minimum reach length be considered? I agree that 40X wetted channel or a full meander (@ minimum reach length) should be used, but some criteria on a reasonable reach length is important because of the potential for sampling the reach being impracticable, expensive, and exhausting for the crew. Large meanders on larger rivers in low-gradient settings can exceed 1 mile! Not a problem for the Lower San Antonio or Cibolo Creek, but a discussion in the Tech Overview Report and other study designs may need to consider this.

Will all species be physically vouchered per site or each species by stream or within the study area? Can photo-vouchering of larger more common species be done, and preserved vouchers be the smaller or less common species only? Vouchering of fish and even mussels needs to be discussed in more detail.

Will each mesohabitat be electrofished 2X (2 passes)? If the intent is to continue collecting as long as additional species are being collected, at least 2 passes per mesohabitat will be necessary, particularly if electrofishing is the principal sampling approach to meet this requirement. In addition to processing fish by seine haul, the same should apply to each electrofishing pass. If only one electrofishing pass per mesohabitat will be done, this should be clearly stated in the methods.

Need to consider the issue of electrofishing too close to an adjacent mesohabtiat, and actually collecting fish from the adjacent mesohabitat. This could be a problem where mesohabitat assemblages are expected to vary more such as between riffles and adjacent runs or pools. Authors may consider the used of block nets between adjoining mesohabitats where practical or developing a mesohabitat sub-sampling approach that minimizes this potential sampling bias. This is an issue I have encountered when trying to stratify small streams into many mesohabitat types include margin and backwater habitats.

Mussel surveys

What about measuring mussel length at least for the more common or imperiled (Golden orb) mussel species to have size and indirectly age structure that could be an indicator of recruitment in a study reach? I have discovered too many times that I wish I had size if not age data after the fact once I realize that I have sufficient sample size for this.

I suggest including a brief description of how and what hydraulic data will be collected in mussel beds in addition to referencing Morales et al (2006) and Randklev and Kennedy (2009).

Instream habitat surveys and habitat modeling

Run and glide are defined the same in this section. Is this because the authors do not expect to observe distinct runs and glides given the channel shape and current velocities characteristic of the study area? If this is the case or if the authors do not recognize any distinction between the two habitat types, further discussion and clarification is needed. Further refinement and definition of the mesohabitat types will be possible after measurements of depth and velocity are taken as the authors discuss in this section.

Fish microhabitat utilization and biological validation surveys

Will one or more species of darters be used for this effort? The authors should clarify if the intent is to use all darter or selected species or if darters will be considered a trophic or habitat guild for purposes of this study. Also, what sampling techniques will be employed to actually obtain what can be considered microhabitat data for selected species such as one of the darters, pugnose minnow, or burrhead minnow? For example, will a single seine haul in a riffle of relatively uniform substrate be sufficient or will the use of dip or d-frame nets in smaller quadrats be necessary? I think a discussion of what constitutes microhabitat versus macrohabitat in the context of this study design should be included.

Biological data analysis

I like the idea of using multivariate analysis to potentially group the rich fish assemblage into discrete guilds. Considering the number of species and size of the fishes involved and the microhabitat sampling approach, it may be more practical and more accurate to scale up to the guild rather than using individual species.

Should clarify in the last sentence of the 2nd paragraph what is meant by '... habitat versus flow relationships, including diversity.' Does the use of diversity in this sentence refer to the diversity of habitat types or the diversity of species?

Riparian habitat –baseline surveys and evaluation

It would be informative to include full or abbreviated cross-sections of the channel carried the full length of each riparian vegetation transect to potentially associate measures of slope, width-to-depth ratios, bank substrate, and historical changes in the section compared to any monumented cross-sections close or at least relevant to (e.g., same reach or ecoregion) the transects such as can be found associated with USGS or other gaging stations.

3.2.4 Water Quality

The use of QualTx to model selected water quality conditions during subsistence to base flows is worthwhile, however, QualTx assumes steady-state, and understanding the relation of higher flows to organic loading and DO is important particularly considering the number of waste water dischargers and other sources that could cause oxygen depletion during high flows in the upper basins.

In addition to collecting one set of standard parameters during each site visit the collection of at least DO and temperature in each mesohabitat during biological sampling to provide some within site characterization of these parameters that can vary significantly, and even be limiting in different mesohabitats, could be beneficial during summer low-flow conditions presumably when biological sampling will take place.