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# Springflow Habitat Protection Work Group

## WORK GROUP PRIORITIZATION IN RESPONSE TO IMPLEMENTING COMMITTEE REQUEST

REVISED October 14, 2021

### Summary

The Springflow Habitat Protection Work Group held 15 meetings over several months to clarify and refine questions for technical studies to address four overarching issues defined by a May 2019 discussion document. The results, primarily in the form of 15 questions, were presented to the Edwards Aquifer Habitat Conservation Plan (EAHCP) Implementing Committee (IC) as a Part 1 Report and Proposed Part 2 Charge (Report and Charge).

The IC considered the Report and Charge at its May 20, 2021 meeting, in addition to written comments on the Report and Charge from San Antonio Water System (SAWS) but did not act to approve or reject that document. Instead, the IC asked the Work Group to move ahead with prioritization of the 15 identified questions and bring that proposed prioritization back to the IC for consideration along with the Report and Charge. In particular, the IC indicated a desire to consider a prioritized list of study topics in the context of the overall program budget and other planned studies.

The Work Group held additional meetings from June through September 2021 to address the prioritization request. As reflected in **Table 1**, the Work Group identified a subset of the previously identified questions as first priority for near-term evaluation through studies. The Work Group also identified an additional subset of questions, and portions of some additional questions, as first priority to be addressed through focused monitoring triggered during low-flow periods, guided through the near-term development of monitoring plans. In addition, the Work Group identified a subset of questions as second priority for evaluation through studies once additional information has been gathered through other studies and/or in anticipation of pursuing a permit renewal. The Work Group recommends that the remaining questions not included in those three priority groupings be retained for future consideration for directed studies through an ongoing review process that assesses priority based on the criteria mentioned above, monitoring efforts, and evolving research needs.

As reflected in the appendices, which provide background on the Work Group decision process, **the Work Group did not have 100 percent agreement in assigning initial priorities to any one question. However, the Work Group reached consensus that better understanding of recreational impacts (addressed in combined questions 3-3, 3-4, and 3-5) and additional validation, using data from recent drought periods, of the existing water quality model (question 1-1) should be identified as first priorities for study. In addition, there was consensus that questions 1-2, 1-3, 2-1, 3-1 (in part), and 3-2 (in part) should be identified as first priority to be addressed through monitoring, with near-term development of plans to undertake future low-flow monitoring. There was initial strong, but not unanimous, support for inclusion of questions 1-6 and 4-1 within the first priority for study. Instead,**

the Work Group ultimately identified those questions as second priority for study. The Work Group reached consensus in recommending that all additional questions, or portions of questions not included in those three groups should be retained for future consideration for prioritization for studies. Work Group members also agreed that, where possible, existing tools should be used as a starting place to address questions.

**Table 1. Work Group prioritization recommendations<sup>a</sup>**

	<b>Cost<sup>b</sup></b>
<b>First Priority for study (Consensus)</b>	
Question 1-1 (validation and sensitivity analysis of water quality modeling to include literature review of water quality models)	L-M
Combined Questions 3-3 through 3-5 (focus on recreational impacts)	L-M
<b>First Priority for developing monitoring plans for data collection during future low-flow periods (Consensus)</b>	
Question 1-2 (collect data on flow at spring openings and relation to Covered Species)	L-H
Question 1-3 (collect data on flow of cool water through Landa Lake at low flow)	L-M
Question 2-1 (collect flow path data for spring openings and presence of Covered Species)	L-H
Question 3-1 <b>partial<sup>c</sup></b> (collect standing crop biomass and aquatic vegetation productivity data to improve understanding of potential die-off of vegetation)	L-M
Question 3-2 <b>partial<sup>c</sup></b> (monitoring of flow over, and through, Spring Lake Dam for future modeling effort)	L
<b>Second Priority for study (Ranked highly but not consensus for first priority for study)</b>	
Question 1-6 (Use available tools (MODFLOW) to run scenarios addressing other drought patterns, including climate change. Availability of results should be timed to inform permit renewal.)	M-H
Question 4-1 (Use existing MODFLOW results to examine flow predictions between minimum and 80 cubic feet per second and, when results are available from monitoring or other studies, assess significance for Covered Species.)	L-H
<b>Retained for future consideration for prioritization for directed studies in response to changed state of knowledge or future research necessity (Consensus)</b>	
Question 1-4 (assess adequacy of spring data being collected)	L
Question 1-5 (consider other water quality modeling approaches if results for Question 1-1 indicate the need)	H
Question 2-2 (review results of genetic studies of riffle beetles)	L-H
Question 3-1 <b>partial<sup>c</sup></b> (use plant data collected under monitoring plan for analysis of potential vegetation die-off and impacts)	H
Question 3-2 <b>partial<sup>c</sup></b> (modeling of flow over Spring Lake Dam)	L-M
Question 4-2 (evaluate effect of siltation on SM salamander during low flows)	L

a. The order of questions within each grouping is numerical and does not indicate recommended prioritization within the grouping.

b. The cost column represents estimates from Work Group members on the relative cost of addressing each question in terms of broad cost categories with high >\$150K, medium \$150K-\$50K, and low <\$50K.

c. The remaining portions of questions prioritized for monitoring plans and noted as "partial" may be prioritized for directed studies in the future based on monitoring results.

NOTE: Appendix A and Table 2 provide the full text of questions ranked by the Work Group.

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## Overview of Work Group prioritization process

Five meetings were held from June through September 2021 to address the IC's request that the Work Group move ahead with prioritization of the 15 identified questions from the Report and Charge. The meeting agendas and minutes are included as **Appendix B**. At the first meeting on June 23<sup>rd</sup>, Work Group members agreed upon an approach, including the criteria to use, to undertake an initial ranking exercise. A simplified approach, rather than a strict numerical ranking, was chosen to allow for a natural sorting of questions and to allow each Work Group member the opportunity to communicate their views.

The approach allowed a member to rank each question based on each of three criteria as high, medium, or low as applicable and offered space for feedback. Several Work Group members indicated they did not have the technical expertise to rank some questions and the option to leave individual rankings blank was acknowledged. For some members, blank rankings were also given as an indication of no priority, or in the case of SAWS, to reflect specific comments already provided to the IC (**Appendix C**). The Work Group did not have 100 percent agreement in assigning initial priorities to any one question. **Appendix D** provides the initial rankings and feedback of Work Group members.

The three criteria by which questions were ranked as high, medium, low, or left blank follow:

1. Adds the greatest value in clarifying uncertainty in the Edwards Aquifer Habitat Conservation Plan flow objectives; particularly the need for 80 cubic feet per second (cfs) or a similar increased flow periodically during prolonged drought.
2. Adds the greatest value in clarifying uncertainty in the Edwards Aquifer Habitat Conservation Plan biological goals and associated objectives.
3. Provides important new information to improve design of management measures for addressing impacts of extended periods of low flow on Covered Species.

Work Group members also provided their best professional judgement in estimating the cost of studies. The cost estimates in **Table 1** are not rigorous and are not intended as limits on study or monitoring budgets but were considered by Work Group members in their prioritization discussion.

The responses were summarized and provided back to members for discussion at the second meeting July 21<sup>st</sup> (**Appendix D**). Work Group members were also invited to propose approaches to help illustrate the qualitative responses to inform discussions. Various figures proposed for doing so are also included in **Appendix E**.

Texas Parks and Wildlife (TPWD) summarized the results of all three criteria based on the combination of high and medium rankings to develop a presentation of the overall ranking of questions. This visualization helped to illustrate clear break points in the overall responses received.

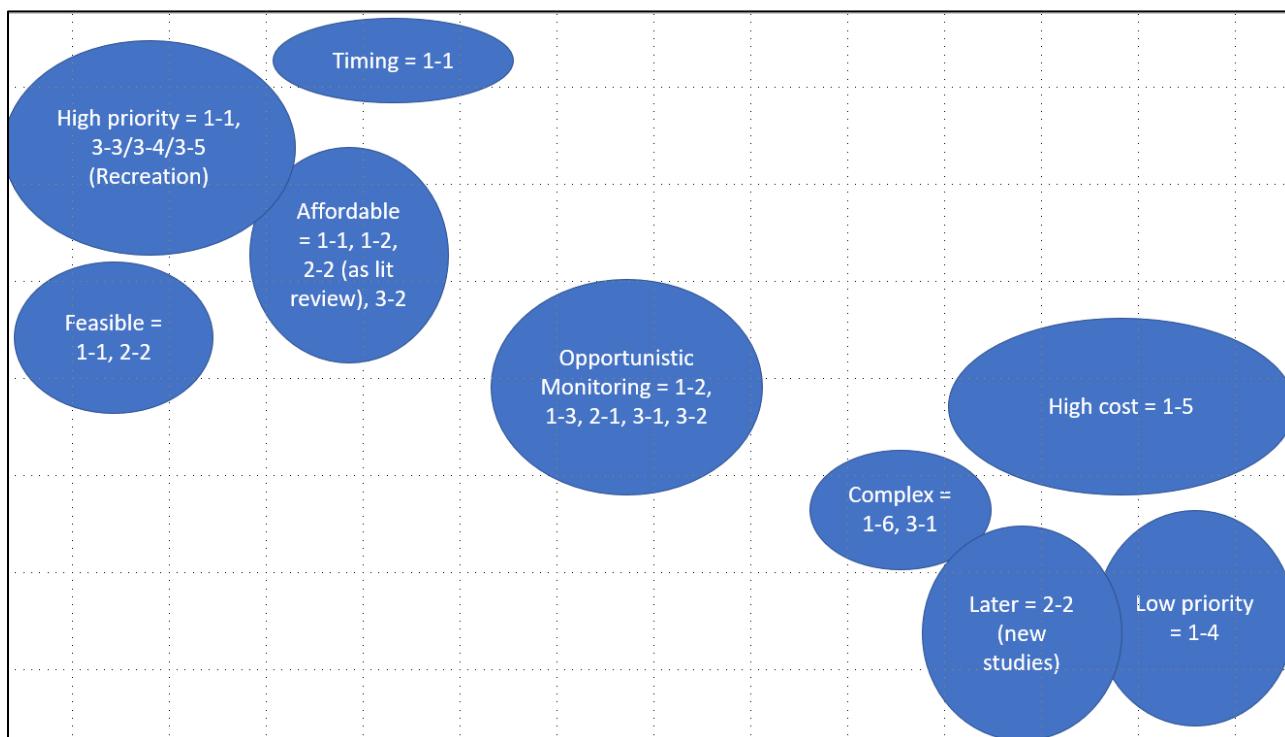
SAWS also responded to the request for illustrations of the rankings by criterion to determine which questions were ranked favorably. Work Group members acknowledged at the July 29<sup>th</sup> meeting that blank responses were not necessarily a negative response as previously presented in some of the illustrations. They also agreed that the illustrations were still valuable in visualizing questions members could agree on as high priorities. Following the discussion, Patrick Shriver revised his illustrations of the

initial rankings to show the blank responses in a more neutral fashion. The revised versions are included in **Appendix E**.

These approaches highlight similarities in responses and helped the Work Group compare the results across the three criteria. Work Group members used these illustrations to support their process, but decisions were made through discussions on July 21<sup>st</sup>, July 29<sup>th</sup>, and August 13<sup>th</sup>. Discussion at the July 21<sup>st</sup> meeting led to the organization of questions into various organizational “buckets” illustrating key characteristics (**Figure 1**).

Following the July 21<sup>st</sup> meeting, Work Group members were presented with ideas for organization of the rankings to the IC. Myron Hess, Work Group Chair, proposed a table using a tiered approach based on the rankings received (included in **Appendix E**). The table and ideas offered by other Work Group members based on the information presented in this response, were the basis of discussion at the July 29<sup>th</sup> meeting.

Members agreed on the **Table 1** prioritization presented above recognizing certain commonalities among high priority questions, questions that can be largely addressed through monitoring efforts, and those that may not be feasible (or simply high priority) at this time. **Table 2** includes the full questions by priority grouping.



**Figure 1.** Questions organized through discussion on July 21<sup>st</sup>. Questions 4-1 and 4-2 were not included in this illustration because a clear designation was not apparent from the discussion.

**Table 2. Full text of questions prioritized by the Work Group (continues on next page)**

<b>First Priority for study (Consensus)</b>
<b>Question 1-1:</b> Based on consideration of the results of a validation and sensitivity exercise using data collected during 2014 drought conditions, is the Hardy model effective and suitable to evaluate water quality (dissolved oxygen and water temperature) effects of springflows below 80 cubic-feet-per-second (cfs)?
<b>Question 3-3:</b> What specific recreational impacts exist and what are their data-supported impacts to Texas wild-rice, fountain darters, and San Marcos salamander and are impacts greater during lower flows?
<b>Question 3-4:</b> What locations and approaches would be most effective for exclosures in the State Scientific Area (SSA) to ensure protections for Texas wild-rice, fountain darter, and the San Marcos salamander habitat during low flow conditions?
<b>Question 3-5:</b> Based on existing and ongoing data collection, what areas within the San Marcos system represent habitat important for maintaining fountain darter populations that can be factored into management decisions, in particular designation of exclosures under the SSA, during periods of low flows?
<b>First Priority for developing monitoring plans for data collection during future low-flow periods (Consensus)</b>
<b>Question 1-2:</b> Which spring openings will still be flowing at various flow levels below 80 cfs in the Comal and San Marcos springs systems and how does that relate to effects on Covered Species?
<b>Question 1-3:</b> How does the flow of cool water from spring openings in the Comal system travel through Landa Lake during extended periods of low flow and what is the potential for the cool water to bypass the Old Channel?
<b>Question 2-1:</b> What aquifer flow paths contribute to individual springs or spring emergence areas that are likely to be significant flow sources into the Comal and San Marcos systems during low flow periods and which fault block—upthrown block or downthrown block—are those flow paths associated with? And, are those springs habitat for, and occupied by, Covered Species?
<b>Question 3-1 partial:</b> How are changes related to vegetative die-off expected to affect the dynamics of habitat, dissolved oxygen and vegetation loss during predicted low springflow in the future in both systems? (Partial: Data collection on standing crop biomass and vegetation productivity.)
<b>Question 3-2 partial:</b> Over what section of Spring Lake Dam does flow move during periods with flows below 80 cfs? (Partial: Data collection on flow over dam.)
<b>Second Priority for study (Ranked highly but not consensus for first priority for study)</b>
<b>Question 1-6:</b> Do existing modeling and statistical tools and available data allow us to incorporate predictions for future drought conditions and make springflow management decisions during periods of extended low flows?
<b>Question 4-1:</b> What consecutive periods of flows at or below specific identified flow levels between 80 cfs and the relevant minimum springflow level for each spring system are predicted using the updated mod-flow model reflecting implementation of the Phase 2 flow protection Work Plan measures? What is the significance of those durations in terms of impacts on the Covered Species?

<b>Retained for future consideration for prioritization for directed studies in response to changed state of knowledge or future research necessity (Consensus)</b>
<b>Question 1-4:</b> Is the available spring data being collected, consistent with the outcomes of the 2016 Expanded Water Quality Work Group, adequate to inform how the physio-chemical aspects, chemistry, discharge, and spring locations change under low flow conditions?
<b>Question 1-5:</b> Depending on results of Question 1-1 regarding validation, what other modeling approaches should be considered for water quality impacts?
<b>Question 2-2:</b> How can results of ongoing genetic studies be used to inform our understanding of impacts of low flow periods on Comal Springs riffle beetle? If those results are not sufficiently helpful in understanding such impacts, how could variations on those studies or other genetic studies be used to provide useful insights?
<b>Question 3-1 partial:</b> How are changes related to vegetative die-off expected to affect the dynamics of habitat, dissolved oxygen and vegetation loss during predicted low springflow in the future in both systems? (Partial: Further evaluation based on data collection during low-flow periods.)
<b>Question 3-2 partial:</b> Over what section of Spring Lake Dam does flow move during periods with flows below 80 cfs? (Partial: Further evaluation based on data collection during low-flow periods.)
<b>Question 4-2:</b> What is the likely effect of extended periods of springflows below 80 cfs in the San Marcos system on siltation around spring openings and, in turn, on the population of San Marcos salamanders?