Edwards Aquifer Habitat Conservation Plan
Nonroutine Adaptive Management Proposal
VISPO

To: **EAHCP Committees**
From: **Scott Storment, EAHCP Program Manager**
Date: **March 14, 2019**
Re: **Voluntary Irrigation Suspension Program Option Enrollment Volume Changes**

EAHCP Flow Protection Measures

The EAHCP calls for four Flow Protection Measures to meet short-term and long-term flow objectives for the Comal and San Marcos Springs complexes. The four measures include the Voluntary Irrigation Suspension Program Option (VISPO) (EAHCP § 5.1.2), Regional Water Conservation Program (EAHCP § 5.1.3), SAWS ASR (EAHCP § 5.5.1), and Critical Period Management – Stage V (EAHCP § 5.1.4). These four water management tools layered together are referred to as the "Bottom-Up" package.

The "Bottom-Up" package was originally evaluated by HDR to understand whether the Flow Protection Measures could meet EAHCP flow objectives (HDR 2011 – Appendix K EAHCP). The analysis was conducted by simulating spring discharge using the MODFLOW groundwater model. The minimum flow objective was examined by simulating the period from 1947-1960 which included the Drought of Record (DOR). The long-term flow objective was examined by simulating the period from 1947- 2000. Since the Flow Protection Measures composing the "Bottom-Up" package were still in development, HDR made assumptions regarding geographic distribution of enrolled water in the various programs. Results from the HDR analysis indicated the Phase I Flow Protection Measures were not adequate to meet minimum and long-term average flow objectives in the Comal system. However, minimum and long-term average flow objectives were achieved in the San Marcos system.

Over the course of implementing Phase I of the EAHCP, the original MODFLOW model used by HDR was reconstructed by EAA staff with several improvements (herein referred to as EAA model). Changes made to the model along with calibration and validation results are described in detail by Liu et al. (2017). Additionally, further comment on model construction and its use can be found in the review by the Groundwater Model Advisory Panel (Appendix - Liu et al. 2017), the National Academies of Sciences (NAS) Reports 1-3 covering the EAHCP (NAS 2015; NAS 2017; NAS 2018), Strategic Adaptive Management Process Model Runs Inputs and Assumptions by Pence (2018a), and technical presentations delivered to the NAS Panel and EAHCP Science Committee (www.eahcp.org).

National Academies of Sciences Review of EAHCP Springflow Protection

The model and its outputs were reviewed by the NAS to make their determination on whether the EAHCP Flow Protection Measures would be adequate to achieve the EAHCP minimum flow objectives. The model runs the panel evaluated to make its determination were essentially HDR's DOR inputs run with the updated EAA model. The minimum flow in the Comal system from this model run was 29.7 cfs. Minimum flow objectives were met for the San Marcos system. Despite not meeting 30.0 cfs, the NAS panel concluded the Flow Protection Measures would be "effective" at meeting the minimum flow related objectives citing the conservative nature of the low flow estimates during calibration and validation (modeled values at low flows were mostly lower than measured values), empirical evidence from the 2014 drought, and overall model performance during calibration and validation runs.

Final Phase I Model Runs

Modeling efforts continued after the NAS consensus report to understand the level of Flow Protection Measure expansion required to achieve a minimum modeled value of 30.0 cfs in the Comal during a repeat of the DOR. Following the process outlined by Pence (2018b), the EAA model was used to simulate the DOR scenario with Flow Protection Measures represented in the model "as-implemented" over the first six years of the program. The pumping and springflow protection forbearance specifics (location and volume) are found in Pence (2018a). Model runs using "as-implemented" programs represented in the EAA model produced minimum flow values of 29.1 cfs in the Comal system.

The 29.1 cfs model run assumed 40,000 ac·ft yr^{-1} are forborne during a year that VISPO is triggered. This is the annual number represented in the EAHCP. Actual enrollment in the VISPO during 2019 is 40,921 ac·ft yr^{-1}. When this actual enrollment volume of water was included in the model runs, minimum flows in the Comal were 29.6 cfs. VISPO forbearance was increased until minimum flows at the Comal system were equal to 30.0 cfs. The VISPO forbearance number that achieved this minimum flow rate was 41,795 ac·ft yr^{-1}.

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This proposal seeks to change VISPO forbearance from 40,000 ac·ft yr^{-1} to 41,795 ac·ft yr^{-1}. This is the only change to this EAHCP Program. All other stipulations regarding the program are as previously implemented.

This Nonroutine AMP proposal relates to the following sections of the EAHCP

This proposal affects Section 5.1.2 of the EAHCP.

Fiscal Impact

Table 1 displays the financial impact of the proposed changes assuming VISPO triggers three times between 2020 – 2028.

Table 1. Proposed costs of VISPO Adaptive Management with three trigger events.

VISPO Program	Rate	Acre-feet	Standby and Trigger Years (2020-2028)	Cost
Standby	$54	1,795.00	9	$872,370
Forbearance	$160	1,795.00	3	$861,600
				$1,733,970

References

Liu, A, N Troshanov, J Winterle, A Zhang, S Eason, 2017. Updates to the MODFLOW Groundwater Model of the San Antonio Segment of the Edwards Aquifer. Available at: https://data.edwardsaquifer.org/documents/2017_Liu-etal_UpdatestotheMODFLOWGroundwaterModeloftheSanAntonioSegmentoftheEdwardsAquifer.pdf.pdf

HDR, 2011. Evaluation of Water Management Programs and Alternatives for Springflow Protection of Endangered Species at Comal and San Marcos Springs. Available at: http://eahcp.org/wp-content/uploads/2019/02/Appendix-K.pdf

NAS, 2015. Review of the Edwards Aquifer Habitat Conservation Plan Report 1. Available at: http://eaahcp.org/administration/science-review-panel/

NAS, 2016. Review of the Edwards Aquifer Habitat Conservation Plan Report 2. Available at: http://eaahcp.org/administration/science-review-panel/

NAS, 2018. Review of the Edwards Aquifer Habitat Conservation Plan Consensus Report. Available at: http://eaahcp.org/administration/science-review-panel/

Pence, 2018a. SAMP Model Runs Inputs and Assumptions. Memo to EAHCP Committees, June 21, 2018.

Pence, 2018b. EAHCP Strategic Adaptive Management Process. Memo to EAHCP Committees, May 11, 2018.