

**Science Committee of the
Edwards Aquifer Habitat Conservation Plan**



*Scientific Evaluation Report:
Nonroutine Adaptive Management Proposal for the Proposed Adaptive Modifications to
the Use of the San Antonio Water System Aquifer Storage and Recovery for Springflow
Protection*

February 2, 2018

Introduction

According to the Funding and Management Agreement, the Adaptive Management Science Committee (“Science Committee”) is tasked with evaluating all Nonroutine Adaptive Management (“AMP”) proposals. These evaluations result in a “Scientific Evaluation Report” for presentation to the Stakeholder Committee. The Stakeholder Committee considers this report in their decision whether to recommend the Nonroutine AMP proposal to the Implementing Committee for final approval.

This Scientific Evaluation Report is issued in response to the Nonroutine AMP proposal submitted by Roland Ruiz, General Manager of the Edwards Aquifer Authority (EAA), dated January 22, 2018, related to use of the San Antonio Water System (SAWS) Aquifer Storage and Recovery (ASR or ASR Facility) for Springflow Protection (“the Program or ASR Program”). The following sections in this report summarize the Science Committee’s evaluation of this AMP proposal.

Once approved by the Chair and Vice-Chair of the Science Committee, and following the January 31, 2018, Science Committee meeting, this Scientific Evaluation Report will be presented to the Stakeholder Committee at its meeting on February 8, 2018.

Overview

The Edwards Aquifer Habitat Conservation Plan (“EAHCP”) currently utilizes the SAWS ASR Facility for storage and recovery of leased Edwards Aquifer water. Broadly, the current program is based on the acquisition by the EAA of 50,000 acre-feet per year of leases and lease options of Edwards Aquifer groundwater withdrawal permits to be utilized to fill, idle, and maintain in storage a portion of the capacity of the ASR Facility for subsequent use to protect springflows during identified drought-of-record conditions. When specific triggers (described in the EAHCP) are reached: (1) SAWS is obligated to forbear on its rights to make withdrawals at specific amounts from the Edwards Aquifer pursuant to its Edwards Aquifer groundwater withdrawal permits; (2) water stored in the ASR Facility is available to SAWS for recovery to offset its forbearance in order to meet customer demand; and (3) the EAA, when not utilizing leased water to fill the ASR Facility, is obligated to forbear pumping of the entirety of its leased or lease option water (50,000 acre-feet). This combination of SAWS and EAA forbearance contributes significantly to

Scientific Evaluation Report: Nonroutine AMP Proposal - Use of SAWS ASR for Springflow Protection

protecting flows at the Comal and San Marcos spring systems during the periods of drought conditions for which this program is triggered.

The ASR Program has been in operation for over four years. During the course of implementation, firsthand experiences with implementation challenges, as well as market responses to proposed leasing and lease-option products have contributed to the identification of opportunities to improve the operational and financial efficiencies of the EAA's water acquisition responsibilities under the ASR Program while providing the same or greater benefit to springflow protection.

Proposal

Specifically, the EAA proposes to amend the leasing structure of the ASR Program to:

1. Replace the current, three-tiered leasing/lease option structure with a two-tiered leasing/forbearance structure that coordinates existing long-term leases with new, long-term forbearance agreements (together providing control of the necessary 50,000 acre-feet per year of Edwards Aquifer groundwater required under the current ASR Program); and
2. Exercise (trigger) forbearance by the EAA in years following a recognition of the Ten-year Rolling Average of the Estimated Annual Recharge to the Aquifer declining to amounts at or below 500,000 acre-feet per annum.

Scientific Evaluation

This AMP proposes no changes to the springflow protection goals and objectives of the EAHCP. The proposal is strictly related to policy and administrative amendments to the Program. However, the basis for some of the amendments is grounded in the use of the updated Edwards Aquifer MODFLOW groundwater model. A simulation was performed in order to compare the springflow results achieved with implementation of the Program as described in the EAHCP to the springflow results achieved with implementation of the Program using several potential modifications. The results of the exercise are summarized in Table 1.

Scientific Evaluation Report: Nonroutine AMP Proposal - Use of SAWS ASR for Springflow Protection

Table 1: Comparison of Potential Forbearance Triggers – Comal Springs

POTENTIAL FORBEARANCE TRIGGERS	SPRINGFLOW ACHIEVED (CFS) AT COMAL SPRINGS
Current EAHCP triggers (three-tiered system): 10-year rolling recharge average of 572,000 A/F per year (Tier 2); and 10-year rolling recharge average of 472,000 A/F per year (Tier 3)	29.71
J-17 at 635 (msl) on Aug. 1	28.64
J-17 at 636 (msl) on Aug. 1	29.32
J-17 at 637 (msl) on Aug. 1	29.32
J-17 at 641 (msl) on Aug. 1	29.8

As indicated by the simulation results, impacts within the model were not very sensitive to a J-17 Index Well level-based trigger. While the modeled results showed desirable springflow impacts could be achieved with higher J-17 Index Well level-based triggers (e.g. 641(msl) and above), the resulting increased frequency of required forbearance is highly likely to significantly diminish the marketability of such a forbearance agreement option, and would thus render the program ineffective in achieving the desired goals and objectives of the EAHCP.

Therefore, with long-term control of Edwards Aquifer groundwater still a critical need under the EAHCP, EAA staff reconsidered a revised 10-year-average rolling recharge trigger. Ultimately, a modeled analysis of a 10-year rolling recharge average of 500,000 acre-feet per annum for a forbearance trigger should provide similar springflow protection as the current ASR Program under a simplified forbearance approach using a recognizable and understandable forbearance trigger. The results of this secondary analysis are summarized in Table 2.

Scientific Evaluation Report: Nonroutine AMP Proposal - Use of SAWS ASR for Springflow Protection

Table 2: Secondary Analysis of Potential Forbearance Trigger – Rolling Recharge

FORBEARANCE TRIGGERS	SPRINGFLOW ACHIEVED (CFS) AT COMAL SPRINGS
Current EAHCP triggers (three-tiered system): 10-year rolling recharge average of 572,000 acre-feet per year; and 10-year rolling recharge average of 472,000 acre-feet per year	29.71
Proposed 10-year rolling recharge average of 500,000 acre-feet per year (two-tiered system)	29.8

Put simply, the study indicated that the ASR Program could be modified in a manner that provided both a simplified, two-tiered leasing/forbearance approach at an equivalent or stronger springflow benefit as the current ASR Program if a 10-year rolling recharge average of at or below 500,000 acre-feet per annum was used as a forbearance trigger. Therefore, this indication of equivalent program efficacy is consistent with the intent of the HCP and the Incidental Take Permit for the Program.

Evaluation of Information Provided

Because of the policy and administrative nature of this Nonroutine AMP proposal, the role of the Science Committee is largely limited to an analysis of whether or not the proposal is based on a decision-making process that uses the best scientific information available – in this case, the updated Edwards Aquifer MODFLOW groundwater model. Also, the Science Committee acknowledges that this Nonroutine AMP proposal does not change the springflow protection goal, but only changes the current three-tier leasing structure to achieve expeditiously EAA's long-term commitment in the ASR Program.

Conclusion

The Science Committee concludes that the ASR AMP proposal is based on a decision-making process that uses the best scientific information available, and the proposed amendment provides the same or greater springflow protection as afforded by the current Program.

References

Liu, Troshanov, Winterle, Zhang and Eason, 2017, "Updates to the MODFLOW Groundwater Model of the San Antonio Segment of the Edwards Aquifer", Edwards Aquifer Authority, San Antonio, TX. http://www.edwardsaquifer.org/documents/2017_Liu-et-al_UpdatestotheMODFLOWGroundwaterModeloftheSanAntonioSegmentoftheEdwardsAquifer.pdf.pdf

Summary of Science Committee Discussion of the Proposal

Overview

At the January 31, 2018 meeting of the Science Committee, Marc Friberg, EAA Executive Director of Intergovernmental Relations provided a presentation on the ASR Nonroutine Adaptive Management (AMP) proposal to modify the use of the SAWS ASR for Springflow protection measure. This presentation covered a summary of the (1) the current ASR program including the long-term goals and three-tiered system (2) the marketability problems of the current tier system, (3), and finally the elements of the Nonroutine AMP proposal itself that would address these problems.

The following sections provide a lightly-edited summary of the Science Committee's discussion of the Nonroutine AMP proposal, organized according to the main themes that emerged over the course of the discussion. This section concludes with the final motions (including associated final recommendations) made by the Science Committee concerning the Nonroutine AMP proposal and this Scientific Evaluation Report.

Analysis of Triggers

Mr. Friberg provided the Committee a summary of the comparison of the current trigger system using the 10-year rolling recharge average and potential J-17 Index Well level forbearance triggers. Dr. Conrad Lamon asked why there was no difference in the results for the Comal springflow when a J-17 Index Well trigger level of 636 ft and 637 ft was modeled. Both Mr. Friberg and Mr. Jim Winterle stated that the model is not sensitive to this one-foot difference. Mr. Winterle added that the modeled springflow at Comal Springs does not respond positively until a J-17 Index Well trigger level of 641 ft.

Use of the 10-year Rolling Recharge Average

Dr. Lamon asked about whether the 10-year rolling recharge average was protective enough of springflow. He also asked for an explanation of the calculation of the 10-year rolling average. Mr. Friberg stated that the EARIP stakeholders agreed to using the 10-year rolling average in the EAHCP. Nathan Pence, EAHCP Program Manager, that during the EARIP process, the Science subcommittee looked at all types of triggers and learned that using a J-17 Index Well trigger level did not provide the same long-term protection as using the 10-year rolling recharge average.

Scientific Evaluation Report: Nonroutine AMP Proposal - Use of SAWS ASR for Springflow Protection

Dr. Jacquelyn Duke asked for a further explanation as to not using a J-17 Index Well trigger level. Mr. Friberg said that springflow is volatile and that the ASR program is intended to provide protection to springflow during the long-term drought of record conditions – explaining the use of the 10-year rolling recharge average.

Benefit of the Proposed Changes

Dr. Tom Arsuffi asked that the proposal should identify more clearly the benefits of the proposed changes. He had thought the goal was to achieve the 30 cfs in the Comal Springs, but now understands that the goal of this proposal is to change how the 50,000 acre-feet per year requirement is achieved. Mr. Pence stated that the 30 cfs goal will be addressed in the second phase of the EAHCP.

Dr. Charlie Kreidler and Dr. Robert Mace both discussed with the Committee their understanding of the benefit of the proposed changes per their one on one meeting with Mr. Pence. They said that after this meeting, they had a better understanding of forbearance of all springflow protection measures such as the VISPO and Critical Period Management programs. Mr. Friberg further added, that 2014 was similar to drought of record conditions. Mr. Pence responded that a new drought of record conditions will be addressed in the roll-over of the Incidental Take Permit.

Mr. Friberg also told the Committee that another benefit of the program is that it would be attractive to many of the permit holders that have participated in the one-year ASR lease agreements. He also stated that under EAA's rules, restricted irrigated water permit-holders are not eligible to participate in the ASR program. However, with these proposed changes – to add a forbearance tier- the restricted irrigated water would be able to participate.

Critique of the Proposal

Dr. Butch Weckerly and Dr. Arsuffi stated that proposal was confusing to those that are not familiar with the ASR program and the terminology. Dr. Arsuffi requested EAA include a glossary of key terms – such as forbearance in the proposal. He also stated that the tables in the proposal need to include titles and references in the text of the proposal. Mr. Friberg responded with a definition of forbearance and stated that a glossary of key terms can be included and modifications to the tables can be made.

Motion and Recommendation

Mr. Pence reminded the Committee their role in the Nonroutine AMP proposal process and the options they have in making their recommendations to the Stakeholder Committee. With that stated, Dr. Mace made the motion that the Science Committee recommend the Nonroutine AMP proposal to the Stakeholder Committee, but to add to the proposal a glossary of key terms and ensure that every table in the proposal includes a title and reference. Dr. Janis Bush seconded the motion. There was unanimous support of the motion.

Attachments

Attachment 1: Minutes from the January 31, 2018, Science Committee Meeting – Unofficial



NOTICE OF OPEN MEETING

Available at eahcp.org

1. Call to order.

Chair, Dr. Weckerly called the meeting to order at 9:05 a.m. Members present include: Janis Bush, Jacquelyn Duke, Conrad Lamon, Glenn Longley, Robert Mace, Doyle Mosier, Chad Norris, Floyd Weckerly, Tom Arsuffi, and Charles Kreitler; Jackie Poole was unable to attend.

2. Public comment.

No comments from the public.

3. Approval of the Science Committee meeting minutes (Attachment 1).

Dr. Mace motioned to approve the minutes as written; Dr. Longley seconded. No opposition.

4. Receive report from the Program Manager.

- Spring systems and index well update
- The National Academy of Sciences EAHCP Science Review Panel's *Report 3*, meeting 2 overview
- Contractor selection for the Sessom Creek 2018 Applied Research project
- 2017 Incidental take assessment (Attachment 2)

Dr. Kreitler inquired why the Comal Spring riffle beetle had the greatest percent take compared to the other species. Mr. Pence and Mr. Oborny explained that in 2014 the Comal system reached a low flow of 65 cfs, exposing CSRB habitat.

5. Presentation, discussion, and possible recommendation of the Nonroutine Adaptive Management proposal related to the Aquifer Storage and Recovery program (Attachments 3 and 4).

Dr. Lamon asked why there was no difference between the J-17 index well trigger level of 636 ft and the 637 ft scenarios. Mr. Friberg replied that during the drought of record scenario runs, modeled conditions did not stay below 641 ft long enough to trigger the ASR forbearance package.

Scientific Evaluation Report: Nonroutine AMP Proposal - Use of SAWS ASR for Springflow Protection

Dr. Lamon asked about whether the 10-year rolling recharge average was protective enough of springflow. He also asked for an explanation of the calculation of the 10-year rolling average. Mr. Friberg stated that the EARIP stakeholders agreed to using the 10-year rolling average in the EAHCP. Mr. Pence, EAHCP Program Manager, that during the EARIP process, the Science subcommittee looked at all types of triggers and learned that using a J-17 index well trigger level did not provide the same long-term protection as using the 10-year rolling recharge average.

Dr. Duke asked for a further explanation as to not using a J-17 index well trigger level. Mr. Friberg said that springflow is volatile and that the ASR program is intended to provide protection to springflow during the long-term drought of record conditions – explaining the use of the 10-year rolling recharge average.

Dr. Arsuffi asked that the proposal should identify more clearly the benefits of the proposed changes. He had thought the goal was to achieve the 30 cfs in the Comal Springs, but now understands that the goal of this proposal is to change how the 50,000 AF/year requirement is achieved. Mr. Pence stated that the 30 cfs goal will be addressed in the second phase of the EAHCP.

Dr. Kreidler and Dr. Mace both discussed with the Committee their understanding of the benefit of the proposed changes per their one on one meeting with Mr. Pence. They said that after this meeting, they had a better understanding of forbearance of all springflow protection measures such as the VISPO and Critical Period Management programs. Mr. Friberg further added, that 2014 was similar to drought of record conditions. Mr. Pence responded that a new drought of record conditions will be addressed in the roll-over of the Incidental Take Permit.

Mr. Friberg also told the Committee that another benefit of the program is that it would be attractive to many of the permit holders that have omitted to the one-year ASR lease agreements. He also stated that under EAA's rules, restricted irrigated water permit-holders are not eligible to participate in the ASR program. However, with these proposed changes – to add a forbearance tier- the restricted irrigated water would be able to participate

Dr Weckerly and Dr. Arsuffi recommended that the ASR AMP proposal include a glossary of terms as well as a description for each of the tables.

Dr. Mace motioned to endorse the Nonroutine Adaptive Management proposal with the added glossary of terms and table legends; Dr. Bush seconded. No opposition.

6. Presentation and possible endorsement of an expedited process to prepare and to submit the Nonroutine Adaptive Management Scientific Evaluation Report to the Stakeholder Committee.

Dr. Arsuffi motioned to endorse the expedited process to prepare the Scientific Evaluation Report to the Stakeholder Committee; Dr. Longley seconded. No opposition.

Scientific Evaluation Report: Nonroutine AMP Proposal - Use of SAWS ASR for Springflow Protection

7. Presentation of the 2017 Biological Monitoring Reports (Attachments 5 and 6).

Mr. Oborny presented a comprehensive overview of the 2017 biological monitoring results for each of the EAHCP biological monitoring datasets.

2017 was the first year of the rapid bioassessment which adhered to standard rapid bioassessment practices. Dr. Arsuffi proposed that someone analyze the RBP and IBI to see how the two indices line-up. Mr. Norris noted that at least 3 years of this dataset are needed to analyze the existing conditions which will help assess conditions for the invertebrate species.

In regard to the fountain darter dropnet data, Mr. Lamon emphasized that the biological goals are based on the median and not the average, therefore, the data could be improved by taking the log of the data and untransforming it back into the median. The confidence level will not be symmetric, but it would be a better indicator to compare with the EAHCP fountain darter goals. Mr. Oborny agreed and will incorporate it into their analysis.

Mr. Oborny then presented the findings of the first year of the fish tissue sampling which use samples from the headwaters and the lower reaches of the river. Dr. Mace asked if the emerging contaminants found within the fish tissue have also been found within the artesian springs or wells. Mr. Pence replied that yes, sampling has found that the contaminants are not just from runoff, but also found within wells in the artesian zone of the aquifer. Other members agreed that studies conducted throughout the US are finding these contaminants within other aquifers; they are everywhere.

Dr. Weckerly requested that the annual Biomonitoring report include descriptions about the sampling methodologies employed. Dr. Furl replied that there is a standard operating procedures document for the biomonitoring program that can be attached to the report.

8. Presentation and discussion of the proposed 2018 Work Plan Amendments for the Refugia, Biomonitoring, and the Applied Research Programs (Attachments 7, 8 and 9).

Dr. Furl presented the proposed amendments to the 2018 Work Plans for the Refugia, Biological Monitoring, and Applied Research Programs.

Dr. Kreidler requested the number for the Sessom Creek Proposal that was selected. EAHCP Staff will follow-up and provide.

Mr. Mosier motioned to approve the 2018 Work Plan Amendments; Dr. Duke seconded. No opposition.

9. Presentation and discussion of the formation and goals of the Research Work Group to discuss the Comal Springs riffle beetle biomonitoring program.

Scientific Evaluation Report: Nonroutine AMP Proposal - Use of SAWS ASR for Springflow Protection

Dr. Furl facilitated the discussion of the formation and need for a Comal Springs riffle beetle biomonitoring work group. Based input from the Science Committee, National Academy of Sciences, and the 2017 CSRB biomonitoring findings, the EAHCP goals for the CSRB are not being met. 2017 biomonitoring data have shown a decline in CSRB which may be attributed to many factors such as, but not limited to, over-sampling, ineffective cotton lures, or movement into unsampled reaches. If additional reaches are added to the CSRB sampling, it may result in cutting funds for sampling of other biomonitoring datasets.

Dr. Lamon requested that the CSRB data be analyzed before additional CSRB reaches are added at the cost of ending another biomonitoring dataset.

Dr. Weckerly suggested a 2-4 year study to compare our existing information and practices to other studies on similar species. He emphasized the need for a controlled study of the cotton lure within a laboratory setting, but also countered that the conditions would not resemble that of the wild so it may need to be more of an in-situ study. There are many unknowns about the cotton lure that need to be analyzed.

All members agree that a CSRB biomonitoring Work Group is needed. Dr. Furl will put together a charge for the group that will define its goals related to the Refugia and Biological Monitoring programs.

10. Consider future meetings, dates, locations, and agendas.

Science Committee Meeting, Thursday, March 8th at 9 a.m. at the San Marcos Activity Center (Multipurpose Room).

11. Questions and comments from the public.

12. Adjourn: 12:02 pm

Scientific Evaluation Report: Nonroutine AMP Proposal - Use of SAWS ASR for Springflow Protection

Attachment 2 – Glossary of Terms

As used in the Nonroutine AMP proposal and this Glossary, the following terms have the following meanings:

“Forbearance” means the complete curtailment of all or part of a right to make withdrawals under a specific Edwards Aquifer Authority Groundwater Withdrawal Permit.

“Forbearance Agreement” is a contractual agreement whereby a party agrees to terms whereby the complete curtailment of all or part of the party’s right to make withdrawals under a specific Edwards Aquifer Authority Groundwater Withdrawal Permit is required when certain conditions, commonly referred to as “triggers” are met.

“Trigger” means to cause an event or situation to happen or exist. In the case of a Forbearance Agreement, a trigger would be a condition that causes or requires the curtailment of all or part of the right to make withdrawals under a specific Edwards Aquifer Authority Groundwater Withdrawal Permit.

“Curtail” or “Curtailment” means the act of reducing or restricting something. In the case of a Forbearance Agreement, the right to withdrawal under an Edwards Aquifer Authority Groundwater Withdrawal Permit would be reduced or restricted.

“Edwards Aquifer Authority Groundwater Withdrawal Permit” means an Initial Regular Permit or Regular Permit issued by the Edwards Aquifer Authority.

“Initial Regular Permit” means an Edwards Aquifer Authority Groundwater Withdrawal Permit issued by the Edwards Aquifer Authority under Subsection 1.16(d) of the Edwards Aquifer Authority Act.

“Edwards Aquifer Authority Act” means the Act of May 30, 1993, 73rd Leg., R.S., ch. 626, 1993 Tex. Gen. Laws 2350, as amended.

“Regular Permit” means an Edwards Aquifer Authority Groundwater Withdrawal Permit issued by the Edwards Aquifer Authority after August 12, 2008, resulting from the sale or amendment of an Initial Regular Permit or the consolidation of two or more such permits.

“Withdrawal” means an act that results in taking groundwater from the Edwards Aquifer by or through man-made facilities, including pumping.

“Lease Option” means a type of contractual agreement whereby a party has the option to lease property when certain conditions are met. In the context of the Edwards Aquifer Habitat Conservation Plan, the Edwards Aquifer Authority is charged with entering into such contracts with the option to lease an Edwards Aquifer Authority Groundwater

Scientific Evaluation Report: Nonroutine AMP Proposal - Use of SAWS ASR for Springflow Protection

Withdrawal Permit becoming actionable upon the existence of a specific ten-year rolling recharge average. The difference between a Lease Option and a Forbearance Agreement is that a Lease Option is a contractual agreement to lease property rights under certain conditions and a Forbearance Agreement is an contractual agreement to curtail withdrawal of an Edwards Aquifer Authority Groundwater Withdrawal Permit under certain conditions.

“Ten-year Rolling Average” or “10-year Rolling Average” means the unweighted arithmetic mean of the ten (10) most recent consecutive years at any given time.

“Estimated Annual Recharge” Annual recharge is estimated by the United States Geological Survey using a water-balance method that: (1) relies on precipitation and streamflow measurements in the nine (9) drainage basins indicated in "Method of Estimating Natural Recharge to the Edwards Aquifer in the San Antonio Area, Texas," 1978, USGS WRI-7810, by Celso Puente; (2) considers only precipitation and stream flow that originates over the Contributing Zone and Recharge Zone of the Edwards Aquifer; and (3) excludes interformational flows from adjacent aquifers.

“Ten-year Rolling Average Recharge” or “10-year Rolling Average Recharge” means the unweighted arithmetic mean of annual recharge to the Edwards Aquifer over the ten (10) most recent consecutive years at any given time.