M E M O R A N D U M

To: EARIP Steering Committee Members and Stakeholders

From: Robert L. Gulley
Program Manager

Date: August 10, 2010

Subject: **Background and Selected Recommendations for the September 9-10, 2010 EARIP Meeting**

I. INTRODUCTION

At the September 9-10 meeting, the Edwards Aquifer Recovery Implementation Program ("EARIP") will need to make essential decisions related to getting water to the species during a severe drought such as the drought of record. These decisions will include decisions on the engineered and management options, and minimization and mitigation measures that will form the backbone of the Habitat Conservation Plan ("HCP").

The purpose of the decisions that will be made beginning on September 9th is to arrive at the engineered and management options and minimization and mitigation measures that will be used by RECON to begin developing the draft Environmental Impact Statement and draft HCP.

These decisions will not be the final decision on these options and measures. After we finish our work in September, Thom Hardy and Ed Oborny will have to evaluate the protectiveness of our package of options and measures with input from the Science Subcommittee.

In addition, HDR may need to model the effects of some elements in our package on springflow and to provide updated cost estimates. We will also have to develop a monitoring and adaptive management plan with respect to these options and measures.

Perhaps most importantly, before the decision is finalized, we will have to develop an Implementing Agreement setting out how the HCP will be implemented and providing legally binding assurances regarding how that implementation will be paid for and by whom it will be paid.

The purpose of this memorandum is to help you prepare for decisions - - not to tell you what decisions to make. It provides both background as well as recommendations regarding the principal issues the EARIP will need to address at the meeting beginning on September 9th.

With respect to getting water to the species when the species need it, the EARIP will need to decide: (1) what are the flow targets for the Comal and San Marcos springs; and (2) how to get the amount of water needed to meet the selected flow targets (Sections I and II of this Memorandum). This memorandum also includes a recommendation for how to deal with the issue of how we pay for the implementation of the HCP and who pays what share of those costs (Section III). While these are the most important issues with respect to the HCP, it is clear that the issue of new water for future growth may be important to reaching agreement on the HCP

issues (*i.e.*, what we have referred to in previous meetings as an "Outer Circle" Issue). This memorandum provides a recommendation for dealing with that issue during our meetings in September (Section IV).

The EARIP has worked diligently for a long time to get to this decision point. As Ed Oborny said at our July 30th meeting, "it's time for you to make decisions."

II. GETTING WATER TO THE SPECIES WHEN THE SPECIES NEED IT

A. Determining the Minimum Flow Targets for the Comal and San Marcos Springs

To be able to make a sound decision on minimum flow targets for Comal and San Marcos springs, the EARIP will need to consider the following elements: (1) the flow needs of the listed species at Comal and San Marcos springs; (2) the role of uncertainty in the decision on the flow targets; and (3) the mitigation and minimization measures that need to be implemented to support the flow targets. These three elements are inter-related and essential to any decision regarding flow targets for these springs. **These are the three elements we will be discussing and considering on September 9-10 to reach agreement on flow targets for the springs.**

1. Flow Needs of the Species

The decision on the minimum flow targets at Comal and San Marcos springs is a threshold issue that should be addressed first because it (1) helps describe how much water may be needed for an engineered solution; (2) assists in the decision regarding whether or not changes in the floor of Critical Period Management ("CPM") plan are necessary or desirable, and (3) allows the effectiveness of any combination approach such as Program 2 that was referred to HDR for further analysis to be evaluated.

Thom Hardy and Ed Oborny gave their scientific views of this issue in presentations at the July 29-30 meeting. These presentations are posted on the EARIP website at http://earip.tamu.edu/Meetings.aspx?MeetingType=EARIPMeetings. Although the two presentations were generally in agreement, there appeared to be some divergent views in the two presentations.

After the July meeting, I talked with Thom and Ed to clarify areas of agreement and disagreement. I told them that I was not seeking consensus, but simply trying to be sure that they were fully discussing their respective points of view.

Based on these discussions, Thom and Ed both agree that any flow target below 80 cfs at San Marcos Springs will require effective recreational controls to be put in place. Additionally, there is general agreement that:

- any flows below 60 cfs will require Environmental Restoration and Protected Areas ("ERPAs") or ERPA components including maintenance of surface connectivity of surface and subsurface flows at spring run 3 at Comal Springs;
- exotic vegetation will be replaced with Texas wild rice in areas of suitable Texas wild rice habitat at San Marcos Springs; and
- habitat restoration and maintenance at both Comal and San Marcos springs.

Additionally, both believe that control of gill parasites and exotic species are necessary at both springs.

Both Thom and Ed may now be able to get comfortable with flow minimums as low as 30 at Comal Springs, if the consecutive time at these minimum flows is sufficiently short and is interrupted by periods of higher flows (*i.e.*, pulses).[1] Ed believes pulses are needed at all minimum flows below 60 cfs at Comal Springs.

Both Thom and Ed also agree that a key factor at this flow level is aquatic vegetation response in Landa Lake. Should massive die-offs of aquatic vegetation occur, then duration will play an even larger role in the assessment. Should modeling show that aquatic vegetation can persist at these flow levels, longer durations at these flows may be possible.[2]

Both Thom and Ed may get comfortable with flow minimums as low as 45 cfs at San Marcos if the consecutive time at these minimum flows is sufficiently short and is interrupted by periods of higher flows (*i.e.*, pulses).

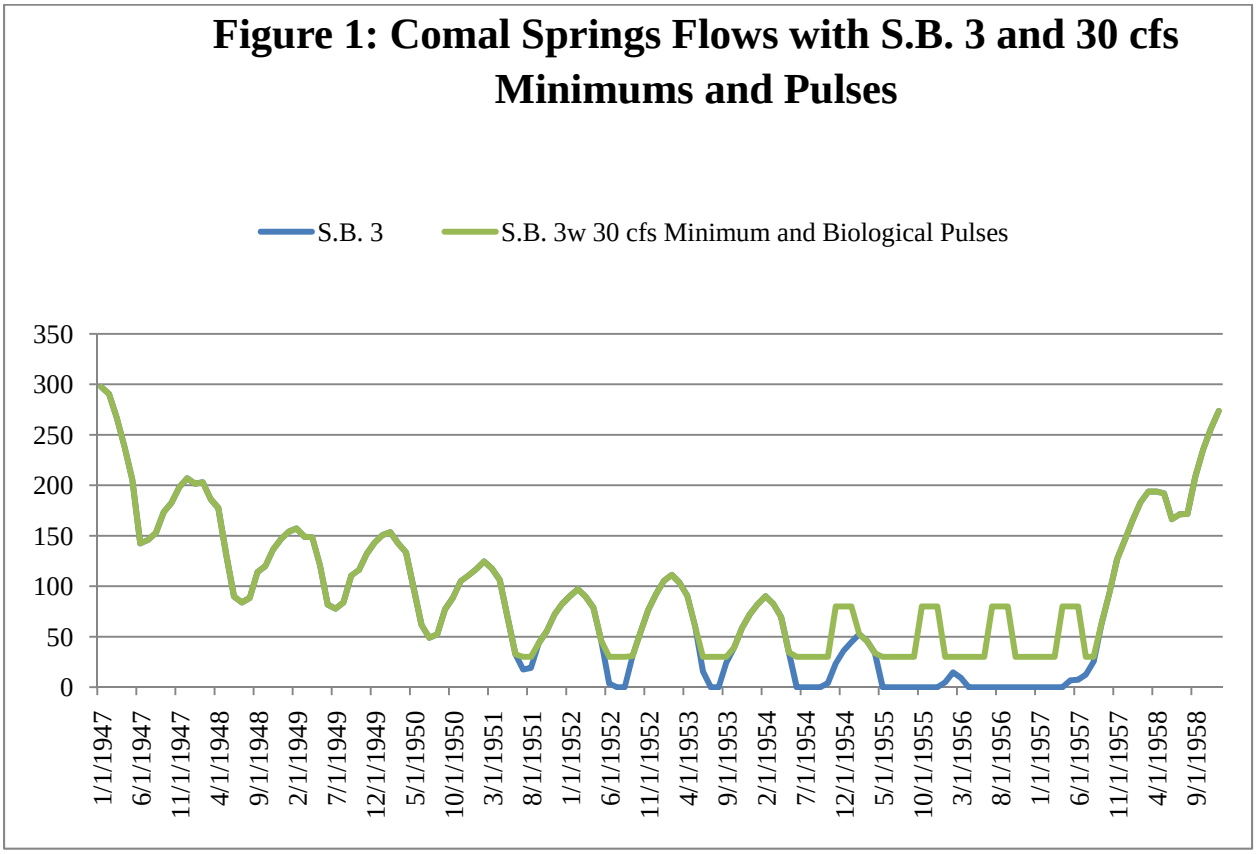
Thom will conduct a model run to examine the biological effects of maintaining minimum flows at 30 cfs at Comal Springs and 45 cfs at San Marcos Springs over the period of the drought of record. When the duration of a minimum flow lasts longer than 6 months an 80 cfs "biological pulse" lasting 3 months will be included in the flow regime. Figure 1 below illustrates the flow regime that will be modeled at Comal Springs over the drought of record.

At this time, neither Thom nor Ed is advocating that this flow regime will be protective, but they agree that it will provide a good starting point for describing the range of acceptable flows below 60 cfs.

[1] The biological pulses create an additional water deficit that may require additional water to satisfy the flow requirement. Karl Dreher has pointed out to me that not all of that water would necessarily have to be stored or created through management measures. During the period where flows are at zero, fluctuations (*i.e.*, pulses) in the Aquifer level due to rainfall and seasonal pumping are obscured. If these fluctuations can be identified and quantified after the EARIP selects its flow targets, Thom and Ed will have to evaluate whether they are biologically adequate without further supplementation. Further, Table 2 does not reflect these potential springflow fluctuations. The amount of water in these fluctuations would have to be considered by HDR in calculating the actual storage required for an engineered solution.

[2] Until this answered, neither Ed nor Thom are actually comfortable with 30 cfs at Comal Springs. Thom is currently working on answering this question via Dissolved Oxygen modeling of Landa Lake.

Figure 1: Comal Springs Flows with S.B. 3 and 30 cfs Minimums and Pulses



Thom and Ed will meet in early September to discuss the results of the modeling and to prepare a joint presentation for the EARIP on September 9th. At the end, they may not agree on all points, but this approach should clarify any differences.

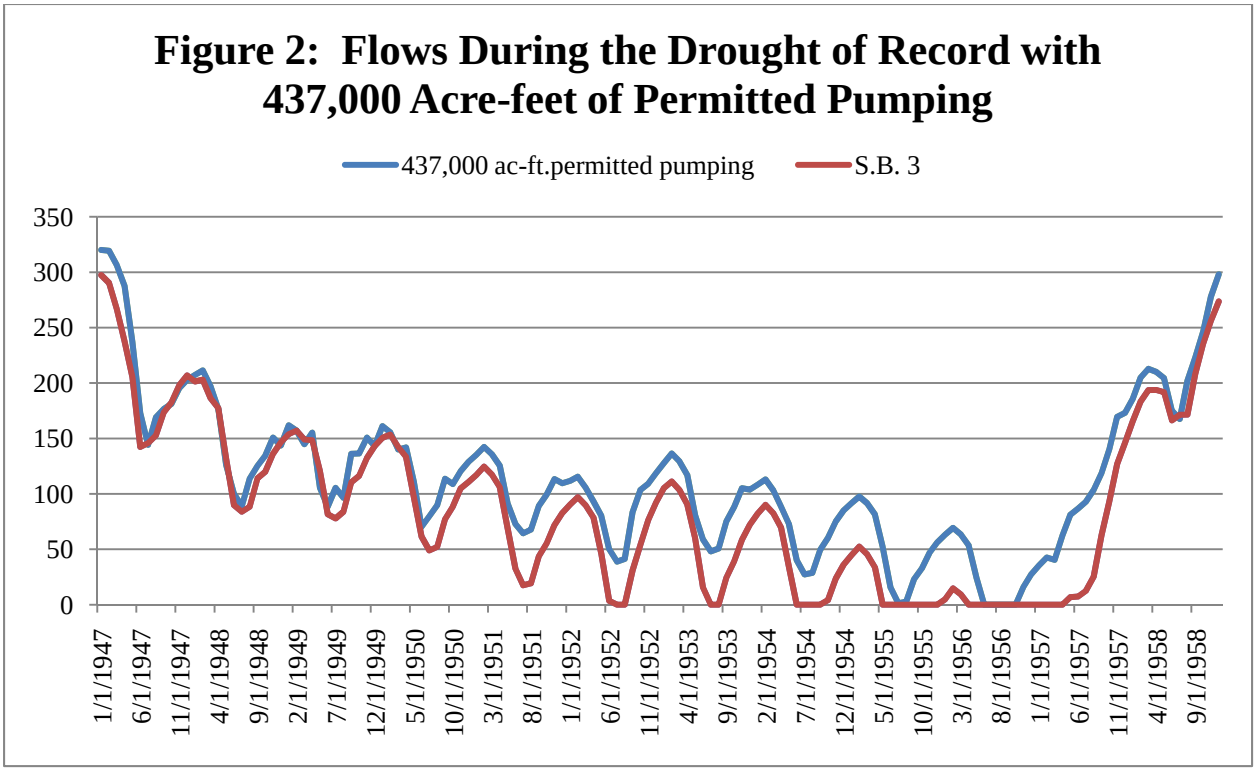
2. Role of Uncertainty in the Decision on the Flow Targets

Uncertainty (*i.e.*, risk) should play a role in your evaluation of the protectiveness of any flow regime.

The use of a model to simulate flow conditions in the drought of record necessarily brings uncertainty. This uncertainty is further exacerbated by uncertainty regarding the conditions that actually may precede a severe drought, and the uncertainty regarding whether, over the duration of the HCP, we will encounter several shorter, severe droughts that are closely related temporally rather than one long sustained event. This uncertainty is furthered by the inherent complex nature of biological systems particular to the Comal and San Marcos springs.

On the other side of the uncertainty equation, the modeling used to simulate flow conditions during the drought of record assumes that a total of 592,000 acre-feet is being pumped (permitted water, domestic and livestock water, and unpermitted water for federal facilities). In fact, that amount of water has never been pumped from the Edwards Aquifer in one year. The highest total annual pumping of 542,400 acre-feet occurred in 1989 before the creation of the Edwards Aquifer Authority. Moreover, over the last 10 years (2000-2009) total pumping has averaged 381,000 acre-feet, with a maximum total pumping of 456,500 acre-feet in 2006 and a minimum total pumping of 317,600 acre-feet in 2004. Further, as a practical matter, because of critical period restrictions, an annual total of 592,000 acre-feet probably will never be pumped.

Figure 2 below illustrates the potential conservatism of the model runs using the 592,000 acre-feet total annual pumping amount. The Science Subcommittee's Run No. 18 assumes 437,000 acre-feet per year of permitted pumping with critical period reductions for both the San Antonio Pool and Uvalde Pool of zero percent for Stages 1 and 2, 20% for Stage 3, and 35% for Stage 4. The number of months with flows below zero drops from 29 under the S.B. 3 scenario to 5 months under the 437,000 scenario.



There are differences between Run No. 18 and the simulations HDR is using for S.B. 3 (*e.g.*, CPM stages and using only permitted pumping). Thus, this comparison is only generally illustrative of the potential conservatism in the simulations using 592,000 acre-feet of withdrawals.

To more accurately identify the conservatism in using 592,000 acre-feet of withdrawals, I have asked the EAA if it would do a simulation run done using the S.B. 3 critical period assumptions and a total withdrawal amount of 456,500 acre-feet (the maximum total pumping in the last 10 years) to at least get a better handle on this uncertainty factor for our discussions.

Uncertainty often leads to conservative decision-making. In the context of an HCP, a robust adaptive management is one way to minimize the need for this conservative approach. Another way to deal with uncertainty is with the duration of an incidental take permit ("ITP") -- *i.e.*, a short duration permit has less inherent uncertainly that a long duration permit.

The EARIP has already tentatively agreed to use a permit duration of 25 years or less, in part, to minimize the uncertainty of climate change. An even shorter permit period could be used to address some of the uncertainty regarding the protectiveness of the flow targets. We could, for example, use a 10-year initial permit term. If we were to do so, the HCP would still have to meet all of the requirements for issuance. However, the United States Fish & Wildlife Service ("FWS") would take into account the duration of the ITP in evaluating the risks. A shorter

duration permit should present lower risk because the likelihood of a severe drought such as the drought of record would be less over the next 10 years than it would be over the next 25 years.[3]

3. Mitigation & Minimization Measures

Both Thom Hardy and Ed Oborny made it very clear that mitigation and minimization measures were central to their ability to support a range of lower flow targets.[4] Accordingly, the mitigation and minimization measures should be considered as part of the flow target determination. Table 1 below summarizes the mitigation measures that we have most frequently discussed in the context of flow targets:

TABLE 1: MITIGATION AND MINIMIZATION MEASURES RELATED TO FLOW TARGETS

Measure	Cost	Comments
Habitat Restoration including Exotics Removal	<$3,000,000 (Ecosystem Restoration Work Group)	Additional cost information will be provided with the Notice for the September 9-10 meeting
ERPAs (aka IMAs)	Up to $2,750,000 plus approximately $250,000 in annual costs (Bio-West)	
Contribute to Upgrading Refugia at NFH&TC	$750,000 annually for personnel costs, 300,000 for equipment and 1.55 million for buildings. It does not include the office and money for backup refugia (Brandt)	
Recreational Controls for San Marcos Scientific Study Area	Not currently known	Largely legislative or regulatory solution but it may involve some costs, *e.g.*, booms, signage, education programs
Recreational Controls for New Braunfels Adaptive Management Program	Not currently known	
Water Quality Issues	Not currently known	Recommendations from the Project Work Group will be included with the Notice for the September 9 meeting. Some of the recommendations may address actions that contribute to recovery
Gill Parasite Control	Not currently known	Feasibility study will be completed in October/November

[3] The Implementing Agreement for any shorter duration permit probably would have to include robust monitoring and adaptive management plans focused on the actual biological effects of different flow levels, the options for water storage and a firm commitment to a process for ensuring that any necessary new projects could actually be implemented as soon as the permit renewal is approved.

[4] You will recall that the Science Subcommittee's flow requirements were not only recovery standards but assumed that no mitigation and minimization measures would be put in place.

A more detailed discussion of the potential mitigation and minimization measures including costs can be found in Attachments 2, 3, and 4 to the Agenda for the June 29, 2010 meeting. http://earip.tamu.edu/Meetings.aspx?MeetingType=EARIPMeetings

4. Recommended Approach for Addressing Minimum Flow Targets

I recommend that we begin our discussions on September 9th with a relatively brief presentation by Thom Hardy and Ed Oborny on the latest modeling run and summarizing their respective views on the flow targets. Then, we should see if we can reach consensus on flow targets for Comal and San Marcos springs. I further recommend that you formally adopt the mitigation and minimization measures that were tentatively approved at our June 29th meeting for purposes of Thom Hardy's and Ed Oborny's work. *See* Attachment 1.

B. How To Get the Amount of Water Needed To Meet the Selected Flow Targets

1. What Amount of Water is Needed to Meet the Selected Flow Targets?

Your decision regarding the flow targets will affect the amount of water needed to maintain springflows at the selected level. This is true whether the flow regime is achieved solely through an engineered solution such as an ASR, a combination of an engineered solution and changes to the floor in the CPM plan, or through the use of management strategies to increase springflow during severe drought. The differences in the amount of water that would needed are shown in Table 2. Attached hereto as Attachment 2.

Table 2 sets out the water required at three different CPM floors (340,000, 320,000, and 286,000 acre-feet) and minimum flows of 30, 40 and 50 cfs at Comal Springs and minimum flows of 45, 55, 60 and 75 cfs at San Marcos Springs. The "deficit" column is the amount of additional water needed in the springs to achieve the specified flow level. The "storage needs" column is the amount of water that is needed to satisfy the deficit taking into account the inefficiency of injection/recharge to supplement springflow or pumping cuts.[5]

The "deficit with pulses" column is the total amount of water needed at the springs to satisfy the flow minimum and 80 cfs pulses when the duration of a minimum flow lasts longer than 6 months. "Storage needs with pulses" is the amount of water that must be stored to satisfy the "deficit with pulses" taking into account the inefficiency of injection/recharge to supplement springflow or pumping cuts.

The amount of water required in storage for an engineered solution varies considerably depending on the minimum flow target. For example, with a CPM floor of 340,000 acre-feet, the water required in storage to supplement springflow at Comal Springs without pulses ranges from 111,180, if the minimum flow target is 30 cfs, to 209,610 acre-feet if the minimum flow target is 50 cfs.

[5] I am using an inefficiency factor of 1.7 for Comal Springs and 1.2 for San Marcos Springs based on discussions with HDR. The actual modeled inefficiencies may vary somewhat in the final report, but these approximations seem reasonable for now.

If it is necessary to provide water for the biological pulses,[6] the amount of additional water could be significant. Without pulses, the water required in storage to maintain a 30 cfs flow minimum at Comal Springs with a CPM floor of 340,000 acre-feet is 111,180 acre-feet. However, if pulses are used, the water required increases to 169,660 acre-feet.

2. What Are the Approaches for Getting the Needed Water to the Species?

Three different approaches emerge in the programs presented to HDR that I believe provide a basis for deciding how to get the amount of water we need to meet the flow targets.

First Approach: Use only an engineered solution – a large ASR or R&R.

Second Approach: Use reductions in the floor of the CPM plan to reduce the amount of water needed for an engineered solution.

Third Approach: Use various small projects involving primarily aquifer management options that collectively achieve the targeted springflow or that cut down the amount of water needed to be stored to obtain a particular flow target with an engineered solution.

I address each of these approaches below.

a. Projects Involving an Engineered Solution that Substantially Or Completely Attains the Flow Targets[7]

We have considered three options that potentially have the ability to substantially or completely attain the flow targets:

(1) Recharge and Recirculation ("R&R") that stores water in the Edwards Aquifer that is released to be discharged at the springs during severe drought;

(2) One or more large ASRs to store the needed water either for recharge/injection near the springs to supplement springflow or as water to trade off for additional pumping cuts during severe drought; and

(3) Quarries to store water either for recharge/injection near the springs to supplement springflow or as water to trade off for additional pumping cuts during severe drought.

Table 3 below summarizes some of the information we have learned about these engineered options:

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[6] *See supra* at n. 1.

[7] Pumping cuts during CPM to below 250,000 acre-feet would be required simply to maintain springflows above 0 cfs at Comal Springs. *See* January 25 Facilitation Meeting Attachment: Times Below Specified Flow Levels. Significant further cuts would be needed to obtain the magnitude of flow targets we are currently discussing. *Id.* We have previously recognized that it would politically impossible to implement such reductions. I am assuming for purposes of this memorandum that solely using such cuts to satisfy the flow targets is not on the table for discussion.

TABLE 3: ENGINEERED SOLUTION INFORMATION SUMMARY		
Option	**Cost**	**Comments**
R&R	Project costs of $971,000,000 without cost of protection for San Marcos Springs and annual costs of approximately $80,000,000 (HDR)	• The ability of this option to ensure at least 30 cfs springflows at Comal Springs has not been demonstrated. • The suitability of the MODFLOW model to evaluate this option has been called into question
ASRs	$660,000,000 for 145,000 acre-feet of storage (HDR)	• The ability to find storage capacity for this amount of water has not been demonstrated • We do not fully understand the difficulties or costs associated with obtaining approvals from the groundwater districts
Quarries	$225,000,000 just to convert 25,000 acre-feet for storage (HDR)	• Limited capacity (probably no more than 50,000 acre-feet) • Treatment will probably be required

The limited availability of quarry capacity near the springs appears to negate their utility as an option that can substantially or completely attain the flow targets. Quarries may, however, be part of a solution in combination with other options that may benefit springflow during drought.

Even without final cost estimates from HDR,[8] we know already that the remaining engineered solutions are going to be very expensive. An ASR storing only 145,000 acre-feet of water will cost at least $660,000,000. R&R could cost in excess of $1 billion when measures to protect San Marcos Springs are added. Moreover, depending on the flow target[9], the amount of water required to be stored whether in an ASR or the Edwards Aquifer may be make the projects technically infeasible or impractical.

b. Reductions in the Floor for CPM

As discussed above, reducing the floor in the CPM plan will substantially reduce the water need for an engineered solution. Tables 4 and 5 summarize the effects of lowering the CPM floor on the amount of water, including the biological pulses, needed in storage to satisfy particular floor requirements assuming CPM floors of 340,000, 320,000, and 286,000 acre-feet.

[8] HDR is currently evaluating the following programs: 1) large ASR with Injection/Recharge (2) a Combination Program including dry year option, Type 2 recharge enhancements, brush management with storage at Canyon Reservoir, and the use of the SAWS ASR; (3) Recharge and Recirculation; and (4) ASR(s) with Tradeoffs Instead of Injection/Recharge. HDR will make a presentation to the EARIP on either September 9 or 10. HDR will provide a PowerPoint of that presentation by September 2, 2010. I expect that presentation will clarify and extend their earlier reports and provide additional new information. It probably will not substantially change the cost work that has already been reported.

[9] *See supra* at p.7.

Table 4 is a summary of the storage needs for different combinations of flows at Comal and San Marcos springs without pulses.

TABLE 4: TOTAL STORAGE WATER WITHOUT PULSES REQUIRED AT DIFFERENT CPM FLOORS						
			SAN MARCOS SPRINGS			
			45 cfs	55 cfs	60 cfs	75 cfs
COMAL SPRINGS	30 cfs	340,000	124,140	134,940	142,620	176,700
		320,000	72,260	77,780	83,060	111,620
		286,000	27,970	30,610	33,010	55,330
	40 cfs	340,000	171,570	182,370	190,050	224,130
		320,000	105,750	111,270	116,550	145,110
		286,000	44,120	46,760	49,160	71,480
	50 cfs	340,000	222,570	233,370	241,050	275,130
		320,000	145,530	151,050	156,330	184,890
		286,000	66,220	68,860	71,260	93,580

Table 5 below is a summary of the storage needs for different combinations of flows at Comal and San Marcos springs with pulses.[10] For example, if the flow target were 40 cfs at Comal Springs and 55 cfs at San Marcos Springs (highlighted), the amount of water needed in storage with pulses at CPM floors of 340,000, 320,000, and 286,000 acre-feet would be 241,190, 154,760, and 58,830 acre-feet, respectively.

			SAN MARCOS SPRINGS			
			45 cfs	55 cfs	60 cfs	75 cfs
COMAL SPRINGS	30 cfs	340,000	196,300	207,700	212,103	238,426
		320,000	116,460	130,620	139,980	159,180
		286,000	54,612	57,252	67,452	86,292
	40 cfs	340,000	229,790	241,190	245,593	271,916
		320,000	140,600	154,760	164,120	183,320
		286,000	56,190	58,830	69,030	87,870
	50 cfs	340,000	272,460	283,860	288,263	314,586
		320,000	172,730	186,890	196,250	215,450
		286,000	92,060	94,700	104,900	123,740

It is apparent that reductions in the floor during CPM can be used to make an engineered solution more feasible and less expensive. If we pursue this option, there is a yet to be quantified cost associated with this approach in that pumpers will have to find other sources of water to

[10] *See supra* at n.1.

satisfy their demand.[11] This cost may be particularly burdensome on irrigation, industrial and smaller municipal pumpers.

c. Projects that Benefit Springflow during Severe Drought That Could Be Used Collectively to Satisfy Springflow Targets

This third approach uses the principles underlying the Combination Option in Program 2 that HDR is evaluating. The approach begins the effort to attain minimal flow targets with options involving primarily non-engineered solutions.

Some believe that it is possible that these options could collectively achieve the flow targets. However, even if these options alone are unable to attain the required minimum flow targets, they may reduce the "gap" to make a smaller engineered solution feasible.

The options that we have discussed that benefit springflow during severe drought that could be used to build a solution that satisfies springflow targets include: [12]

(1) dry year option;

(2) brush management in the Upper Guadalupe watershed to store water in Canyon Reservoir ("Brush Management and Canyon Reservoir");

(3) SAWS agreement to use specified amounts of water from its ASR to satisfy its water demand and to make corresponding pumping cuts during CPM ("SAWS ASR");

(4) construct Type 2 recharge structures at Lower Frio, Sabinal, Hondo, Verde, Salado Creek FRS, and Cibolo ("Type 2 Recharge Enhancements"); and

(5) conservation measures.

A brief summary of these options is set out in Table 6 below:

[11] One of HDR's deliverables is to summarize relevant cost information regarding recommended non-Edwards water management strategies in the 2011 South Central Texas Regional Water Plan which could be used to offset reductions in permitted withdrawals from the Edwards Aquifer.

[12] Two other projects have been discussed that may be of benefit to the HCP. Larry Hoffman discussed springflow enhancement as an option but has not made any specific proposal. The Project Management Work group is evaluating a Brush Management Project to supplement springflows at San Marcos Springs. Such a project is likely to last 10 years and cost approximately $7,500,000 (TAMU). It is unlikely that such a project will actually yield benefits at the springs that can be quantified, although previous work suggests that such benefits are likely to occur.

TABLE 6: POTENTIAL PROJECTS TO BENEFIT SPRINGFLOW		
Project	**Costs**	**Comments**
Dry Year Option	$51,000,000 for 10 year 20,000 acre-ft program (DYO Work Group)	Approximately 68,500 acre-ft of enhanced flow at Comal Springs and 12,000 acre-feet at San Marcos Springs during the drought of record (DYO Work Group)
Brush Management and Canyon Reservoir	$42,000,000 not including cost of delivery for injection or trade off (Region L)	• Firm yield of 5600 acre-feet in Canyon (Region L) • Uncertain if or how much yield TCEQ will permit • Being evaluated by HDR only as a supplementation project for San Marcos Springs
SAWS ASR	Unknown at this time	The water from the SAWS' ASR will be used as source water for trade-off with SAWS, which will result in an equivalent reduction in SAWS' permitted pumping. The water from SAWS' ASR would be limited to: • 30 MGD for up to 200 days during Stage 3. • 30 MGD for up to 200 days during Stage 4. • Total allocation of water stored in SAWS ASR facility for this program is not to exceed 40,000 acre-ft during a given drought.
Type 2 Recharge Enhancements	$150,000,000 with annual costs of approximately $12,000,000 (Region L)	• These structures clearly reduce the time in CPM and contribute to springflow during the early stages of a severe drought • HDR will tell us how much, if any, benefit these structures can provide to springflow at the later part of a severe drought such as the drought of record
Conservation Measures	Unknown at this time	The Conservation Work Group will provide its recommendations with the Notice for the September 9 meeting

3. Recommended Approach

I believe a solution that alone substantially or completely attains the flow targets may prove not to be either technically or economically feasible. More likely, the EARIP will need to focus on an approach that reduces the amount of water needed for an engineered solution (the "gap") either through reductions in the CPM floor or through other management measures that reduce the magnitude of the engineered solution.

While deep reductions in the CPM floor can make an engineered solution feasible, I believe it may be extraordinarily difficult, if not impossible, to reach consensus on such an approach. Modest reductions in the CPM floor may, depending on the flow targets, make the

engineered solutions more feasible. It also may be difficult to reach agreement on even a modest reduction of the floor to 320,000 acre-feet.

Accordingly, on September 9-10, I suggest that we discuss briefly the EARIP's views on the feasibility of using only an engineered solution. Then, the EARIP should focus on developing a combination of predominately management options to try to reduce the size of any engineered solution that may be needed. The management options may include, but certainly would not be limited to, the measures currently being analyzed by HDR in Program 2: the dry year option, brush management and Canyon Reservoir, Type 2 enhancements, and use of water from SAWS's ASR. If the selected flow targets cannot be attained at either Comal or San Marcos springs, smaller engineered solutions may need to be added. As shown in Table 6 above, even with using this approach, the cost of implementing the results of such a "bottom up" approach will, nonetheless, be substantial.

I know that some Stakeholders believe strongly that SAWS must decrease its dependency on Edwards Aquifer water. I suggest that such concerns be addressed as an "Outer Circle" Issue (*see* Section IV below) rather than through the selection of an option for achieving the flow targets unless the flow targets cannot otherwise be achieved or achieved at an acceptable cost.

III. PAYING FOR IMPLEMENTATION OF THE HCP

The questions of how the EARIP is going to pay for the implementation of the HCP and who is going to pay what part of those costs are of paramount concern to most if not all of the Stakeholders. Whatever the EARIP decides, the cost of implementing the HCP will be very expensive.

The prospect of significant federal funding was a strong inducement to some or many of you to participate in the EARIP. Whatever those prospects may have been when the EARIP began, they are markedly diminished now. Moreover, the prospects for any significant State funding simply is non-existent. Nonetheless, I believe that we have made too much progress to let this funding obstacle, however significant, derail the process at this point.

For now, I recommend that we forego any discussion of how the EARIP is going to pay for implementation of the HCP and who is going to pay what part of those costs until we have agreement on the elements of the HCP.

Any HCP must satisfy all of the incidental take permit issuance requirements. Those requirements, however, can be satisfied in many ways. **We should try to limit our discussion for now to those activities essential to the issuance of the Incidental Take Permit and to try to look for the most cost-effective way of meeting those requirements. After we have completed those discussions, in subsequent meetings, we can address the elements necessary to achieve our obligations as a "recovery implementation program" to contribute to the recovery of the species.**

Once we have completed these discussions, we can take the package to some or all of the Texas congressional delegation to better assess the prospects are for federal funding. Perhaps we can obtain assistance from our state legislative delegations to gain an audience with the entire congressional delegation. The significance of and national attention given to the challenges we face may work to our advantage

With knowledge of what we are actually seeking to fund and better knowledge of the prospects of third-party funding, we can begin our discussions of funding in the context of the Implementing Agreement.

We may need to revisit our decisions made in September as a result of the discussions regarding the Implementing Agreement.

IV. "OUTER CIRCLE" ISSUES

A. New Water for Growth

Very early in the facilitation process, we identified two categories of decisions we would need to make – decisions directly related to meeting the requirements for issuance of the ITP ("Inner Circle" Issues), and issues that may not be directly related to the satisfying the issuance requirements, but are nonetheless viewed by some as essential to reaching consensus ("Outer Circle" Issues). I think this distinction is important because it allows discussions to move forward on the HCP issues based solely on the science and issuance criteria while preserving, and in no way diminishing the importance of, issues such as the use of non-Edwards Aquifer water.

Tom Taggart with the support of others has said that his support for the types of options we are considering may depend upon the assurances he receives regarding how SAWS intends to obtain water to support new growth. We have talked very generally about the new growth issue but have not addressed the issue in the context of a specific proposal. I have asked Tom to put together a more concrete proposal with respect to his, and perhaps others, expectations on this issue. His proposal will be included with the Notice for the September 9-10 meeting. **I encourage others interested in this issue or related issues to submit a concrete proposal(s) by August 27, 2010 for distribution with the meeting notice.**

This "Outer Circle" Issue should be discussed <u>in the September meetings</u> after consideration of how we get water to the species but before we reach any decision on that issue. We may want to consider whether discussions between SAWS and a small number of the proponents of such measures take place before the issue is taken up by the EARIP as a whole.

SEPTEMBER 9 AND 10 EARIP MEETING

Joe, Patrick, and I agree that it is better not to have a formal agenda for the meetings. We also believe it is not necessary to spend an undue amount of time with informational presentations.

We suggest that we begin our deliberations with the threshold issue of minimum flow targets. I have asked Thom and Ed to make their presentation to begin these discussions. After that, we will probably generally try to follow the outline in this Memorandum. HDR's presentation will be used to kick off the discussion of how to get the amount of water needed to meet the selected flow targets.

As Joe and Patrick have repeatedly reminded us, we need to come to this meeting with open minds and be prepared to engage in productive dialogue about the challenges we face. Our joint work has been very productive, and you have engaged in thoughtful dialogue. This meeting requires that you simultaneously both consider the individual interests of your organization as well as the combined interest of all using and protecting the aquifer.

Please plan on two full days (9 a.m. to 5 p.m.) for those meetings.

ATTACHMENT 1

COMBINED MITIGATION AND MINIMIZATION ASSUMPTIONS TENTATIVELY AGREED TO ON JUNE 29, 2010

San Marcos Springs

1. Protect wild rice: access and exclusion zones, floating vegetation removal and sediment removal
2. Control exotics: domestic waterfowl, hydrilla, nutria, and armored catfish
3. Increase enforcement of park rules especially aquarium dumping
4. Include landowners in riparian management
5. Re-introduce native riparian vegetation
6. Create buffer zone along river's edge
7. Prepare emergency plan in the event of dam failure
8. Conduct annual monitoring of biota
9. Remove invasive plants

Comal Springs

1. Control exotics: Tilapia and armored catfish
2. Optimize fountain darter habitat in the old and new channel
3. Establish riparian zones and remove sediment in selected areas to promote beetle habitat
4. Control gill parasites
5. ERPAs
6. Establish riparian zones (parks, golf course) by removing non-natives, planting natives
7. Remove Elephant ear plants and replace with native vegetation
8. Control aquarium dumping
9. Implement BMPs to address stormwater runoff in and around Landa Lake
10. Develop household hazardous waste collection program
11. Implement an aerobic and anaerobic septic system registration program
12. Aquire land acquisition for conservation and green space to fit EARIP goals and objectives
13. Convert impervious cover to pervious cover
14. Restore riparian zones along tributaries

15. Monitor water quality

San Marcos and Comal (Bio-West)

1. Ensure water quality of springflow resulting from any engineered solution

2. ERPAs at both Comal and San Marcos that are established in advance of any drought and includes total coverage of wild rice of approximately 1000 m^2

3. Address recreational impacts to species