

Summary of Existing Documents Pertinent to Development of the EARIP HCP and EIS

Prepared for RECON

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1.0 Understanding of the Scope of Work Covered by this Report

Activities covered by this report are described in Task 1 of the Prime Contract between Texas Agrilife Extension of the Texas A&M University System and RECON Environmental, Inc. Task 1 states that a report shall be submitted detailing 1) the changes or revisions that would be required to the Edwards Aquifer Authority's Draft Environmental Impact Statement (DEIS) dated July 2004 (as amended 9/21/04) to prepare an updated DEIS; 2) additional scientific information that must be obtained to complete the document and 3) an updated timeline for completing the document.

This task was further refined in the subconsultant agreement between RECON Environmental, Inc and Hicks & Company to include the following subtasks:

- Subtask 1a Review the Existing EAA HCP/EIS
- Subtask 1b Review the Hardy Study, the Draft San Marcos EIS and HCP, and other scientific background data to evaluate what additional data and information are needed to complete the documents
- Subtask 1c Prepare an existing Documents Summary Report

This report is a key deliverable responding to Subtask 1c and provides a summary of the conclusions and findings identified by Subtask 1a and 1b, above.

2.0 Review of the Existing EAA HCP/EIS

The Edwards Aquifer Authority's Draft HCP/EIS dated July 2004 (as amended 09/21/2004) was prepared as a combined document by the Hicks & Company/RECON team. The HCP was intended to support an application for a Section 10(a)(1)(B) Incidental Take Permit pursuant to Section 10(a) of the Endangered Species Act of 1973, and identify a long-term, regional plan that would optimize use of the Edwards Aquifer while adequately protecting federally-listed species dependent upon the aquifer and springflow from Comal and San Marcos Springs, and minimizing the negative impact of the plan on the regional economy and economic interests of all of the stakeholders. Species covered by the HCP included eight endangered species—the Texas blind salamander (*Eurycea rathbuni*), fountain darter (*Etheostoma fonticola*), San Marcos gambusia (*Gambusia georgei*), Texas wild-rice (*Zizania texana*), Comal Springs riffle beetle (*Heterelmis comalensis*), Comal Springs dryopid beetle (*Stygoparnus comalensis*), Peck's cave amphipod (*Stygobromus pecki*), and whooping crane (*Grus americana*)—and one threatened species, the San Marcos salamander (*Eurycea nana*). The whooping crane is dependent on marshes and wetlands in the Guadalupe River Estuary that are sustained by freshwater inflows from the San Antonio and Guadalupe Rivers and from discharge of the Edwards Aquifer at Comal and San Marcos Springs which contributes flow to the Guadalupe River via the Comal and San Marcos Rivers, respectively. Cagle's map turtle (*Graptemys caglei*), was also included as a covered species, because it was a candidate for future listing. The EIS was prepared pursuant to requirements of NEPA to support the issuance by the U.S. Fish and Wildlife Service (FWS) of a Section 10(a) Incidental Take Permit, a federal action.

2.1 Components of the DHCP/EIS Document

The DHCP/EIS is a 787-page document that is divided into eleven chapters and nine appendices. The main document (excluding appendices) includes 532 pages, 77 supporting tables, and 51 figures. The document chapters and major subsections are as follows:

Abstract. This is a one page summary which provides a statement of the development of an HCP and EIS, lists the endangered species involved, and what is expected from preparation of the HCP.

Chapter 1, Purpose and Need. This chapter provides background concerning the actions that are being proposed and justification for why the actions are proposed. A description of the scoping process and summary of public involvement is provided. A discussion of the extent of the scope of the EIS and other required actions is included.

Chapter 2, Alternatives Including the Proposed Action. This chapter describes, summarizes, and compares four alternatives evaluated in the EIS. A section discussing alternatives eliminated from further consideration is included. Alternatives evaluated and eliminated from further consideration included no pumping restrictions on aquifer pumping, development of a regional habitat conservation plan mandated by court order, and extending existing or proposed habitat conservation plans/proposals developed by other entities. Alternatives developed for the EIS include:

- Alternative 1, No Action;
- Alternative 2, Regional Permit-Highly Restricted Aquifer Pumping;
- Alternative 3, Regional Permit-EAA Proposed HCP; and,
- Alternative 4, Regional Permit-Least Restricted Aquifer Pumping.

For each of the four alternatives, descriptions are provided for the Plan Area, Permit Area, incidental take, measures to minimize potential impacts, measures to mitigate and monitor potential impacts, implementing roles of the Authority HCP plan participants, funding, and plan amendment procedures. A table summarizing comparison of the alternatives is also included.

Chapter 3, Affected Environment. This chapter provides a description of existing conditions of the major components of the human environment that may be affected by the proposed actions. Major components and summary of descriptions include:

Section 3.1, Biological Resources – This section includes several categories:

- Regional Flora and Fauna – Describes regional vegetational/ecological areas, and biotic provinces with occurring wildlife and lists rare species not endemic to the Edwards Aquifer, Comal Springs, or San Marcos Springs.
- Animal and Plant Species in the Edwards Aquifer, Comal Springs, San Marcos Springs, and Karst Ecosystems – Detailed descriptions of these ecosystems are provided, including listed rare species and associated natural history, and species of concern/proposed for listing.
- Species covered by the Section 10(a) Permit – Includes descriptions of eight listed species and one candidate species proposed for listing.
- Species of Concern/Proposed for Listing – Includes descriptions of aquatic and terrestrial organisms that are considered rare and subject to future threat.

Section 3.2, Physical Environment – This section discusses climate, geology and soils of the southern portion of the Edwards Aquifer, San Marcos Springs, and Comal Springs.

Section 3.3, Water Resources – Descriptions are provided for:

- Status of surface water in the Guadalupe, San Antonio, and Nueces River Basins. Within the Guadalupe River Basin a discussion of the contribution of aquifer springflow to the lower Guadalupe River and San Antonio Bay is provided.
- Comal Springs, San Marcos Springs and other aquifer-fed springs.
- Status of surface water quality in each of the basins.

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- Southern Edwards Aquifer including its major zones, hydraulic properties, groundwater quality, and interrelationships of recharge, discharge, effects of pumping and spring discharge.

Section 3.4, Agriculture – This section describes existing agricultural production, water use for agricultural purposes, and other specific agricultural enterprises that may be affected by the proposed actions.

Section 3.5, Demographics – This section divides the HCP Planning Area into four regions and describes population growth, population projections, population density and projected water supply and demand for each of the regions.

Section 3.6, Economy – A description of major components of the economy including services, trade, manufacturing, transportation, communication, public utilities, recreation, and tourism is provided for each of the four regions in the HCP Planning Area.

Section 3.7, Land Use – This section provides a description and lists the extent of areal coverage of major types of land uses within each of the four regions of the HCP Planning Area. The major land uses include crops, pasture, rangeland, urban, transportation, surface water, lands held by federal interests, and a miscellaneous category.

Section 3.8, Cultural Resources – A cultural history and description of cultural resources is provided for San Marcos Springs and Comal Springs.

Section 3.9, Air Quality – A discussion of pollutant dispersion characteristics, relevant pollutants, compliance standards and status of compliance is provided for the Edwards Aquifer region.

Chapter 4, Environmental Consequences. Evaluation of the environmental consequences of each of the four EIS alternatives is presented for the following environmental components:

Section 4.1, Biological Resources – Regional - includes regional aquatic and terrestrial resources.

Section 4.2, Biological Resources of Comal Springs, San Marcos Springs and Other Spring Ecosystems.

Section 4.3, Physical Environment - includes climate, geology, and soils.

Section 4.4, Water Resources - includes surface water and water quality in the Guadalupe, San Antonio, and Nueces River Basins; aquifer-fed springs; and groundwater.

Section 4.5, Agricultural and Urban Land Use Changes - includes changes in agricultural production and resulting land use, including changes in the urban landscape.

Section 4.6, Social Resources – includes effects on population, minority and low income populations, and community and public resources.

Section 4.7, Economics – includes water use, regional employment, income, gross regional product related to agriculture, water prices, and net regional benefits.

Section 4.8, Cultural Resources – types and extent of effects.

Section 4.9, Air Quality – effects of potential brush control.

Section 4.10, Comparison of Impacts by Alternatives.

Section 4.11, Cumulative and Secondary Impacts

Section 4.12, Irreversible and Irrecoverable Commitment of Resources

Chapter 5, Relationship Between Local Short-term Uses of Man's Environment and the Maintenance and Enhancement of Long-term Productivity. This chapter discusses the attempts to balance short-term water demands and endangered species concerns with long-term water supply and species conservation issues.

Chapter 6, Proposed Habitat Conservation Plan. This chapter includes all of the component parts of the proposed HCP organized according to format prescribed by FWS guidelines.

Chapter 7, Coordination and Consultation. Lists private and governmental entities solicited for input and consultation in development of the HCP/EIS.

Chapter 8, List of Preparers. A complete list of individuals and firms who assisted with preparation of the HCP/EIS document.

Chapter 9, References Cited. This chapter includes all written references, personal communication, and internet inquiries used to prepare the HCP/EIS document.

Chapter 10, Glossary of Terms and Acronyms. An extensive list is provided of acronyms and glossary of terms to describe underground and hydrological processes.

Chapter 11, Index. This chapter will be included after the review by the Board and before the document is released for public comment. It will provide references to names and topics discussed in the EIS/HCP and provide specific page numbers for the references.

Appendices:

Appendix A, Edwards Aquifer Authority Draft 30-Year Water Supply Plan – provides complete descriptions of water management strategies that are referenced in the HCP/EIS.

Appendix B, A Report Investigating Impacts of Aquifer Pumping Limits on Flow of Comal Springs and San Marcos Springs – Provides detailed report on results of study funded by the EAA to predict springflow resulting from specified aquifer pumping limits. Also includes supplement of predicted springflow at Comal Springs from selected base pumping limits ranging between 400,000 and 500,000 acre-feet per year, with and without proposed critical period reductions.

Appendix C, Edwards Aquifer Groundwater Recharge and Discharge Data – Lists recharge by drainage basins for the years 1934 through 2002.

Appendix D, Tabular Data for Agricultural Production and Irrigation Water Use within the HCP Planning Area – supplements information provided in main document.

Appendix E, Cultural Resources Near Comal Springs and San Marcos Springs-Historic and Prehistoric Significance and Assessment of Impacts – Provides detailed information from the summary provided in the main document.

Appendix F, Structure for Planning, Development, and Soliciting Public Involvement for the Edwards Aquifer Authority Habitat Conservation Plan – includes flow charts and organization charts of HCP development process, and composition of Citizen Advisory Committee and Biological Advisory Team.

Appendix G, Economic Impacts of Edwards Aquifer Pumping Restriction Alternatives – provides detailed report on study funded by the EAA that evaluates predicted economic impacts from specified aquifer pumping limits; includes two supplements reflecting impacts of additional pumping limits not previously evaluated in the original report.

Appendix H, An Analysis of Impacts of Habitat Conservation Plan/Environmental Impact Statement Alternatives on Animal and Plant Species in the Comal and San Marcos Springs Ecosystems – provides detailed report on study funded by the EAA that evaluates predicted impacts of various aquifer pumping limits on spring ecosystems and establishes rational impact rating categories for impact evaluation in the main document.

Appendix I, Legal Background on Springflow Determinations by the U.S. Fish and Wildlife Service – provides a summary of the litigation and judicial intervention leading to the 1993 U.S. Fish and Wildlife Service springflow determinations and subsequent actions.

2.2 Identification of Updates and Other Information Needed to Complete the EARIP DEIS.

A thorough review of each of the chapters of the EAA DEIS was performed and evaluated according to the changed conditions that now exist. Based on this assessment and review of the other information contained in Chapters 3-5 above, updates to the information contained in the DEIS have been identified, including updates or revisions to the data originally presented, identification of other information needed, a plan for obtaining additional information, and other listing of proposed adjustments. This information is provided in the following **Table 2-1**.

Table 2-1 Identification of Updates to the EAA DEIS, and Other Information Needed to Complete the EARIP EIS

Chapter/Page/ Appendix	Updates	Other Information Needed	Plan for Obtaining Information	Level of Adjustments Needed
Title Page	<ul style="list-style-type: none"> ▪ Complete Revision 	<ul style="list-style-type: none"> ▪ Add business logos 	<ul style="list-style-type: none"> ▪ Contact firms for logos 	<ul style="list-style-type: none"> ▪ Moderate adjustments likely
Abstract	<ul style="list-style-type: none"> ▪ Complete Revision 	<ul style="list-style-type: none"> ▪ All other chapters must be completed before abstract can be revised 	<ul style="list-style-type: none"> ▪ Await completion of other chapters 	<ul style="list-style-type: none"> ▪ Major adjustments according to new document contents
TOC	<ul style="list-style-type: none"> ▪ Rebuild when all other chapters complete 	<ul style="list-style-type: none"> ▪ Completion of all other chapters 	<ul style="list-style-type: none"> ▪ Await completion of other chapters 	<ul style="list-style-type: none"> ▪ Major adjustments according to new document contents
Chapter 1: Purpose and Need for the Action	<ul style="list-style-type: none"> ▪ Complete Revision 	<ul style="list-style-type: none"> ▪ Amendments to Edwards Aquifer Act and EARIP mandates, ▪ identification of covered species, ▪ recent data on EAA permits, ▪ determination of applicant(s) for permit, ▪ description of new scoping process, ▪ CAC & BAT update 	<ul style="list-style-type: none"> ▪ Coordinate with affected entities; ▪ await decisions and guidance from EARIP committees 	<ul style="list-style-type: none"> ▪ Major adjustments likely, depends on future decisions by EARIP and participating stakeholders
Chapter 2: Alternatives Including the Proposed Action	<ul style="list-style-type: none"> ▪ Almost complete revision, updates of other HCPs status, ▪ new HCPs, update Critical Period rules 	<ul style="list-style-type: none"> ▪ Development of alternative descriptions, including proposed measures, ▪ status of other HCPs, ▪ new CP rules, ▪ new Permit & Plan Area boundaries, ▪ funding amount & sources, ▪ implementation roles, ▪ listed species, determination of risks to species 	<ul style="list-style-type: none"> ▪ Await development of alternatives, ▪ contact applicants and sponsors of other HCPs within the southern Edwards Aquifer Region 	<ul style="list-style-type: none"> ▪ Major adjustments likely, depends on timing of alternative development and content of alternative measures

Table 2-1 Identification of Updates to the EAA DEIS, and Other Information Needed to Complete the EARIP EIS

Chapter/Page/ Appendix	Updates	Other Information Needed	Plan for Obtaining Information	Level of Adjustments Needed
Chapter 3: Affected Environment	<ul style="list-style-type: none"> ▪ Update Planning Area boundary, updates required for listed species, species of concern & rare species, ▪ update spring ecosystem existing conditions and trends, ▪ update variability of streamflow & best available biological information, and other components of the affected environment; ▪ updates needed for take and jeopardy springflow levels, ▪ water quality data, ▪ description of Edwards Aquifer, ▪ TCEQ regs on groundwater, ▪ EA water budget, ▪ agriculture data, ▪ water use data, ▪ population data & projections, ▪ water demand projections, ▪ employment data, ▪ tourism data, ▪ land use data, ▪ cultural resource data, ▪ air quality data and compliance requirements 	<ul style="list-style-type: none"> ▪ Designation of HCP Planning Area boundary and covered species; ▪ potential occurrence of rare species, ▪ take and jeopardy minimum springflow levels, ▪ species of concern, water quality data, ▪ Edwards Aquifer data, agriculture data for recent years, ▪ recent water use data, recent population & water demand data & projections from TWDB, ▪ employment data from TWC, tourism data, ▪ and use data from NRI, new cultural resource data, ▪ new NRHP/SAL properties, ▪ new information on whooping crane, ▪ recent existing conditions and trends for spring systems, ▪ new data on variability of streamflow 	<ul style="list-style-type: none"> ▪ Wait for/incorporate guidance from EARIP committees: consult state, regional & federal agencies as needed, ▪ incorporate EARIP committee findings and determinations on listed species & springflow requirements, ▪ review literature on whooping crane 	<ul style="list-style-type: none"> ▪ Potentially substantial, depends on designation of covered species, ▪ HCP Planning Area boundary; establishment of springflow requirements; and ▪ availability of updated base line information

Table 2-1 Identification of Updates to the EAA DEIS, and Other Information Needed to Complete the EARIP EIS

Chapter/Page/ Appendix	Updates	Other Information Needed	Plan for Obtaining Information	Level of Adjustments Needed
Chapter 4: Environmental Consequences	<ul style="list-style-type: none"> ▪ Revision needed based on new EIS alternatives & associated measures, ▪ new information on listed species, ▪ revise risk assessment method, ▪ update water projects from Region L Plan, ▪ update agricultural production data, ▪ update EDSIMR model or replace with alternative impacts method, ▪ identify supplemental water supplies, ▪ revision to NEPA-required indirect & cumulative section to meet legal sufficiency as determined by recent NEPA litigation 	<ul style="list-style-type: none"> ▪ New EIS alternatives & associated measures, ▪ new information on listed or rare species, ▪ description of new risk assessment method, ▪ recent Region L Plan, ▪ agricultural production data, ▪ new model runs for EDSIMR or new impacts method including data provided by EARIP science subcommittees, ▪ supplemental water supplies, ▪ additional data on indirect and cumulative impacts, ▪ need to determine an Area of Impact (AOI) for Indirect and Cumulative Impacts (ICI) section of DEIS 	<ul style="list-style-type: none"> ▪ Await for/incorporate EARIP determination of new EIS alternatives & associated measures, ▪ review literature on whooping crane, ▪ research existing conditions and trends for spring systems, ▪ consult with risk assessment experts, ▪ review Region L Plan, ▪ identify current availability of EDSIMR model & contract implementation of new runs, ▪ or identify and implement alternative methods, ▪ consult with SAWS & Region L to determine potential supplemental water supplies, ▪ coordinate with EARIP to determine AOI for ICI section 	<ul style="list-style-type: none"> ▪ Potentially substantial, depends on determination of new alternatives & associated measures, EDSIMR model may not be available or affordable, ▪ alternative economic impact methods are undetermined and may require adjustments to schedule and budget, ▪ identification of supplemental water supplies needed may be delayed by SAWS & Region L schedule and may require additional adjustments
Chapter 5: Relationship Between Local Short-Term Uses of Man's Environment and the Maintenance and Enhancement of Long-Term Productivity	<ul style="list-style-type: none"> ▪ New withdrawal limits & Critical Period, ▪ Other measures in HCP, ▪ EAA's Updated Comprehensive Water Management Plan 	<ul style="list-style-type: none"> ▪ SCTRWP's (Regional L) 2011 Regional Water Plan 	<ul style="list-style-type: none"> ▪ Await development of Draft HCP measures and incorporate pertinent information, ▪ await SCTRWP's 2011 Plan 	<ul style="list-style-type: none"> ▪ Moderate adjustments likely; ▪ will depend on identification of HCP measures
Chapter 7: Coordination and Consultation	<ul style="list-style-type: none"> ▪ Update Public Involvement, Distribution List 	<ul style="list-style-type: none"> ▪ Currently undetermined 	<ul style="list-style-type: none"> ▪ Await EARIP public involvement 	<ul style="list-style-type: none"> ▪ Major adjustments likely
Chapter 8: List of Preparers	<ul style="list-style-type: none"> ▪ Need new list of preparers 	<ul style="list-style-type: none"> ▪ Currently undetermined 	<ul style="list-style-type: none"> ▪ Initiate list and continually update until project is completed 	<ul style="list-style-type: none"> ▪ Moderate adjustments likely
Chapter 9:	<ul style="list-style-type: none"> ▪ References Cited 	<ul style="list-style-type: none"> ▪ Currently undetermined 	<ul style="list-style-type: none"> ▪ Initiate list and continually 	<ul style="list-style-type: none"> ▪ Moderate adjustments

Table 2-1 Identification of Updates to the EAA DEIS, and Other Information Needed to Complete the EARIP EIS

Chapter/Page/ Appendix	Updates	Other Information Needed	Plan for Obtaining Information	Level of Adjustments Needed
References Cited			update until project is completed	likely
Chapter 10: Glossary of Terms and Acronyms	<ul style="list-style-type: none"> ▪ Update Glossary of terms 	<ul style="list-style-type: none"> ▪ Currently undetermined 	<ul style="list-style-type: none"> ▪ Update from EARIP HCP/DEIS 	<ul style="list-style-type: none"> ▪ Minor adjustments likely
Chapter 11: Index	<ul style="list-style-type: none"> ▪ Index 	<ul style="list-style-type: none"> ▪ EARIP HCP/DEIS 	<ul style="list-style-type: none"> ▪ Update from EARIP HCP/DEIS 	<ul style="list-style-type: none"> ▪ None
Appendix A: Edwards Aquifer Authority Draft 30-Year Water Supply Plan	<ul style="list-style-type: none"> ▪ Determine need for this Appendix; updates will require revisions to Edwards Aquifer Authority 30-Year Water Supply Plan 	<ul style="list-style-type: none"> ▪ Currently undetermined; need for this Appendix or other similar information will be based on guidance from EARIP 	<ul style="list-style-type: none"> ▪ Currently undetermined; depends on type of information needed and appropriate source 	<ul style="list-style-type: none"> ▪ Currently undetermined
Appendix B: A Report Investigating Impacts of Aquifer Pumping Limits on Flow of Comal Springs and San Marcos Springs	<ul style="list-style-type: none"> ▪ New groundwater modeling information on impacts of aquifer pumping limits on flow of Comal and San Marcos Springs 	<ul style="list-style-type: none"> ▪ Analysis of groundwater modeling results and effects of pumping on springflow, recommendations for withdrawal reductions and stages for Critical Period management of the Edwards Aquifer, ▪ Edwards Aquifer Area Expert Science Subcommittee, Edwards Aquifer Authority (model runs) 	<ul style="list-style-type: none"> ▪ Incorporate data and related guidance provided by EARIP subcommittees 	<ul style="list-style-type: none"> ▪ Major adjustments likely
Appendix C: Edwards Aquifer Recharge and Discharge Data, 1934-2002	<ul style="list-style-type: none"> ▪ Edwards Aquifer Recharge and Discharge Data 1934-most current dates available 	<ul style="list-style-type: none"> ▪ None 	<ul style="list-style-type: none"> ▪ Update from recent EAA data 	<ul style="list-style-type: none"> ▪ Moderate adjustments likely
Appendix D: Tabular Data for Agricultural Production and Irrigation Water Use within the HCP Planning Area	<ul style="list-style-type: none"> ▪ Update from United States Department of Agriculture data (2000), ▪ Texas Water Development Board, Texas Agricultural Extension Service, ▪ Texas A&M University System; Uvalde (1997) 	<ul style="list-style-type: none"> ▪ None 	<ul style="list-style-type: none"> ▪ Download electronic data from sources indicated and update accordingly 	<ul style="list-style-type: none"> ▪ Minor adjustments likely

Table 2-1 Identification of Updates to the EAA DEIS, and Other Information Needed to Complete the EARIP EIS

Chapter/Page/ Appendix	Updates	Other Information Needed	Plan for Obtaining Information	Level of Adjustments Needed
Appendix E: Cultural Resources near Comal and San Marcos Springs: Historic and Prehistoric Significance and Assessment of Impacts	<ul style="list-style-type: none"> ▪ Update to determine if additional archeological surveys have been conducted 	<ul style="list-style-type: none"> ▪ Results of Cultural Resources Surveys completed near Comal and San Marcos Springs: Historic and Prehistoric Significance and Assessment of Impacts 	<ul style="list-style-type: none"> ▪ Identify, obtain, and evaluate updated information 	<ul style="list-style-type: none"> ▪ Minor adjustments likely
Appendix F: Structure for Planning, Development, and Public Involvement For the Edwards Aquifer Habitat Conservation Plan	<ul style="list-style-type: none"> ▪ Structure for Planning, Development and Public Involvement for the Edwards Aquifer Habitat Conservation Plan, ▪ Charge of the EARIP Public Outreach Subcommittee 	<ul style="list-style-type: none"> ▪ EARIP Public involvement Plan: Public Outreach Subcommittee Meetings Archive 	<ul style="list-style-type: none"> ▪ Review program operational rules for EARIP Steering Committee Members and participants, MOA for EARIP, Charge of the EARIP Public Outreach Subcommittee 	<ul style="list-style-type: none"> ▪ Major adjustments likely
Appendix G: Economic Impacts of Edwards Aquifer Pumping Restriction Alternatives	<ul style="list-style-type: none"> ▪ Determine need for this Appendix; updates will depend on new information concerning economic impacts of Edwards Aquifer pumping restriction alternatives, ▪ EDSIMR model results plus IMPLAN 	<ul style="list-style-type: none"> ▪ Uncertain, pending decision on continued utility of existing EDSIMR & IMPLAN analysis 	<ul style="list-style-type: none"> ▪ Uncertain access to EDSIMR, could update I/O analysis with RIMS II multipliers 	<ul style="list-style-type: none"> ▪ Undetermined, will depend on level of new studies needed
Appendix H: An Analysis of Impacts of Habitat Conservation Plan / Environmental Impact Statement Alternatives on Animal and Plant Species in the Comal and San Marcos Springs Ecosystems	<ul style="list-style-type: none"> ▪ Determine need for this appendix; ▪ Update analysis and evaluation of changes in springflow on the Comal and San Marcos Springs Ecosystems including listed species 	<ul style="list-style-type: none"> ▪ Results of Hardy Study, and information provided by EARIP Subcommittees 	<ul style="list-style-type: none"> ▪ Bio-West to develop Risk Assessment per scope of work and guidance provided by EARIP 	<ul style="list-style-type: none"> ▪ Major adjustments likely
Appendix I: Legal	<ul style="list-style-type: none"> ▪ Determine need for this 	<ul style="list-style-type: none"> ▪ Senate Bill 3 2007 Texas Legislature 	<ul style="list-style-type: none"> ▪ Update based on new 	<ul style="list-style-type: none"> ▪ Moderate adjustments

Table 2-1 Identification of Updates to the EAA DEIS, and Other Information Needed to Complete the EARIP EIS

Chapter/Page/ Appendix	Updates	Other Information Needed	Plan for Obtaining Information	Level of Adjustments Needed
Background On Springflow Determinations by the U.S. Fish and Wildlife Service	Appendix; if included update to include EARIP legislated mandates		legislative mandate in SB 3	likely

2.3 Summary of key Issues

A review of Table 2-1 reveals several key issues that will affect the content and schedule of the EIS.

- 1) The ability to meet document preparation milestones such as the completion of the preliminary draft HCP, draft HCP, public review draft HCP, and final HCP will require timely decisions by the EARIP committees concerning designation of covered species, delineation of geological boundaries of the HCP planning area (study area for baseline descriptions of the affected environment); development and refinement of EIS alternatives including the preferred HCP alternative; and scheduled on-time completion of other EARIP studies that would be used to develop and support development the HCP.
- 2) If a qualitative evaluation of the economic effects of the HCP alternatives is acceptable, then uncertainty with respect to selecting an acceptable economic impact model, cost, scheduling, and related milestones can be eliminated.
- 3) Recent NEPA guidance requires greater effort in completing EIS indirect and cumulative impact evaluations to meet litigation challenges. Cost and scheduling limitations may be associated with meeting this guidance.

3.0 Review of the Hardy Study

A study recently completed for the EARIP in 2009 has been documented in a draft report entitled “*Technical Assessment in Support of the Edwards Aquifer Science Committee “J Charge” Flow Regime Evaluation for the Comal and San Marcos River Systems*”. The principal investigator and author of the report is Dr. Thomas B. Hardy, River Systems Institute, Texas State University, San Marcos, Texas. The draft report dated October 20, 2009, summarizes a study prepared for EARIP and is posted on the EARIP website at <http://earip.tamu.edu/Subcommittees.aspx>.

The report summarizes the results of a technical analysis of flow dependent physical habitat characteristics of three endangered target species in the Comal and San Marcos Rivers, the fountain darter (*Etheostoma fonticola*), Comal Springs riffle beetle (*Heterelmis comalensis*), and Texas wild-rice (*Zizania texana*). Historical and updated modeling of water quality components (temperature and dissolved oxygen) and physical habitat components for the Comal Springs riffle beetle, fountain darter, and Texas wild-rice allow the prediction of habitat suitability for these target species at various hypothetical springflow levels. This information is being used by the EARIP Science Subcommittee to complete mandated subcommittee “J” charges under SB 3, passed by the Texas Legislature in May 2007.

The study incorporated a team of private, state, federal, and university researchers familiar with the target species and associated spring and river ecosystems. The team developed influence diagrams identifying habitat components affecting the population viability of each of the three species. The influence diagrams were used to examine existing data and specific modeling approaches to evaluate flow regimes for each spring and river ecosystems. The group also considered other factors such as invasion of non-native species, parasites, recreation, and other anthropogenic influences.

Existing physical, chemical, and biological monitoring data collected through 2009 from both the Comal and San Marcos Rivers were used to develop biological response functions. Temperatures used in the modeling analyses were derived from the QUAL2E model reported by Bartsch et. al, (1999) and Hardy et. al (1998) for the San Marcos and Comal Rivers. These data were used together with habitat suitability curves for depth and velocity to estimate available habitat for Texas wild-rice and Comal riffle beetle over a variety of flow rates. For fountain darter, suitability curves were developed from a multivariate analysis of long term monitoring data from the Comal and San Marcos Rivers. Fountain darter habitat was

modeled using depth, velocity, vegetation type, and temperature. These data were used to predict the location and quality of wild rice, fountain darter, and riffle beetle habitat as a function of different flow ranges in each river system. The report also provides information concerning modeling sensitivity to changes in channel topography and habitat suitability.

While the draft report provides technical information on modeling approaches and summary results, no specific flow recommendations are made. Rather, the summary information in the report will be used by the EARIP Science Subcommittee to evaluate and determine recommended minimum flows and associated Critical Period withdrawal reductions. The report and subsequent refinements to the models will also be available to help evaluate and compare alternative HCP/EIS alternatives.

The draft report is 97 pages long and contains four appendices:

- Appendix A - Definition of Terms Used in Preliminary Edwards Aquifer Influence Diagrams
- Appendix B - Depth, Velocity, and Combined Suitability Contours for the Fountain Darter in the Comal River for Simulated Discharges
- Appendix C - Weighted Useable Area Relationships for Fountain Darters within the Comal River for Different Total Comal River Flow Rates and Various Flow Split Combinations Between Old and New Channels
- Appendix D - Depth, Velocity, and Combined Suitability Contours for Texas Wild Rice and Fountain Darter in the San Marcos River for Simulated Discharges

4.0 Review of the San Marcos River Habitat Conservation Plan and EA

The City of San Marcos and Texas State University (TSU) are proposing future activities within, adjacent to, and near the San Marcos River and have applied for a five-year Incidental Take Permit from the FWS with options for renewal. As part of this application, the parties have submitted a combined EA/HCP document. The version reviewed for the report was dated May 13, 2009.

A number of projects have been identified that are on-going or proposed by Texas State University and primarily take place in the Spring Lake and Sewell Park area. The City is proposing several projects/activities in and along the San Marcos River from the sand bar at the Sessom Creek confluence to IH-35. These projects will be associated with the various City parks that border the river: City, Bicentennial, Children's, Rio Vista and Ramon Lucio. A summary of these projects is provided below.

1. Management of submerged & floating aquatic vegetation in Spring Lake (TSU);
2. Sediment removal in Spring Lake (TSU);
3. Construction of a bike/hike trail along the northwest side of Spring Lake (TSU);
4. SCUBA class instruction in Spring Lake (TSU);
5. Diversion of up to 100 ac-ft/year of water from Spring Lake to irrigate the Aquarena Golf Course (TSU);
6. Management of Aquarena golf course & grounds (TSU);
7. Installation of a pervious parking lot at the Saltgrass Restaurant (TSU);
8. Boating in Spring Lake and Sewell Park (TSU);
9. Management of aquatic vegetation in Sewell Park (TSU);
10. Removal of accumulated plant materials in Sewell Park (TSU);
11. Recreation in Sewell Park (TSU);
12. Sessom Creek sand bar Removal (City);
13. Management of aquatic vegetation below Sewell Park (City);

14. Removal of sediment in the San Marcos River below Sewell Park (City);
15. Bank stabilization and establishment of permanent access points at selected sites along the San Marcos River (City);
16. Construction of two sedimentation ponds along the San Marcos River (City); and,
17. Recreation in city parks downstream of Sewell Park (City).

For each of the proposed activities, the HCP identifies measures that would minimize incidental take. Most of these measures are associated with assuring that the projects would be constructed, implemented, and operated in ways that would avoid or minimize impacts. A low flow protocol was established to guide construction/operation of the projects during specified low flow levels. Some of the proposed actions or activities would be reduced or suspended at specified low flow levels, or would completely avoid areas where listed species are known to exist.

The HCP also identifies five groups of mitigation measures that would offset any incidental take that occurs. Each group of mitigation measures is intended to address five respective conservation goals listed in the San Marcos/Comal (Revised) Recovery Plan.

The HCP includes a detailed monitoring plan and adaptive management strategies for each of the five groups of mitigation measures.

5.0 Other Scientific and Background Data

Other selected (but not inclusive) background information that provides historical perspective or may have direct application to updates is provided in **Table 5-1** below.

Table 5-1 Pertinent Background and Historical Information (Not Inclusive)

Date	Author	Information Source	Synopsis	Type /Status of Report/Availability
1975	Espey, Huston & Associates, Inc.	Investigation of Flow Requirements from Comal and San Marcos Springs to Maintain Associated Aquatic Ecosystems	For species <i>Etheostoma fonticola</i> & <i>Protophila arca</i> (Trichoptera insect) in SM River: min. instantaneous daily flow = 40 cfs; min. monthly avg. flow = 80 cfs; min annual avg. flow >100 cfs.	Final Report
1978	U.S. Bureau of Reclamation	Special Report on San Antonio-Guadalupe River Basins Study	For maintenance of aquatic biota @ SM Springs = min of 72,000 ac-ft/yr annual avg. with 100 cfs annual avg; @ Comal Springs= min of 4,000 ac-ft/yr avg. annual, with 75 cfs annual avg.	Final Report
1993	McKinney, D.C., and D.W. Watkins, Jr.	Management of the Edwards Aquifer: A Critical Assessment	Cites aquifer pumpage limitation of 200,000 ac-ft/year to effectively protect the Edwards Aquifer and its downstream environment.	Final Report
1993	U.S. Fish and Wildlife Service	Take and jeopardy springflow levels for selected species	Tabular data that provides take and jeopardy springflow levels for specific species at Comal and San Marcos Springs	Contained in the 1996 Recovery Plan for San Marcos and Comal Springs

Table 5-1 Pertinent Background and Historical Information (Not Inclusive)

Date	Author	Information Source	Synopsis	Type /Status of Report/Availability
2000	Bartsch, N.R., T.B. Hardy, J.A. Shoemaker, and P.J. Connor 2000.	Development and Application of an Instream Flow Assessment Framework for the Fountain Darter (<i>E. fonticola</i>) and Texas wild-rice (<i>Zizania texana</i>) in Spring Lake and the San Marcos River System.	Establishes a methodology to determine habitat suitability of fountain darter and provides estimates of habitat suitability for fountain darter at various flow levels.	Final Report
2001	Saunders, K.S., K.B. Mayes, T.A. Jurgensen, J.F. Trungale, L.J. Kleinsasser, K. Aziz, J.R. Fields, and R.E. Moss	An evaluation of Spring Flows to Support the Upper San Marcos River Spring Ecosystem, Hays County, Texas	Study provides information concerning the habitat suitability requirement of target species and provides estimates of flow levels at San Marcos Springs necessary to support and maintain the spring ecosystem (effects to target species including fountain darter)	Final Report
2009	South Central Texas Regional Water Planning Group	Regional Water Plan as amended August 2009	Provides regional water supply and demand data and identifies water strategies needed to meet future water demand	Final Report
2009	Miscellaneous Sources	EARIP program documents, Subcommittee documents and reports, and other resource information	Much guidance documentation, background information and pertinent data is available on the EARIP Website: http://earip.tamu.edu	All phases