

2016 Edwards Aquifer Authority Ecological Modeling Work Plan

The development of a mechanistic ecological model is assigned to the Edwards Aquifer Authority (EAA) per section 6.3.3 of the Edwards Aquifer Habitat Conservation Plan (EAHCP). The purpose of the Ecological Model is to evaluate potential adverse effects to Covered Species and their critical habitat, and to the extent such effects are determined to occur, quantify their magnitude, and develop alternate strategies.

Long Term Objective:

The objective is the development of a comprehensive, mechanistic Ecological Model for the Comal and San Marcos ecosystems. The model requires adapting modules for aquatic vegetation and fountain darters, developing a module for Texas wild-rice, and a module for the impact of gill parasites on fountain darters. The model is a predictive tool for management.

Year 1 and Year 2 Overview:

The Ecological Model is a complex combination of studies that input data into the development of specific modules for individual components. Supporting studies and modules for input into the Ecological Model Year 1 through Year 2 (May 2015) include:

- Hydraulic Modeling
 - Complete for both the Comal and San Marcos systems
- Water Quality Modeling
 - Complete for water temperature in both systems
- Aquatic Vegetation Modeling
 - Complete in Old Channel study reach
 - Calibrated models in the Old Channel study reach (Comal) and City Park study reach (San Marcos)
- Fountain Darter Modeling
- Fountain Darter to Aquatic Vegetation linkage complete
- Fountain Darter to Water Temperature linkage complete
- Percent Cover to Biomass Study
- Biological Monitoring (2000-2014)
- 2013 Applied Research
 - Aquatic vegetation tolerance
 - Food source tolerances
 - Bicarbonate utilization
- 2014 Applied Research
 - Fountain darter movement
 - Fecundity
 - Predation
- 2015 Applied Research
 - Algae dynamics
 - Effect of turbidity on submerged aquatic plants
 - Native –vs– non-native plant competition

Target for 2016:

The Year 3 (June 1, 2015 – December 31, 2016) Ecological Model scope as approved is available at

http://www.eahcp.org/files/admin-records/NEPA-and-HCP/BW_Year3_Ecomodel_Scope_and_Costs_20140302_EAA.pdf

The Year 3 scope provides for:

- Water quality modeling
 - Dissolved oxygen incorporated system wide
- Aquatic vegetation and fountain darter modeling
 - Comal System – expanded study reaches in the Upper Spring Run reach and Landa Lake reach
 - San Marcos System – expanded study reaches in the I35 study reach
- Incorporate 2015 Applied Research where applicable
- Model calibration, sensitivity analysis, and validation, including an additional study to validate the habitat preferences of fountain darters.
- Fountain darter mortality study.
- HCP flow regime scenario run
- User's manual and training sessions

The schedule for Year 3 includes:

- March 2015
 - Year 3 scope of work submitted for approval
- May 2015
 - Complete integration/linkage of water temperature, aquatic vegetation and fountain darter models
 - Complete – calibrated models for the Old Channel (Comal River) and the City Park (San Marcos River) reaches
- December 2015
 - Submit annual model status report
- Summer 2016
 - Complete spatial expansion modeling in both systems.
 - Model validation
- December 2016
 - Complete users' manual and submit final working models

In Year 3, besides the submittal of monthly progress reports, the Contractor will submit a Draft and a Final Report for Year 3 of model development by December 31, 2016.

TOTAL PROJECT BUDGET**YEAR 1 (June 1, 2013 – May 31, 2014)**

<u>TASK</u>	<u>ESTIMATED COST</u>
Task 1. Literature Review	\$ 12,500.
Task 2. Data Acquisition	\$ 3,500.
Task 3.1 U.S. Army Corps of Engineers Model Modification	\$ 55,000.
Task 3.2 Fountain Darter Response/Dynamics Model	\$ 47,500.
Task 3.3 Wild Rice Parameters	\$ 7,500.
Task 3.4 Gill Parasite and Non-Native Snails Response/Dynamics	\$ 4,500.
Task 4. Recommendations and Future Work	\$ 5,000.
Task 5. Draft and Final Reports	\$ 10,500.
Task 6. Meetings and Presentations	\$ 11,500.
Task 7. Deliverables	<u>\$ 12,500.</u>
	YEAR 1 SUBTOTAL <u>\$170,000.</u>

YEAR 2 (June 1, 2014 – May 31, 2015)

<u>TASK</u>	<u>ESTIMATED COST</u>
Task 1. Project Management and Meetings	\$ 37,765.
Task 2. Literature Review	\$ 16,580.
Task 3. Fountain Darter Modeling	\$154,755.
Task 4. Aquatic Vegetation Modeling	\$138,520.
Task 5. Draft and Final Interim Status Reports	\$ 57,730
Task 6. Recommendations and Future Work	No Cost
Task 7. Deliverables	<u>No Cost</u>
	YEAR 2 SUBTOTAL <u>\$405,350.</u>

YEAR 3 (June 1, 2015 – December 31, 2016)

<u>TASK</u>	<u>ESTIMATED COST</u>
Task 1. EAHCP Ecological Model Development, Calibration, and Validation	<u>\$455,000.</u>
Task 2. EAHCP Ecological Model Training and User Guide	\$ 25,000.
Task 3. Deliverables	<u>No Cost</u>
	YEAR 3 SUBTOTAL <u>\$480,000.</u>
	<i>(January 1, 2016 – December 31, 2016)</i> <u>\$305,000</u>

TOTAL PROJECT COSTS \$1,055,350.