6.3.4 Applied Research

Section 6.3.4 of the Edwards Aquifer Habitat Conservation Plan (EAHCP) includes Applied Research as a "valuable" component of the Phase I package and states that the "Edwards Aquifer Authority (EAA) will contract for the research activities."

Long Term Objective:
2018 and 2019 represent the final two years for the Applied Research program of the EAHCP. In prior years, the Applied Research program has primarily undertaken study of the Comal Springs riffle beetle, fountain darter, and submerged aquatic vegetation. Much of the information generated as part the program has gone towards creating the Ecological Model (EcoModel) which was completed in 2017.

In addition to finalizing the EcoModel, 2017 represents the first year of a long-term Refugia contract with USFWS. The contract outlines specific research tasks related to species collection methods and techniques, species husbandry, species propagation, species genetics, and species reintroduction methods. It is anticipated that all future research on these topics will take place as part of the Refugia research program and not the Applied Research program.

Given the completion of the EcoModel and startup of long-term Refugia operations, a workgroup of EAHCP science committee members (Research workgroup) met to discuss the Applied Research project schedule for 2018 and 2019.

Target for 2018:
The Research workgroup identified several projects ~~which can be found in the final workgroup report. Projects undertaken as part of the Applied Research program will be developed from this final workgroup report. At present, individual projects targeted for 2018 have not been prioritized.~~ including a project to develop sediment/constituent export loading curves for the Sessom Creek watershed. The project will take place during 2018 and 2019. 2018 activities include methodology development, methodology presentation to the EAHCP Science Committee, and collection of data on sediment/constituent loading. These three items are summarized below.

Task 1. Literature Review and Methodology Development

The Contractor will conduct a literature review and develop project methodology for presentation to the EAHCP Science Committee ("Science Committee"). The literature review and methodology will address the three major areas comprising the study:

1. Collect data on sediment/constituent loading
2. Calculate sediment/constituent loading curves
3. Analyze the collected data and examine the factors contributing to sediment export

Task 2. Present Methodology to the EAHCP Science Committee

Upon completion of Task 1, the Contractor will present the literature review and project methodology to the Science Committee, at a date to be determined by the HCP Chief Science

Officer, for review prior to the implementation of activities. The Contractor will give a brief presentation and must be prepared to answer any questions that the members of the Science Committee have. In collaboration with HCP staff, recommendations provided by the Science Committee will be considered for inclusion in conducting the Applied Research described below.

Task 3. Collect data on sediment/constituent loading

We will use a 24-sample ISCO Model 6712 automatic water sampler and targeted grab samples to collect stormwater samples across multiple stormwater hydrographs from Sessom Creek – tributary to the upper San Marcos River. We will sample 12 storm events from May, 2018 to August, 2019. Additionally, we intend to collect one duplicate grab sample from each ISCO sampled storm event; collected simultaneously with an ISCO sample intake. In the event we are unable to sample 12 events, a prorated amount of the analytical bill (Exhibit C) will not be spent. The automatic water sampler will be installed at the point where Sessom Creek flows underneath the Freeman Aquatic Building (FAB) on Texas State University property.

Sample collection will be triggered by a liquid-level sensor that will be set to trigger a pre-programmed sampling routine if stage in the stream rises at least 2 inches. Sampling will occur at 3-minute intervals for the first 6 samples, 5 minute-intervals for the second 6 samples, 10-minute intervals for the third 6 samples, and 30-minute intervals for the final 6 samples, totaling 288 minutes or 4.8 hours per sampling event. Targeted 1-L grab samples will be collected by hand at documented times during the programmed sampling routine and will be used as duplicate samples during analysis.

The intake line will be anchored approximately 6-inches above the streambed to ensure that the sampler is not sampling the coarse bedload. After completion of the programmed autosampling, all samples will be moved to an analytical lab in FAB where they will be processed or preserved, as appropriate. Analytical procedures for each analyte are detailed below.

TSS and VSS/NVSS: Bulk 1-L samples will be well-mixed and split for TSS and NVSS analysis by vacuum filtration of up to 500 mL (depending on TSS concentration) of water onto pre-weighed and pre-ashed Pall A/E (1-µm nominal pore) glass fiber filters. Filters are then stored in aluminum foil until drying. TSS is determined by weighing the filter after drying it at 50ºC (Standard Methods 2540 D), where change in mass equals the amount of sediment in the filtered volume. NVSS is then determined by heating the filter to the organic-combustion point in a muffle furnace at 550ºC and then weighing again to calculate the mass of organic matter lost (Standard Methods 2540 E).

Nutrients: Well-mixed splits of samples will be analyzed for Total Nitrogen (TN) and Total Phosphorous (TP) concentrations. If nutrient analysis cannot be conducted within 48 hours of collection, 125 mL total nutrient samples will be preserved with 188 µL of H_2SO_4 and stored in HDPE bottles at 4ºC until analysis. Total N will be digested with alkaline potassium persulfate and subsequently acidified. TN will be quantified as nitrate through second-derivative spectroscopy (Crumpton et al. 1992).

TP is oxidized by potassium persulfate digestion and then determined using the ascorbic acid method (Standard Methods 4500-P E). Remaining sample volumes will be retained until all analyses pass internal QA/QC checks.

Laboratory controls and QA/QC: Quality Assurance and Control practices include the use of calibration standards, certified reference materials, spiked samples, pseudo-replicate and duplicate sample analysis, and blanks. Duplicate samples will be collected manually during storm events, whenever possible. However, the "flashy" nature of the system is such that many storm hydrographs may return to baseflow conditions before personnel can reach the creek for sampling. At least one pseudo-replicate sample will be analyzed for each set of 24 samples, and will consist of a second independent set of analyses. As appropriate, blanks and check standards are inserted randomly into each batch of analyses, and standards plus blanks are run at the beginning and end of each batch. Chain of custody form will be used to trace each sample from collection to final analysis.

Stream Discharge: Stream discharge volumes are required to calculate constituent exports. Pressure transducers (Measurement Specialties, TruBlue Model 585, or similar) will be used to collect real-time stage (water depth) data at one-minute increments at the downstream end of the Sessom Creek watershed, just inside a box culvert before Sessom Creek discharges into the San Marcos River. Discharge at low flows will be measured directly using either a SonTek FlowTracker Handheld-ADV or a SonTek FlowTracker2 Handheld-ADV. Discharge will also be logged using a stream radar system recently installed in Sessom Creek by the NOAA National Severe Storms Laboratory. Once calibrated across a range of hydrologic conditions, this system can provide real-time highly accurate discharge data that can serve as a back-up and/or primary data source for this project.

Rainfall: We will use MRMS radar-derived precipitation data (when available) for the watershed to derive daily/event rainfall amount and intensity. In addition, we will deploy two Hobo RG3 tipping bucket Rain Gauge Data Loggers (Onset Computers) at the downstream end and in the upper half of the watershed.

Additional Research Facility

In 2018, the EAA is entering the final year of a five-year contract with Texas State University (TEXAS STATE) that allows Applied Research contractors to use the Freeman Aquatic Building (FAB) raceways, two concrete ponds and wet lab (with living streams and aquaria) for EAHCP research. The TEXAS STATE facilities meet the needs of providing source water, quarantine capabilities, endangered species handling, and infrastructure/resource needs. The EAA pays the utility costs for use of the facilities and EAHCP staff coordinates the projects for timing and availability of resource needed (tank, living stream, trough, raceway, or pond).

Monitoring:

EAHCP staff receives monthly status reports from selected contractors and will visit with selected contractors on-site to evaluate the progress and methodology compliance of Applied Research projects.

Budget:
Table 7.1:
$450,000

Available budget for 2018:
$450,000

Estimated 2018 budget:
$450,000*

*The EAA pays the utility costs for use of the facilities ($25,000 is budgeted for facility use). There is no annual fee for the use of the FAB for Applied Research.