

STATISTICAL ANALYSIS OF SYSTEM DISTURBANCE AND RECOVERY FOR THE SAN MARCOS AND COMAL SPRINGS AQUATIC ECOSYSTEMS

PRELIMINARY SCOPE OF WORK

The Edwards Aquifer Habitat Conservation Plan (EAHCP) establishes specific long-term biological goals (LTBGs) and objectives for each of the species in the San Marcos and Comal springs systems covered by the Incidental Take Permit (ITP). In general, LTBGs are measured by a habitat component and a population measurement. Presently, data have been collected on the species and their habitats since 2000, and no detailed statistical analyses have been performed on the dataset. The purpose of this study is to provide a statistical analysis on the effects of system disturbance and response to support management decisions related to the LTBGs.

The EAA has conducted routine comprehensive and critical period monitoring in the San Marcos and Comal springs systems in order to monitor and evaluate the effects of variable flows on biological systems. Data are typically collected two to three times a year with additional sampling conducted during low flow conditions and after flood events. The majority of the data collected is focused at three reaches within the San Marcos River and four reaches in the Comal River.

Task 1. Methodology Development

Proposals are sought for a rigorous statistical analysis of the effects of disturbance and the response of three categories of data from the Comal and San Marcos springs systems: aquatic vegetation, water quality/quantity, and the listed species populations. Disturbance is defined here as an interruption of normal conditions and includes events such as scouring floods, droughts, and recreation. Response refers to the resilience or resistance of the data under consideration.

The analysis should be designed to discern the effects of the disturbance and quantify response. Proposers should provide a sufficient literature review and must explicitly identify measures to quantify uncertainty of their analysis. Proposals examining a specific category are allowed as long as interdependencies are thoroughly considered (e.g. species populations cannot be properly examined without consideration of aquatic vegetation and water quality/quantity). Proposals examining the data categories in a holistic manner for a given disturbance are encouraged.

Task 2. Present Literature Review and Methodology to Science Committee

Once proposed methodologies have been developed, the Consultant will present these methodologies to the EAHCP Science Committee for review prior to the implementation of any activities in the field. The Consultant will give a 30-minute presentation and must be prepared to answer any questions from the Science Committee. Recommendations provided by the Science Committee should be considered for inclusion in final research methodologies. The Consultant will provide detailed written justification to the EAA for any recommendations they do not incorporate into their final methodology.

Task 3. Conduct Applied Research

The Consultant will carry out the analysis consistent with the methodologies proposed in Task 1 and approved by the Science Committee. The Consultant will keep an electronic project notebook containing a description of the assumptions and methodologies used in the study analysis. The notebook shall be organized in such a way as to allow replication of the steps, calculations, and procedures used by the Consultant to reach conclusions, described in the draft final report. The project notebook shall include a USB flash drive or other suitable electronic storage device of all data used during the project, along with code generated for the analysis. The USB flash drive containing the project notebook, project data, and code will be submitted with the draft final report.

Task 4. Draft and Final Reports

The Consultant will include in the Draft and Final Report a section describing the assumptions and methodology used by the Consultant in generating the data, analysis and conclusions. The reports will include details of the statistical analysis and conclusions, and will provide recommendations to the EAA for potential future research (if applicable). The Draft Report must be submitted to the Authority in an expedient manner to allow review and to allow the Consultant to develop and submit the Final Report on time. The Final Report, along with all data and the project notebook, must be submitted in hard copy and on a USB flash drive or other suitable electronic storage device in a Microsoft Office, or other agreed upon, format.

Task 5. Meetings and Presentations

The Consultant should budget for a minimum of two meetings with the Science Committee and when requested by the EAHCP Program Manager (1) to present the project methodologies, and; (2) to present the project results.