

Section 6 (Texas Traditional) Report Review

Form emailed to FWS S6 coordinator (mm/dd/yyyy): 12/3/2012

TPWD signature date on report: 10/10/2012

Project Title: An evaluation of the relationship between stream flow and habitat availability for the Devils River minnow *Dionda diaboli*.

Final or Interim Report? Final

Grant #: Grant No. TX E-115-R

Reviewer Station: Austin ESFO

Lead station concurs with the following comments: Choose an item

Interim Report (check one):

- ☐ Acceptable (no comments)
 - ☐ Needs revision prior to final report (see comments below)
 - ☒ Incomplete (see comments below)
-

Final Report (check one):

- ☐ Acceptable (no comments)
 - ☐ Needs revision (see comments below)
 - ☐ Incomplete (see comments below)
-

Comments:

No comments on the interim report. However, some of the items they anticipated completing by the interim report submission date have not yet been completed due to unforeseen environmental and technical difficulties. They are requesting a 9 month extension of the grant funds to ensure completion of the project. We recommend that the extension be granted, if possible.

INTERIM REPORT

As Required by

THE ENDANGERED SPECIES PROGRAM
TEXAS

Grant No. TX E-115-R

Endangered and Threatened Species Conservation

**An evaluation of the relationship between stream flow and habitat availability
for the Devils River minnow *Dionda diaboli*.**

Prepared by:

Stephan Magnelia



Carter Smith
Executive Director

Clayton Wolf
Director, Wildlife

10 October 2012

INTERIM REPORT

STATE: Texas GRANT NUMBER: TX E-115-R

GRANT TITLE: An evaluation of the relationship between stream flow and habitat availability for the Devils River minnow *Dionda diaboli*.

REPORTING PERIOD: 1 Oct 11 to 30 Sep 12

OBJECTIVE(S):

To assess the instream flow needs of the Devils River Minnow in one of the streams within the critical habitat designation over three years.

Segment Objectives:

The following tasks will be performed on representative reaches of Pinto Creek:

- a. Bathymetric mapping.
- b. Detailed, georeferenced maps of substrate, instream cover, and other relevant channel features will be developed.
- c. A two-dimensional hydraulic model will be developed.
- d. Habitat Utilization.
- e. Quantify patterns in life history and reproductive biology of the Devils River minnow.
- f. Data on existing stream habitat, habitat utilization, and hydraulic modeling results will be integrated and a range of alternatives presented.

Significant Deviations:

Due to unforeseen difficulties in contracting some of the work (see item #3, "Completion of bathymetry and substrate mapping" under Significant Deviations, Attachment A).

Summary Of Progress:

Please see Attachment A.

Location: Val Verde and Kinney Counties, Texas.

Cost: Costs were not available at time of this report, they will be available upon completion of the Final Report and conclusion of the project.

Prepared by: Craig Farquhar

Date: 10 October 2012

Approved by: _____

C. Craig Farquhar

Date: 10 October 2012

ATTACHMENT A

Section 6 grant TX E-115-R-1

**AN EVALUATION OF THE RELATIONSHIP BETWEEN STREAMFLOW AND HABITAT AVAILABILITY FOR THE
DEVILS RIVER MINNOW (*Diionda diabolii*)**

Prepared by

Stephan Magnolia

Inland Fisheries Division

Texas Parks and Wildlife Department

October 9, 2012

Reporting Period: October 1, 2011 to September 30, 2012

Progress Report – Fiscal Year (FY) 2012

Scope of Work: The United States Fish and Wildlife Service Recovery Plan identifies several areas where a better understanding of the ecology of the Devils River minnow (*Dionda diabolica*) is important to conservation of the species. We propose to study the relationship between instream habitat and flows needed for habitat maintenance and reproduction of the Devils River Minnow.

This study will address three Recovery Actions identified in the Recovery Plan (All Priority 1b):

1.2.2: Study Reproductive Variables.

1.3.3: Determine the relationship between stream flow and habitat availability.

1.3.4: Determine stream flows needed for habitat maintenance.

Given the increasing demand for water to address societal needs, it is imperative that we determine the instream flow needs for this species, especially in areas where there is a significant potential for dewatering, or reducing stream flow to meet human demand.

The designated critical habitat for the Devils River minnow (Federal Register, August 12, 2008: 50 CFR Part 17: Endangered and Threatened Wildlife and Plants; Designation of Critical Habitat for the Devils River Minnow, Final Rule) includes Pinto Creek in Kinney County, TX.

During the term of this proposal, we plan to assess the instream flow needs of the Devils River minnow in Pinto Creek (Kinney County). This information will also be used to determine whether or not habitat utilization information is transferable among the different streams within this species native range.

Tasks:

- g. Bathymetric mapping: A bathymetric map will be developed for stream segments (study reaches) that are known to support Devils River minnow and contain a range of habitat elements;
- h. Detailed, georeferenced maps of substrate, instream cover, and other relevant channel features will be developed;
- i. A two-dimensional hydraulic model will be developed based on the bathymetry of the channel;
- j. Habitat Utilization: The primary objective of this proposal is to assess the instream flow needs of the Devils River minnow in Pinto Creek during different phases of its life history;
- k. Quantify patterns in life history and reproductive biology of the Devils River minnow;

- I. Data on existing stream habitat, habitat utilization, and hydraulic modeling results will be integrated.

Summary of Progress:

Task A: Bathymetric mapping: The intent of this task was to develop detailed bathymetric maps of the stream in order to support the development of a two-dimensional hydraulic model. The upper section of Pinto Creek rarely maintained connectivity through surface flow during the study. The upper (head spring) was never observed flowing and habitat in the uppermost reach was limited to one isolated pool. A small side spring provided flow for a short run and one pool, but flow leaving the pool was subsurface. It was unclear whether the isolated pools were interconnected through subsurface flow, had different groundwater sources, or in some instances, may fill during surface flow events and then gradually dry between events. Because of the subsurface flow it was originally thought the hydraulic modeling portion of this study could not be accomplished. After further consultation with TPWD River Studies Program staff and Texas Rivers Institute hydrologist Dr. Thom Hardy it was thought a two-dimensional model might be able to be constructed using theoretical upper and lower study bound water elevations (the creek was largely dry during the reporting period). Plans were made in summer 2011 to map the bathymetry of the creek channel and construct the model. However, in the interim conditions for granting access changed and access to Pinto Creek was restricted to only a few TPWD staff. This task was not accomplished, because the staff which had access to the property did not have the necessary expertise or equipment to complete this task.

Task B: Habitat mapping: Staff from Texas State University (Dr. Thom Hardy) used an unmanned aerial vehicle and camera system to provide high resolution (7.5 cm/pixel), georeferenced aerial photographs of Pinto Creek including the study reaches. Photographs were used to produce a mosaic of Pinto Creek showing channel features and riparian zones. These photos provided a base map for overlaying habitat features such as substrate, vegetation and hydraulic features. Pinto Creek had no surface flow during the fly over period and habitat was restricted to a series of isolated pools. In summer 2011 it was determined the photographs did not have the resolution to provide details on substrate and instream cover without on-the-ground observation (i.e. - ground truthing). Plans were made in summer 2011 to map substrate and instream cover. However, in the interim conditions for granting access changed and access to Pinto Creek was restricted to only a few TPWD staff. This task was not accomplished because the staff which had access to the property did not have the necessary expertise or equipment to complete this task.

Task C: Development of a two-dimensional hydraulic model: This task cannot be completed without bathymetric mapping. The justification for why this was not completed is summarized in task A.

Task D: Habitat Utilization: Heart of the Hills Fisheries Science Center (HOH) staff completed quarterly sampling of available sites representing three different mesohabitats (i.e. -run, riffle, pool). This work was

completed in FY 2011 and observations made by the project team were reported in the FY 2011 interim report. Additional analysis of these data for inclusion in the Final Report are underway.

Task E: Study Reproductive Variables: Texas State University (Dr. Timothy Bonner) was contracted to evaluate reproductive biology of Devils River minnows. Due to the uncertainty of consistently obtaining adequate samples from Pinto Creek to evaluate reproductive conditions, as well as the perceived benefits of having comparative samples from the better known population in the Devils River, this task included collections from both streams. The reproductive ecology study was largely finished during the FY 2011 reporting period and a draft final report submitted. The draft report also included information on the feeding ecology of *Dionda diaboli*. A final report was submitted in February 2012.

Task F: Data Integration: This portion of the study was not initiated due to the inability to collect data for hydraulic modeling (bathymetry) and substrate mapping. Justification for not collecting data is included in previous sections.

Summary: Extreme drought conditions during most of this study have diminished the ability to produce meaningful results from the Pinto Creek study site. While Devils River minnow persisted in isolated pools of the Pinto Creek study reach it is difficult to say if these were preferred habitats or areas of subsistence. In addition, access to the study site was restricted in year two making it impossible to collect data needed for determining the relationship between streamflow and habitat availability in year three. Should the opportunity arise for collecting additional habitat use data once more normal stream flows return these data could be valuable. Integrating habitat use, reproductive variables and hydrology results will not be accomplished at this study site.

While Devils River minnows persisted in Pinto Creek their life span is relatively short (1-2 years) and prolonged drought conditions (several years) could lead to significant decreases in abundance or loss of the species in Pinto Creek. Lack of documented reproduction by HOH staff in the second year of the study (spring 2011) might be attributed to the lack of surface flow due to drought conditions during the winter-summer reproductive period identified by the Texas State researchers. Additional research looking at flow or other abiotic conditions which might induce reproduction in Pinto Creek and other systems is needed.

During the first year of the study, it has become evident that the surface water hydrology of Pinto Creek was poorly understood. The stream is ungaged and much of the information on surface flow was anecdotal. Given the lack of stable surface flow during the first reporting period and the apparent importance of persistent pools in maintaining the Pinto Creek population of Devils River minnow, the

project team initially considered dye studies to evaluate subsurface flow and connectivity among isolated pools within the channel. This proposed approach was eventually abandoned due to landowner concerns. In the second year of the study a new approach to modeling flow in the study reach was considered, and likely could have been accomplished, except access to the study site became restricted.

Significant Deviations:

- 1) **Change in Principal Investigator:** Doyle Mosier was the original principal investigator on this study, but retired from TPWD in spring 2011. In July 2011, Stephan Magnolia inherited this study and became principal investigator.
- 2) **Change in Study Area:** Hydraulic modeling and substrate mapping could not be accomplished due the access restriction in year two of the study. Because hydraulic modeling (stream flow) was a key component for making inferences on reproduction and habitat use/availability, integration of study results (task F) from the Pinto Creek study site will not be possible. We proposed moving the study location for these tasks to the Devil River State Natural Area where Devils River minnows were collected during task E of this study (reproductive variables) and by other researchers (Bonner, Kollaus, Garrett etc.). We have unrestricted access to this area and have additional access at adjacent Texas Nature Conservancy lands. This stretch of river also has significant reaches influenced by spring flow, similar to the original Pinto Creek site, and additional comparisons between spring and river influenced populations might be made. A two dimensional hydraulic model which provides information on stream and/or spring flow reproductive cues and habitat availability might be constructed in this reach of the river. This model might provide valuable information for conservation of Devils River minnows in similar environments.
- 3) **Completion of bathymetry and substrate mapping:** A proposed amendment to the study design (change in principal investigator and study area) was prepared in March 2012. In early-May 2012 The Texas Nature Conservancy (TNC) and Texas State University (TSU) agreed to serve as contractors for completing the substrate mapping and bathymetry work, and provide the required non-federal matching funds for the amended project statement. Inter-agency contracts between TPWD, TNC and TSU were prepared by the Principal Investigator (PI) and submitted to TPWD contracting specialists at the end of May 2012, with the anticipation that contracts would be signed and completed by August 1, 2012. It was anticipated fieldwork would take place during August and September, 2012, and data analysis and a final report would then be prepared to meet the final report deadline of February 28, 2013. Due to unforeseen circumstances contracting staff at TPWD were not able to send the contract to TNC until the end of July 2012 (two months after submission by the PI). Similarly delays in processing occurred at TNC, and as of October 9, 2012 the inter-agency contract has not been approved by their legal staff. In short due to processing delays with the inter-agency contracts no work at the new study location has been initiated. Little time remains to finish the fieldwork portion of the project this fall, calibrate the hydraulic model under different flows and prepare the final report to meet the February 28, 2013 deadline. A 9-month no-cost extension of the grant will likely be required to finish the fieldwork and final report.