



## **Species Occurrence Probabilities for Fishes of Texas**

**Progress Report**

**Prepared by**

**Tx FISH**

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Texas Foundation for Identifying Species Habitats (Tx FISH)  
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Mr. Ben Labay  
Texas Natural History Collections  
c/o Texas Natural Science Center  
2400 Trinity Street  
Austin, Texas 78705

Dear Mr. Labay:

We are writing to inform you of our progress on the Species Occurrence Probabilities for Fishes of Texas project. As per our proposal, Tx FISH is agreeing to provide attribute rasters in a database for use in the MAXENT program, and to create suitability models for three Texas fishes using ArcGIS. Upon your acceptance of our proposal on February 22, Tx FISH has begun downloading and manipulating data for the study area of this project.

After downloading approximately 8GB of data from the National Hydrography Dataset Plus website, we have narrowed down specific attribute information pertaining to the three hydrologic regions that make up the study area. We have also obtained the data on three separate fish species occurrences to incorporate into our suitability models. We expect to have the final project completed on the determined delivery date of May 10, 2010.

This report will cover a review of the project description on what services and deliverables you can expect from Tx FISH. This report also includes the work we have completed, the work in progress, and the work needing to be finished, as well as a list of obstacles we have faced. Lastly, Tx FISH will give an overall assessment of how the project is going.

## **Project Description**

The following is a description of our project, including the purpose for the project and the scope of this report.

### **Purpose**

The purpose of the project for Tx Fish is to work with the Fishes of Texas project, developed by the Texas Natural History Collections, to better organize their massive data collections and to reformat the data into a more suitable form for their MAXENT program. MAXENT takes rasterized data sets and uses them to predict species distributions and analyze how habitat conditions affect the distribution. The results of these analyses will allow TNHC to be able to predict distribution shifts due to environmental factors. Tx FISH will take the raster files and combine them into a geodatabase which, along with the occurrence records provided by Ben Labay, will be used to make a suitability model to present to TNHC. This model

will then be compared to a model made with MAXENT to see how accurate GIS analyses can be for these purposes.

## Scope

This report will summarize what has already been done to date on Tx FISH's portion of the project and work that is currently in progress. It will also touch on work to be completed in the future. A brief statement on the obstacles Tx FISH has incurred will be included, followed by the overall assessment of the project.

## Work Completed

As of this time, Tx FISH has completed the following five tasks that TNHC has asked to be done.

**A. Download individual catchment shapefiles from National Hydrography Dataset Plus website (NHDplus).** Tx FISH has merged three individual shapefiles into one master shapefile, based on a common identification key. This consisted of 324,916 total feature classes.

**B. Gather data from 4 databases from the National Hydrography Dataset Plus website (NHDplus).** This included gathering 8GB of data from the National Hydrography Dataset Plus website. The data was broken down into the following four databases:

1. Catchment Attributes NLCD
2. Catchment Attributes Temperature Precipitation
3. Flowline Attributes Flow
4. Flowline Attributes Temperature Precipitation

Once this data was gathered, it was joined to the master shapefile mentioned in task A. This consisted of 31 fields of attributes.

**C. Rasterize the 31 fields of attributes.** MAXENT only runs on raster files so this task is essential to the whole project. The fields included National Land Cover Datasets (NLCD) compiled by the United States Geological Service (USGS), information on catchment attributes, information on flowline attributes, cumulative characteristics, and flow volume. These attributes were reformatted into raster shapefiles.

**D. Make individual layers for the rasters.** Upon completion of rasterizing the attributes, individual layers were made out of the rasters mentioned in task C.

**F. Group individual rasters into categories.** Once the rasters had individual layers, Tx FISH separated the layers into categories based on Land Use Land Classification (LULC) categories provided by Ben Labay. See Figure 1.

| Original categories          | Reclassified categories |
|------------------------------|-------------------------|
| Developed, Open Space        | Urban                   |
| Developed, Low Intensity     |                         |
| Developed, Medium Intensity  |                         |
| High Intensity, Residential  |                         |
| Deciduous Forest             | Forest                  |
| Evergreen Forest             |                         |
| Mixed Forest                 |                         |
| Shrub/Scrub                  |                         |
| Grasslands/Herbaceous        | Grassland               |
| Pasture/Hay                  |                         |
| Cultivated Crops             | Agriculture             |
| Woody Wetlands               | Wetland                 |
| Emergent Herbaceous Wetlands |                         |

Figure 1: LULC categories used by Tx FISH.

## Current Work

Tx FISH is currently working on three projects that will allow Mr. Labay and TNHC to have greater access to the information and will make the data easier to use.

- A. **Establish a geodatabase for the raster files.** Since the raster files have been completed and grouped together into the appropriate categories, the establishment of a geodatabase is important to the project. This will give researchers a chance to access and use the raster files easier, causing their studies to be enhanced further.
- B. **Give raster files individual layer symbolization.** After rasterizing the data, each file is just that: a file of rasterized data that is not symbolized well in the maps. The raster files now need to be given unique values that will allow Tx FISH to appropriately symbolize each layer, giving them a cleaner and more professional appearance.
- C. **Metadata.** Compiling this data will provide users with the needed information about where the original data came from, how it was manipulated, and how it came to be in its final form.

## Future Work

The future work that has to be completed can be separated into three main components:

**Create suitability models.** Tx FISH will use the newly created geodatabase to help create suitability models for the pugnose minnow, the channel catfish, and the Guadalupe bass. These suitability models will help us know and understand the different habitats these fishes live in.

**Create website.** This step will allow public access to the work that Tx FISH has completed. The website will include documents pertaining to our project that can be downloaded, as well as links to the data used and contact information for the group. We hope to also include an interactive map in which the user can view as many of the layers as they need.

**Construct a ReadMe file.** This instruction file will include instructions on how to use the data and maps provided by Tx FISH and definition tables that will give the user additional information on how to use the finished disk and programs.

## **Obstacles**

The large amount of data, equivalent to 8GB, has proven to be cumbersome. The overall study area, which is in three separate regions, has taken a great amount of time to group into one large study area. Joining three large databases into one has resulted in a large data-saturated database, out of which Tx FISH has had to query out specific attributes.

## **Overall Assessment of the Report**

The Species Occurrence Probabilities for Fishes of Texas project is coming along favorably. Barring the large amounts of data manipulation and time consuming data processing, Tx FISH has not encountered any impassible obstacles.

If you have any questions about the progress of the Species Occurrence Probabilities for Fishes of Texas project please let Tx FISH know. Currently, the progress of our project is coming along well; hence, we expect the final deliverables to be complete on the scheduled time as stated in the proposal.

Sincerely,

Tx FISH

Pete M. Castillo – Project Manager

Jesus Avillaneda – Project Assistant Manager

Sara Bell – GIS Analyst, Graphic Design Architect

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