# Finding the Right School: Geodatabase to Support Habitat Study of Texas Fishes

## Background

Texas Natural History Collections (TNHC) is working with Texas Parks and Wildlife on the Fishes of Texas Project. The overall goal of the Fishes of Texas Project is to use environmental parameters to predict species distribution, analyze how habitat affects the distribution, and to predict distribution shifts. It will highlight the freshwater fish populations in Texas in an attempt to combine all scientific information about these species together into one, easily accessible dataset

## Project Design

Texas Foundation for Identifying Species Habitats (Tx FISH) were to work with TNHC to create a geodatabase containing environmental data for locations of freshwater fish in Texas. TxFISH also were to gather information to create specific attribute layers for the study area that can be easily used by the Fishes of Texas Project. In addition to creating a geodatabase, TxFISH also were to compile three suitability models using attribute layers and occurrence records

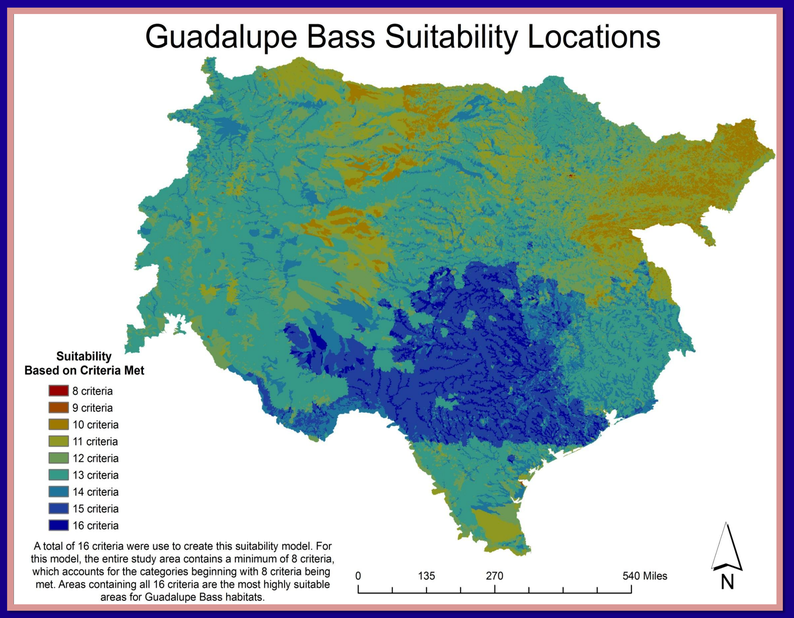
## Scope

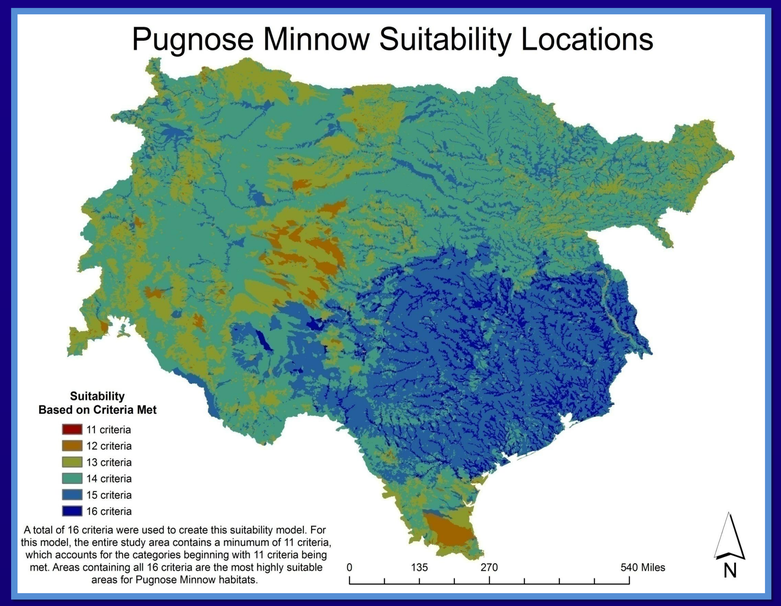
The scope of this project consisted of three hydrologic regions as defined by the National Hydrography Dataset Plus (NHDPlus) team. The regions encompassed all of Texas and parts of Oklahoma, New Mexico, Colorado, Kansas, Missouri, Louisiana, and Arkansas.

## Geodatabase

### Geodatabase

The database compiled by TxFISH contains 28 environmental attributes in the form of raster files. The 28 attributes can be categorized by Urban, Forest, Agriculture, Wetlands, Precipitation, Temperature, Slope, and Flow Attributes.




## Suitability Models

### Suitability Criteria

The 16 environmental attributes used as criteria for the suitability models are as follows:

- Mean average temperature
- Mean average flow at bottom of flow line
- Cumulative drainage area at bottom of flow line
- % of catchment area classified as Low Intensity Residential in the National Land Cover Dataset (NLCD)
- % of catchment area classified as High Intensity Residential in NLCD
- % of catchment area classified as Commercial/Industrial/Transportation in NLCD
- % of catchment area classified as Bare Rock/Sand/Clay in NLCD
- % of catchment area classified as Quarries/Strip Mines/Gravel Pits in NLCD
- % of catchment area classified as Deciduous Forest in NLCD
- % of catchment area classified as Evergreen Forest in NLCD
- % of catchment area classified as Mixed Forest in NLCD
- % of catchment area classified as Shrubland in NLCD
- % of catchment area classified as Orchards/Vineyards/Other in NLCD
- % of catchment area classified as Row Crops in NLCD
- % of catchment area classified as Small Grains in NLCD
- % of catchment area classified as Fallow in NLCD

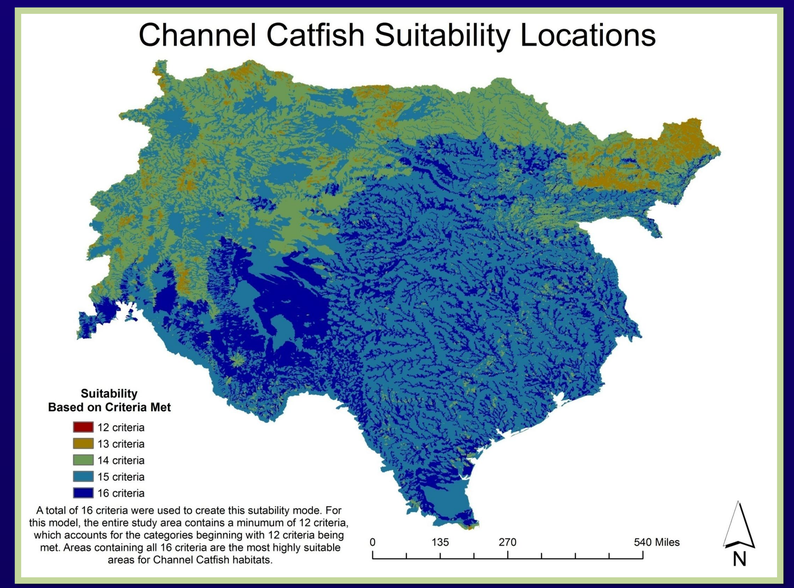
### Methodology

TxFISH collected data covering the study area from NHDPlus website. This data were imported in ArcGIS and converted into raster files. These raster files were then merged from three separate regions into one region. The results were 28 raster files covering a wide array of environmental attributes. A geodatabase was created to contain all 28 rasters.

Suitability models using 16 criteria from the geodatabase along with occurrence records were created using ArcGIS. The three species of fishes modeled were the Guadalupe Bass, Channel Catfish, and Pugnose Minnow.

### Results

Tx FISH collected environmental data from NHDPlus website for the study area and converted it to raster format. The raster data was compiled into a geodatabase available to researchers through THNC who can easily access data needed to perform analysis and understand the effect that hydrology has on different freshwater fish species. Additionally, Tx FISH provided suitability models that will help forecast the habitat locations for three species of Texas fishes.





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**References**

NHD Plus - NHDPlus Data. (n.d.). *Horizon Systems Corporation*. Retrieved February 19, 2010, from http://www.horizon-systems.com/NHDPlus/data.php

Texas Natural Science Center: Texas Natural History Collections- TNHC Home Page. (n.d.). *The University of Texas at Austin – Web Central*. Retrieved February 19, 2010, from http://www.utexas.edu/tmm/tnhc/

Maps created by TxFISH

Fish Images from: Game and Fish Project Wild Clipart. (n.d.) Fish *of North Dakota Clipart*. Retrieved April 26, 2010, from http://ndwild.psych.und.nodak.edu/ndwild/owls/fishclip.html



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**Project by TxFISH**
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