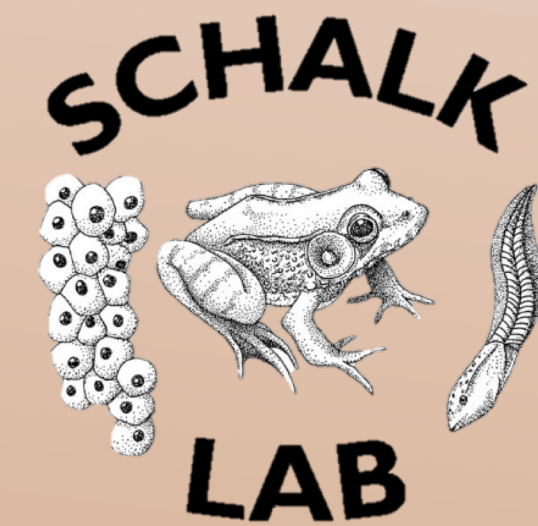


# Fish Community Assembly across Riverine Systems of East-Central Texas

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## Introduction

Stream communities are structured by biotic and abiotic processes that vary in strength across different spatiotemporal scales (**Fig. 1**).

Increases in anthropogenic activities that alter land use and flow regime affect local community structure and biodiversity.

Functional traits of species can provide insights into the processes that shape community structure and how species respond to environmental gradients.

The relationship between functional traits and environmental variables provide an opportunity to model flow-dependent species distribution.

## Goals

1) Characterize relationships between fish taxonomic and functional diversity and environmental variables at the watershed and local scale.

## Methods

### Habitat Assessment

43 local habitat variables will be collected at 5 cross sectional transects within a 160-500m stream reach. 21 watershed scale variables will be quantified with ArcGIS.

### Fish Collection

Within the study reach, all available habitat will be thoroughly sampled using a backpack electrofisher and seine net.

### Morphological Measurements

26 morphological traits associated with feeding locomotion, habitat preference, and life history will be measured.



Low head river dam. Obtained from USGS.

### Watershed Scale Species Pool

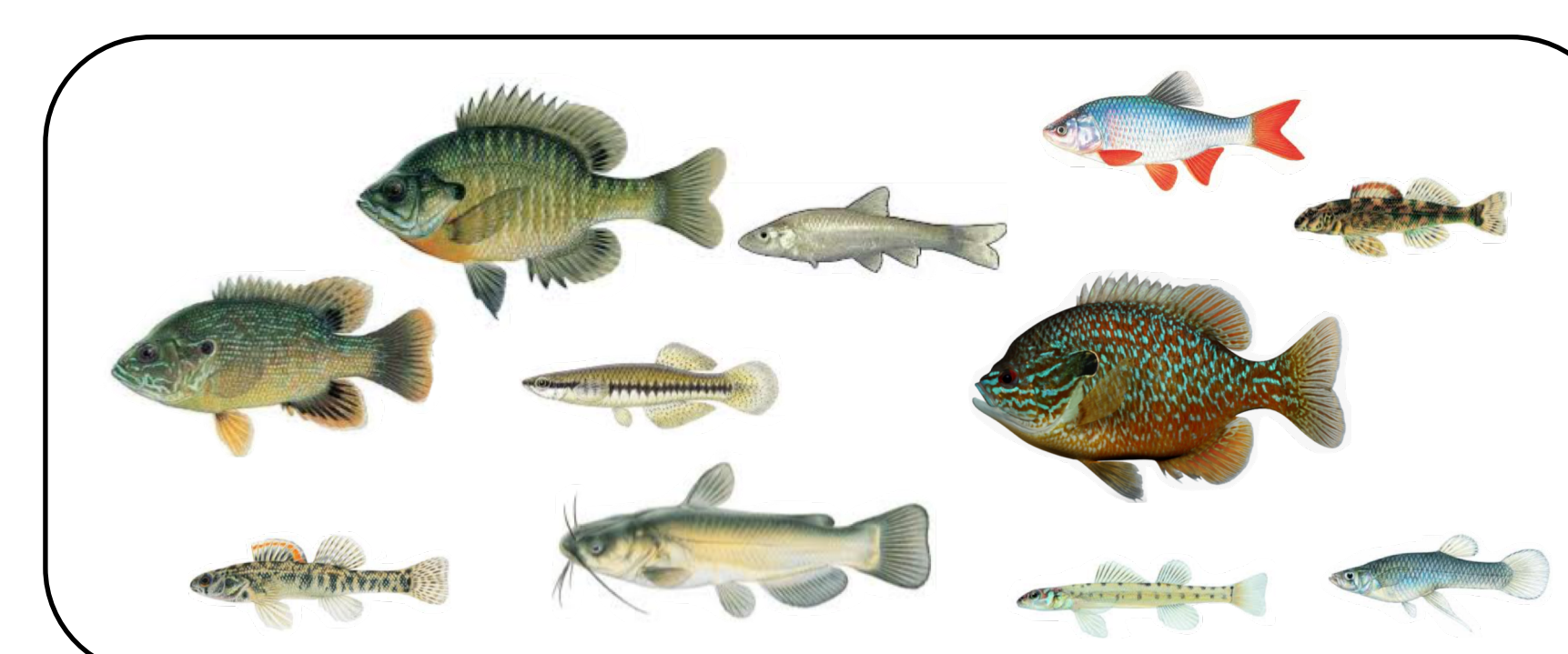
#### Environmental Variables

Topography  
Land Use  
Spatial Relation  
Dams & Outfalls



Forest clear-cut. Obtained from USGS.

**Figure 1.** Environmental variables create gradients of variability that in-turn, determine the species pool at watershed scale. Environmental filters such as flow regime and land use change influence the local assemblage by the alteration of habitat.



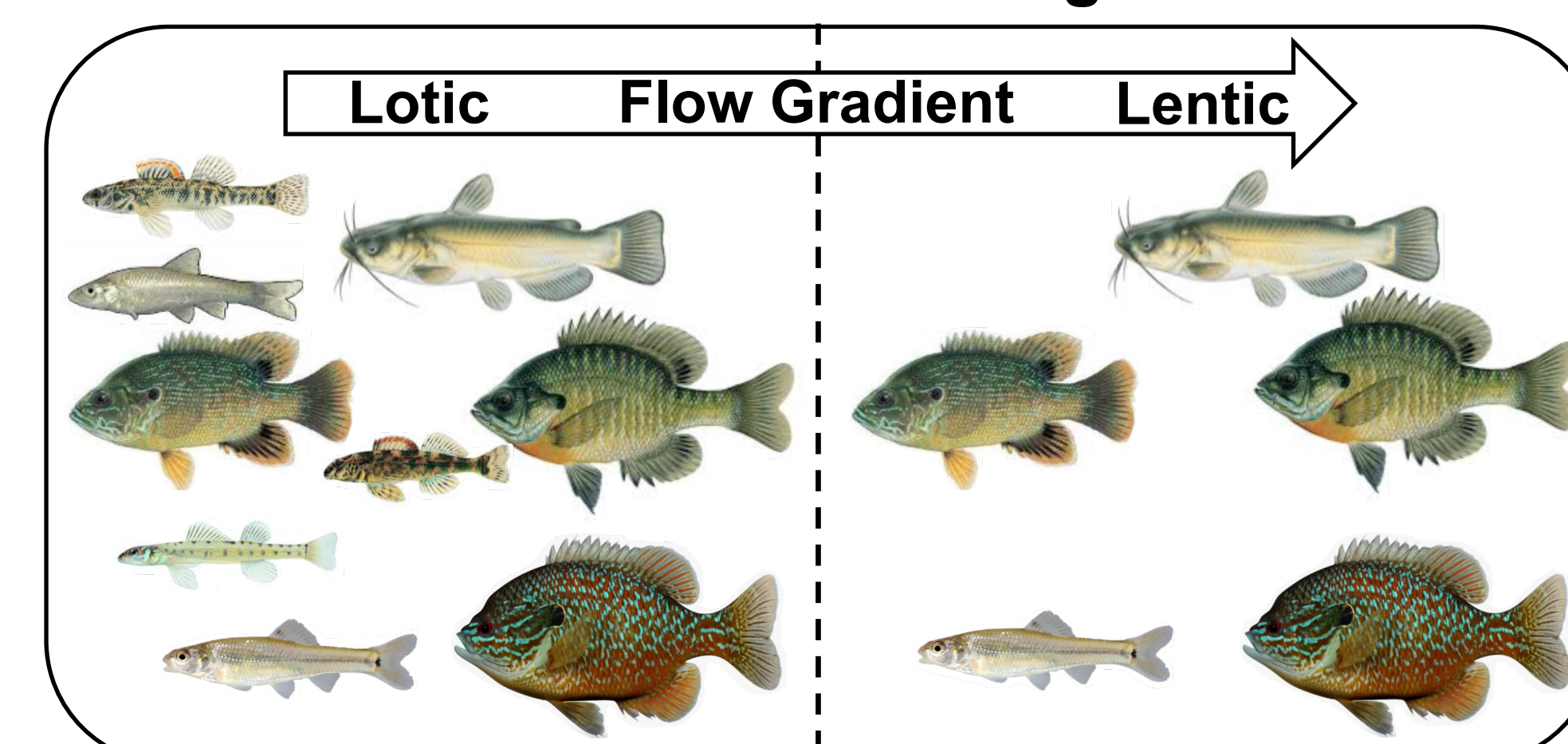
#### Environmental Filters

#### Flow Regime

#### Land Use

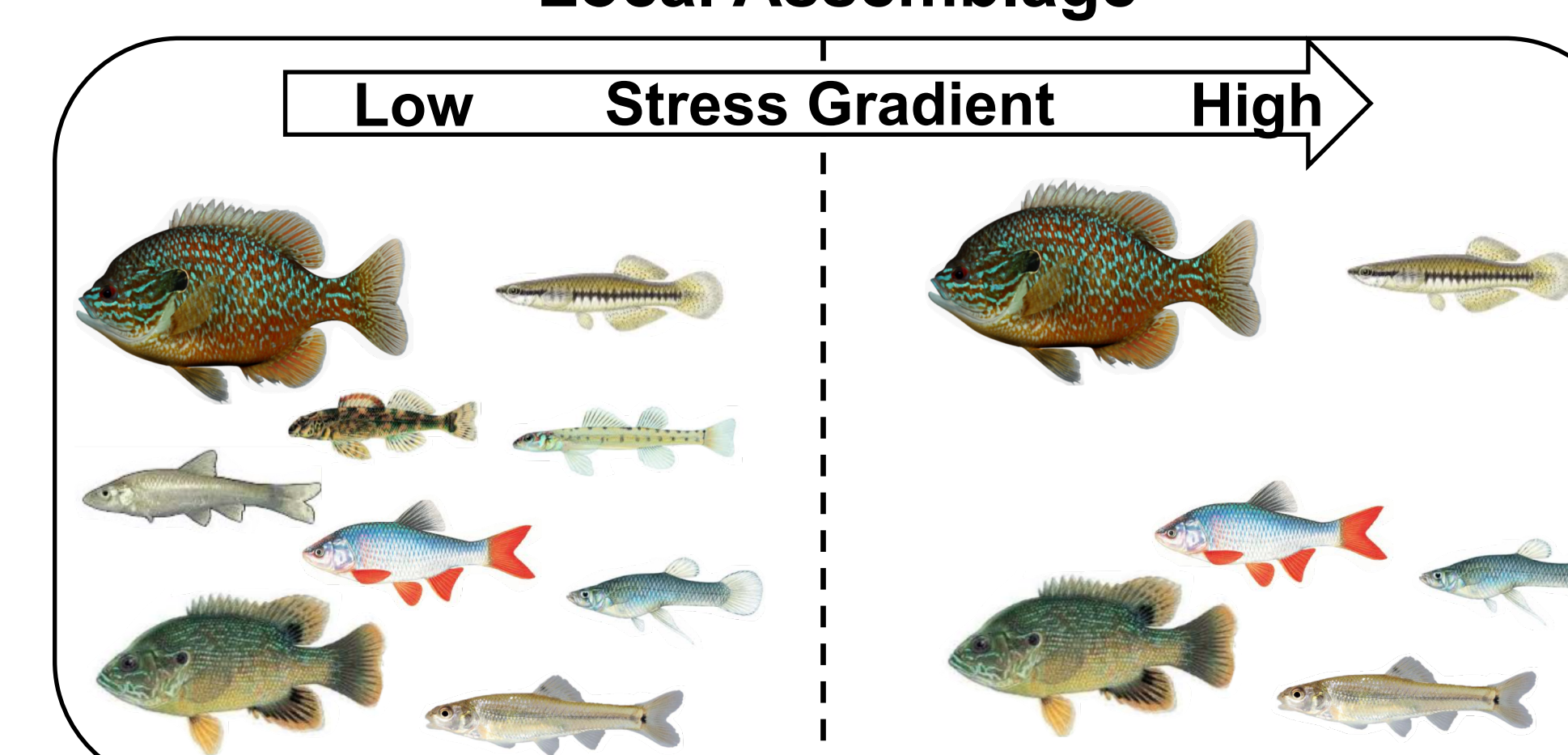
#### Local Assemblage

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High Richness → Low Richness

**Hypothesis:** Functional diversity of local fish assemblage is explained by changes in flow regime characteristics.



High Richness → Low Richness

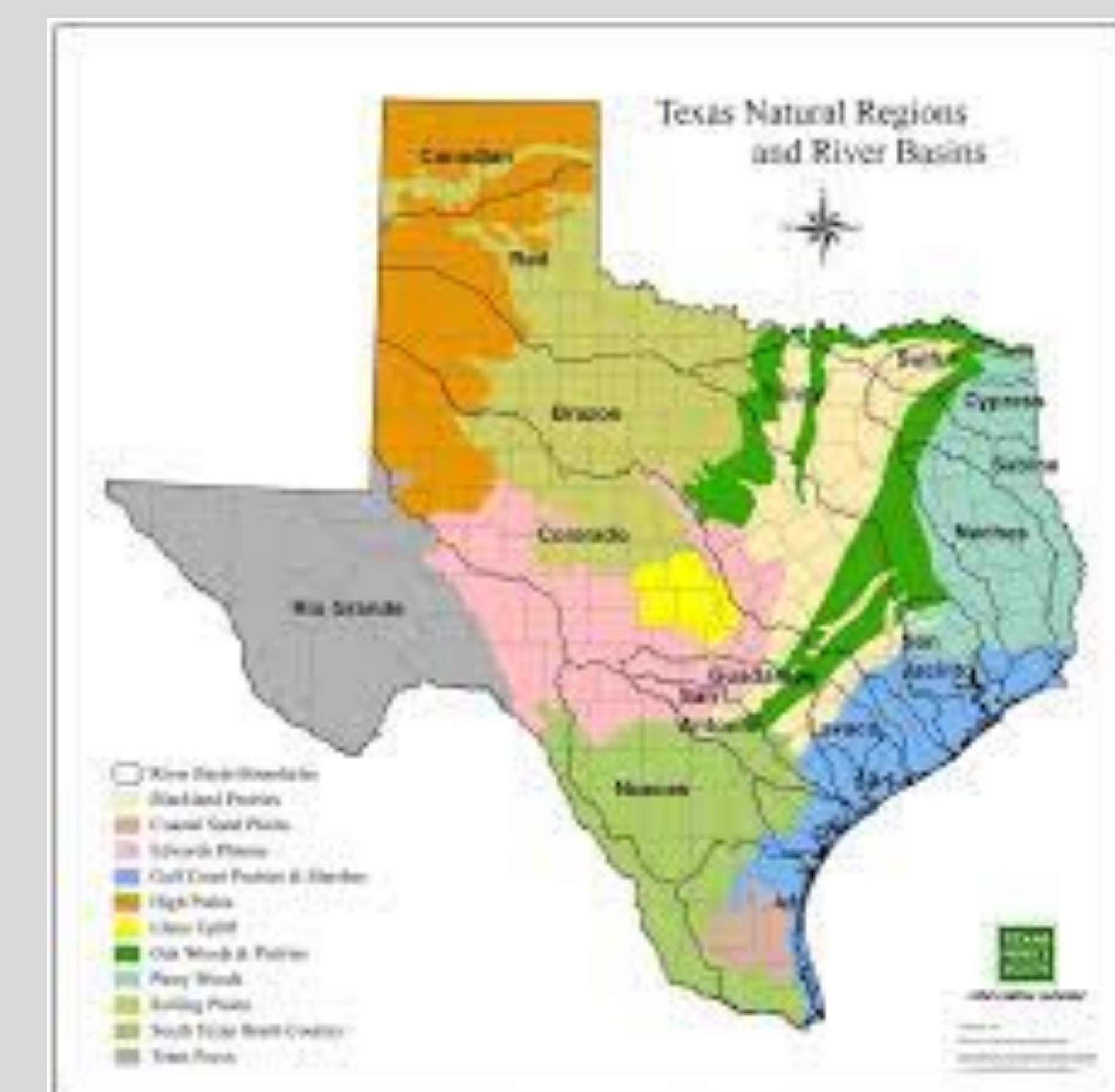
**Hypothesis:** Local fish assemblage is explained by increases in environmental stress from changes in land use (e.g. Forest, Agriculture, Urban).

### Predictions

- Fragmented streams with less flowing water will have a lower species richness and be occupied by ichthyofauna with larger, deeper bodies, larger eyes, and longer fins due to lower flow rates and more in-stream woody habitat.
- Streams with greater anthropogenic impacts such as urbanization or channelization will favor generalist species that are more tolerant to habitat changes.

## Study Area

Sampling of fish communities will be conducted within the Brazos, Neches, Sabine, and Trinity watersheds during the summer season (May to August) 2020-2021. The streams within these watersheds lie within the Cross Timbers, East Central Texas Plains, Texas Blackland Prairie, and Western Gulf Coastal Plains ecoregion (**Fig. 2**) and occur over a variety of land uses and stream types.



**Figure 2.** Texas map of watersheds and ecoregions. Obtained from Texas Parks and Wildlife Department.

## Future Directions

This study provides insight into the fish-environmental relationship and patterns of functional and taxonomic diversity to further understand the structure of fish communities across different spatial scales.

The observation of flow regime and surrounding land uses within this study will provide the opportunity to model patterns of flow-dependent fish species distribution related to alteration in habitat and environment variables.