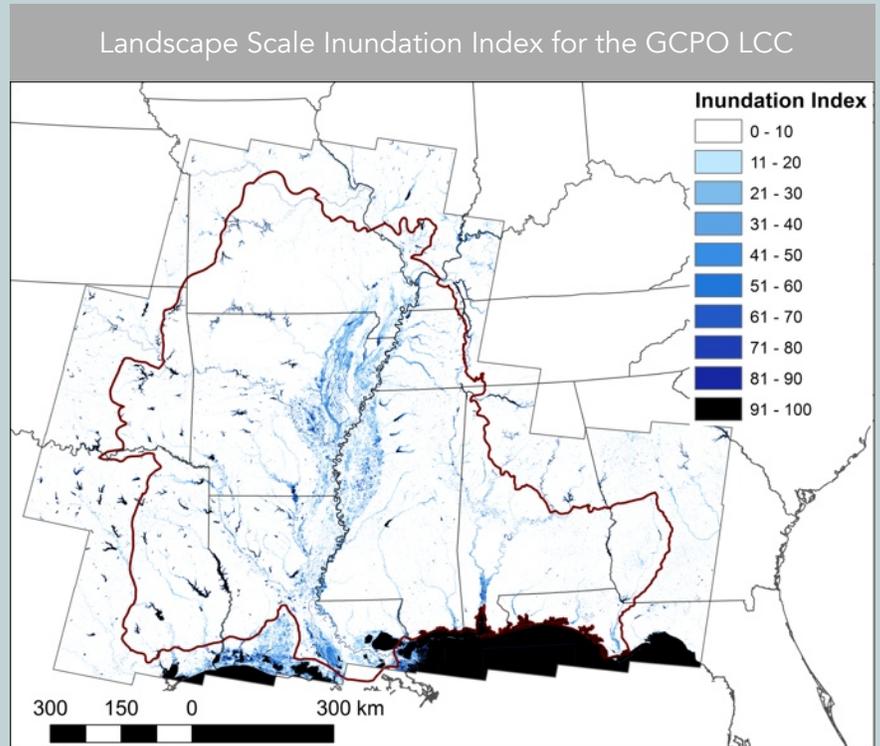# Conservation application of a GCPO LCC product: the Inundation Frequency Dataset

The Gulf Coastal Plains & Ozarks Landscape Conservation Cooperative's [Inundation Frequency (IF) dataset](#), first developed to cover the Lower Mississippi River corridor for use in the [Alligator Gar Habitat Suitability tool](#), has been expanded to cover the entire GCPO region. Using Landsat satellite images, it identifies locations that are subject to intermittent inundation as a result of variations in river level, precipitation and land or water management. This dataset is proving quite popular among fisheries managers working to manage and restore Alligator Gar and other wildlife populations, as it provides a comprehensive "desktop" evaluation of habitat that would be next to impossible to assess on the ground. Once identified, potential habitats can be evaluated in the field. For example, IF data can show specific floodplain areas on the landscape that are most likely to provide the right inundation conditions at the right times for various target species.

Landscape Scale Inundation Index for the GCPO LCC

Inundation Index
- 0 - 10
- 11 - 20
- 21 - 30
- 31 - 40
- 41 - 50
- 51 - 60
- 61 - 70
- 71 - 80
- 81 - 90
- 91 - 100

Habitat Model Passes the Ultimate Test

The US Fish & Wildlife Service and many others are collaborating to improve Alligator Gar spawning habitat. The GCPO LCC combined the IF dataset with information on water temperature and vegetation type to model habitat suitability. The model identifies areas within the Lower Mississippi River with seasonally flooded habitats and low open vegetation that could be suitable for Alligator Gar spawning or reintroduction. In the ultimate test of the completed model, gar were observed spawning at a new site on the St. Catherine Creek National Wildlife Refuge in 2014, which the model had correctly predicted as potential high quality habitat.

Alligator Gar Model showing a portion of St. Catherine Creek NWR
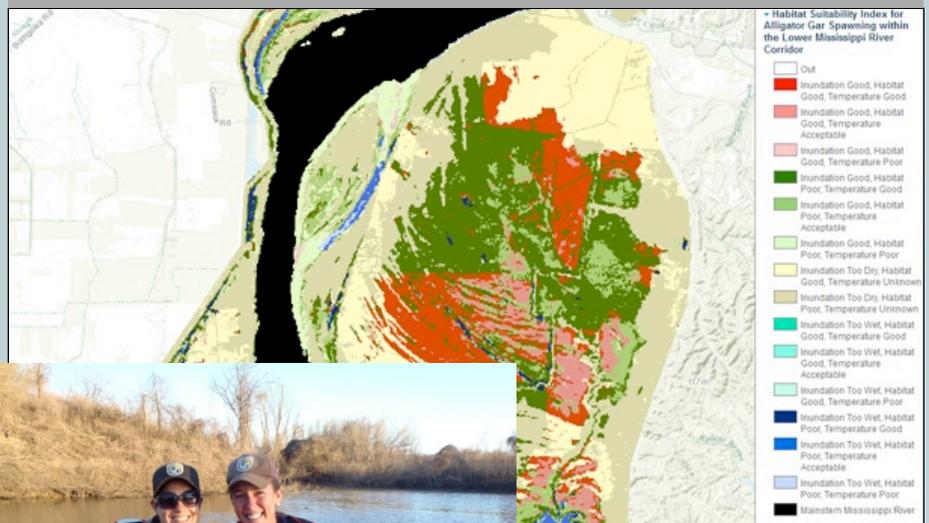
USFWS fisheries biologist Kimmel and volunteer Wright holding an Alligator Gar

The Inundation Frequency dataset is being used within the neighboring **Gulf Coast Prairie LCC** (GCP LCC) geography. (The dataset includes all bordering Landsat scenes that touch the GCPO; this includes all of the Trinity River up to Dallas.) Scientists focused on restoring and managing Alligator Gar — an important sport fish in Texas — in the lower Trinity River may receive support from the GCP LCC as well. The proposed study will not only focus on identification of spawning areas, but seek to determine whether Alligator Gar reproduced most successfully during years of greatest spawning habitat availability. Researchers are essentially trying to identify what flood characteristics and river stages result in the greatest availability of spawning habitat, and whether this translates into more Alligator Gar. Results will then be used to make management recommendations for how and where to:

- increase river connectivity to floodplain spawning areas;
- re-establish connections between the main channel and backwater areas that could become important for spawning and juvenile development (taking advantage of more frequent high flow pulses that are still below flood stage);
- provide appropriate land cover on public or private lands in the floodplain.

In addition, this information may help to answer the question, "Can floodplain inundation or reconnection with the main channel be managed to benefit multiple aquatic species, waterfowl, and riparian productivity?
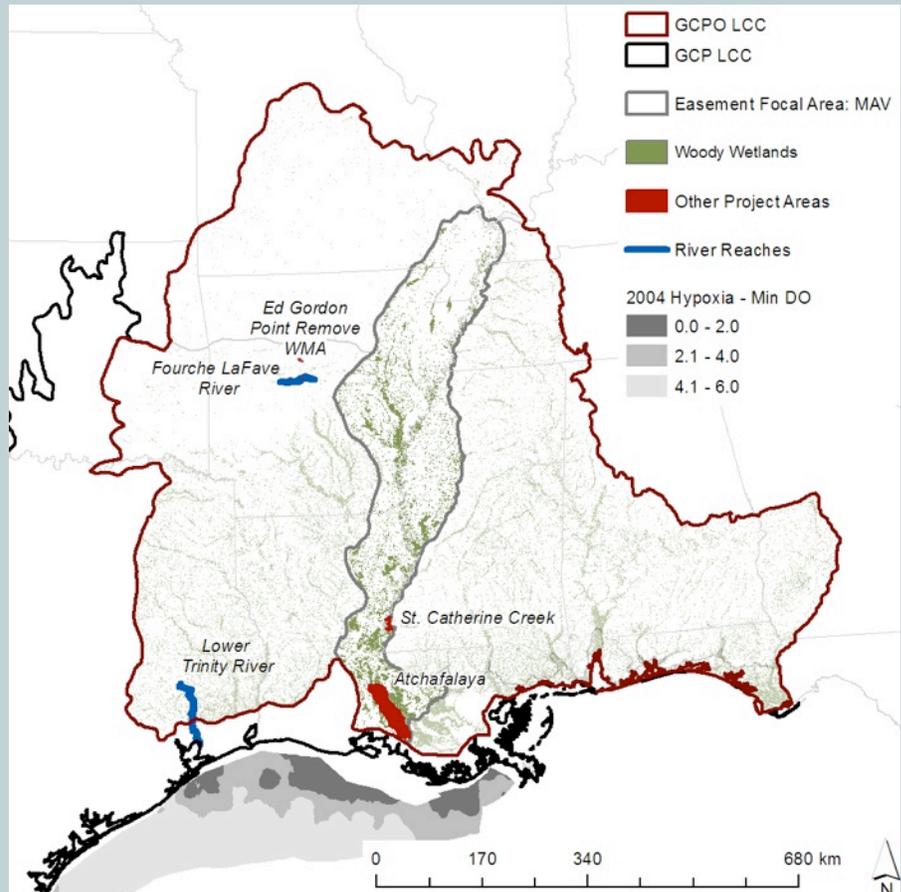
Fisheries managers in Arkansas consulted with the GCPO LCC Aquatic Habitat Analyst concerning appropriate Alligator Gar reintroduction and spawning locations in the Fourche LaFave and Arkansas Rivers in the central part of the state. In addition to identifying areas in the Fourche LaFave, the IF data also indicated that other locations near the Ed Gordon/Point Remove Wildlife Management Area could be equally important to gar.

Southern Illinois University's Watershed Science & Policy Program applied the IF information to estimate denitrification in the Atchafalaya basin and its potential to reduce the Gulf hypoxic zone. Maximizing denitrification (a natural process that reduces nitrate pollution in water) in bottomland forest wetlands of the Mississippi River could potentially reduce the world's second largest hypoxic, or dead, zone in the northern Gulf of Mexico. The researchers used a number of published datasets, including the IF dataset, to estimate annual denitrification in the Atchafalaya River Basin, the principal river delta channel that distributes waters from the Mississippi River to the Gulf of Mexico.

Ducks Unlimited has developed a land protection prioritization model that uses IF data as one of several inputs to identify frequently flooded forest habitats adjacent to other protected lands in the Mississippi Alluvial Valley, with a focus on Arkansas, Mississippi and Louisiana. This model is assisting DU to proactively engage private landowners interested in perpetual protection of these important wetland habitats via donated conservation easements.