

Name: _____ Teacher: _____

ECOSYSTEM DYNAMICS, FUNCTIONING, AND RESILIENCE: DON'T BOX ME IN | FORMATIVE ASSESSMENT TASK HS-LS2-6

TASK 1.

SCENARIO

The **Niangua River Watershed** is an example of a diverse stream system, located within the Ozark Highlands in Missouri. The Niangua River feeds into the Lake of the Ozarks which feeds the Osage River. The Niangua River contains 61 species of fish. The Niangua Darter is a small fish listed as State Endangered and Federally Threatened by the U.S. Fish and Wildlife Service. Individually, Niangua Darters are not that important to humans or the food chain. However, they are highly sensitive to changes in stream habitat and water quality and will die when water quality decreases. This makes them a valuable indicator species. Efforts to save the Niangua Darter ensure we are maintaining good water quality for people and animals, keeping water safe for drinking, bathing, and recreation.

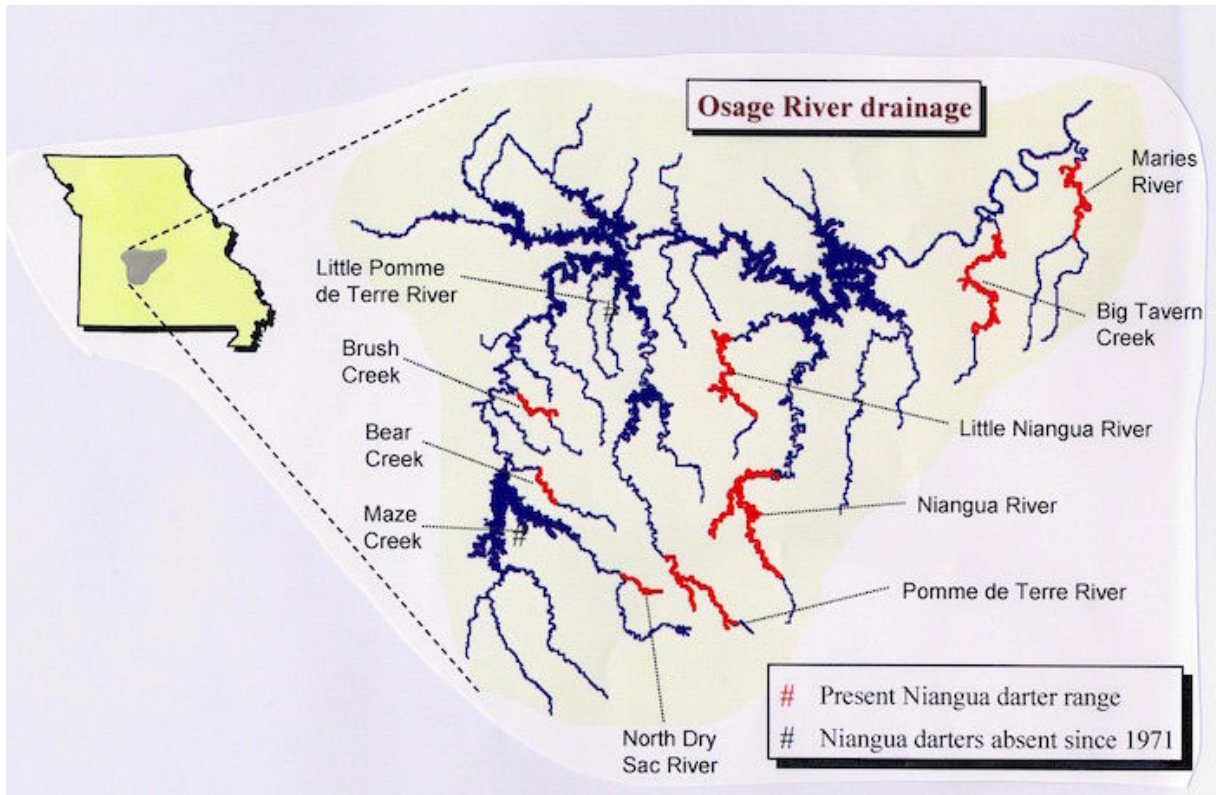


Niangua Darter



Osage Watershed with Niangua River Watershed marked in red.

The Niangua Darter inhabits clear upland creeks and small- to medium-sized rivers with slight to moderate currents. They require constant flowing streams with silt-free gravel and rock bottoms. The fish is originally from Missouri and lives nowhere else in the entire world. Today, eight populations survive only in northern flowing tributaries in the Osage River basin— across just 13 of Missouri's 114 counties. Two populations no longer exist. The Missouri Department of Conservation (MDC) says more could vanish if physical barriers to the species' movement and reproduction aren't eliminated. The map below shows where the Niangua Darter is located and places it is not found in the Osage River Watershed.



Places the Niangua Darter is present in the Osage River Watershed

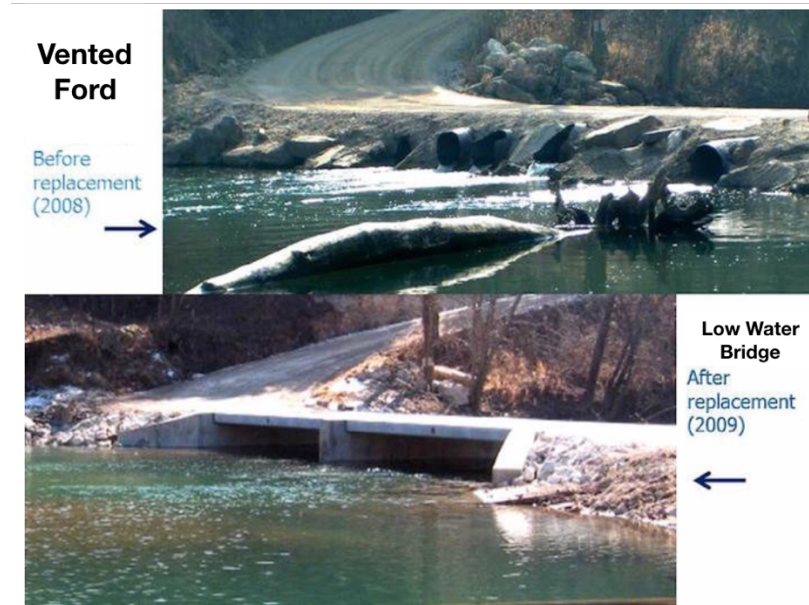
1. What patterns do you observe in the data presented in the map above that would help you explain how the population of the Niangua Darter has changed over time?

2. What might be possible causes for these patterns?

3. What additional observations could you make, or what questions could you ask next, to help explain the patterns in the data?

TASK 2.

It was determined by the Missouri Department of Conservation (MDC) that vented fords at low water crossings pose problems for the fish. The fords can get clogged with gravel or woody debris. Many times, if you look downstream you will see a pipe or vented ford that sits above the surface of the water. Vented fords create fish passage barriers by changing elevation or velocity. Replacing the vented fords with low water bridges was the least expensive answer to removing barriers and facilitating fish passage.



Barriers in the river and the low water crossings with which they were replaced.

4. In what ways might low water bridges remove barriers that could limit the movement of fish species in the river ecosystem?

5. How might the installation of low water bridges positively and negatively affect the stability of this ecosystem?

6. The claim could be made that as a result of installing low water bridges, the Niangua Darter will expand their range within the watershed. **What evidence presented in the scenario would support the above claim? What evidence presented might refute this claim?**

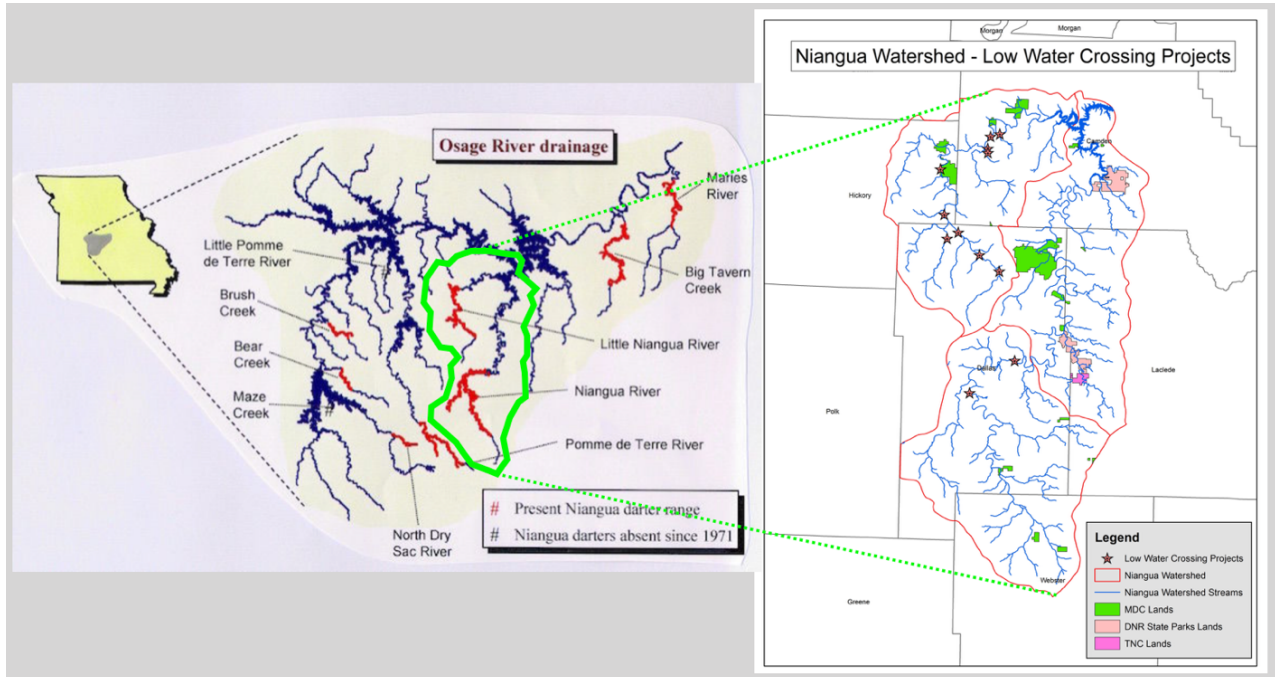
Supporting Evidence: _____

Refuting Evidence: _____

TASK 3.

Ten vented fords initially identified as fish passage barriers were replaced with low water bridges within the Little Niangua River watershed, near Lake of the Ozarks to protect the Niangua Darter.

The ten low water bridges constructed throughout the Little Niangua River created more than 55 miles of barrier-free stream flow. These crossings previously restricted the movement of individuals in the Niangua Darter population.



Left Image: Osage Watershed with Niangua River Watershed marked in green. Right Image: Locations of Low Water Crossings installed in Niangua watershed

7. Make a claim about what you think happened to the size of the Niangua Darter population after the low water crossings were installed?

Claim: _____

8. Using information from all parts of the scenario above, provide an explanation to support your claim.

Supporting Evidence: _____

My Reasoning: _____

9. Make a different claim about what might be another possible outcome. What information from all parts of the scenario above and reasoning might support this alternate claim?

Alternate Claim:

Supporting Evidence:

My Reasoning:
