CORPS

Oklahoma Rural Partnership For Science

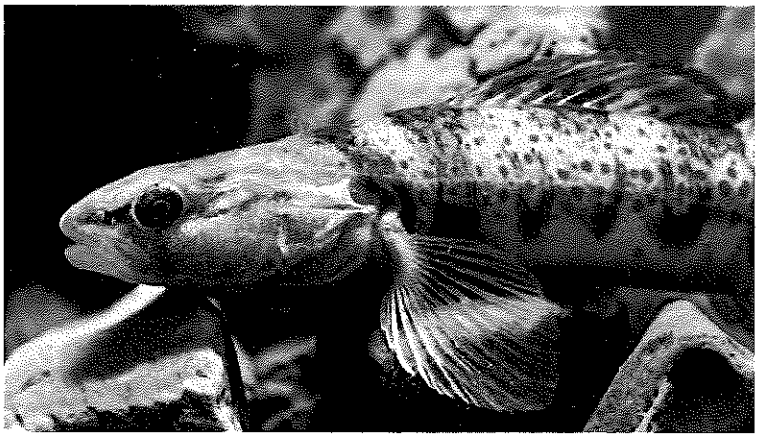
Name: [redacted] Teacher: _____

DON'T BOX ME IN | FORMATIVE ASSESSMENT TASK HS-LS4-5

TASK 1

SCENARIO

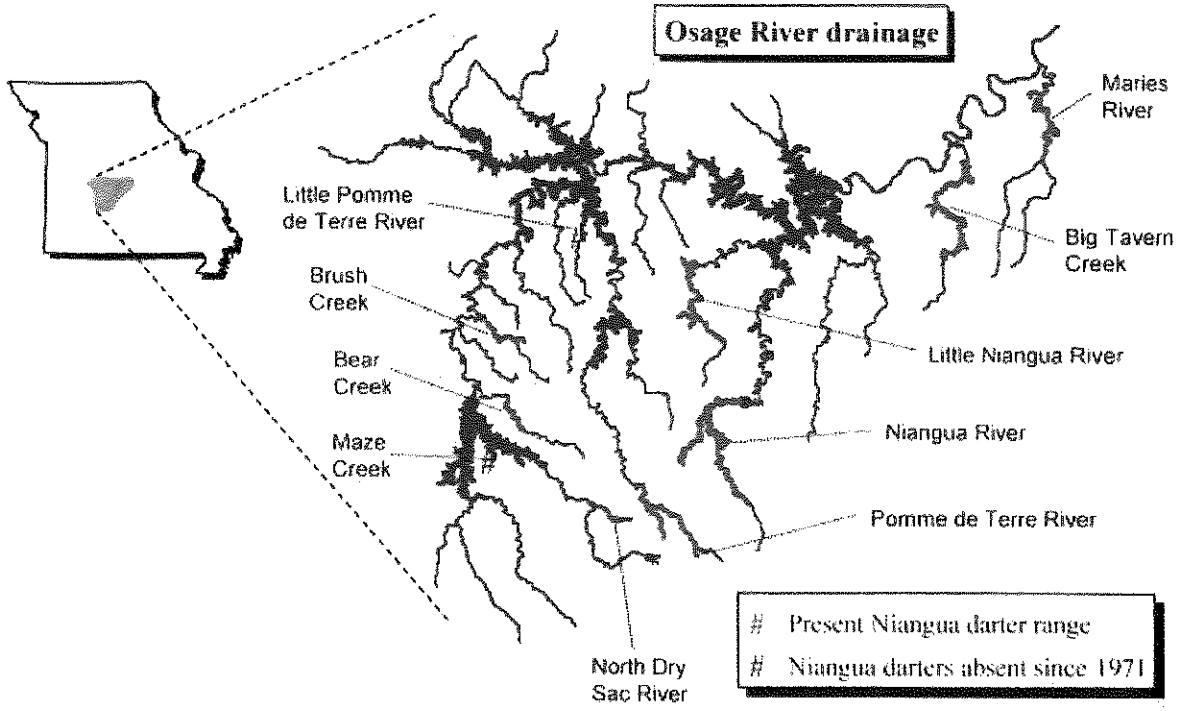
The **Niangua River Watershed** is an example of a diverse stream system, located within the Ozark Highlands in Missouri. The Niangua River feeds into the Lake of the Ozarks which feeds the Osage River. The Niangua River contains 61 species of fish. The Niangua Darter is a small fish listed as State 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.



Ningua River 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.



Range where the Niangua Darter is present or absent in the Osage River Watershed

1. What patterns do you observe in the data presented in the map above?

Every so often in a certain area (small) of creeks or rivers the Niangua darter range is present. There is alot of presence in the ends of the creeks/rivers.

2. What might be possible causes for these patterns?

The causes could be a presence of some resource in those areas that are good for the Niangua or there could be something trapping them.

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

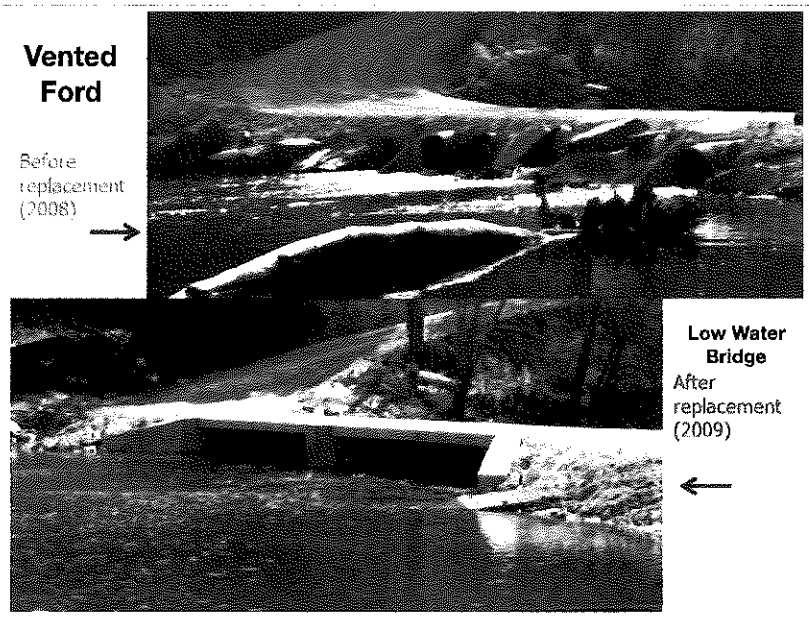
What is mainly present in the ends of the river and creek areas that isn't present in the other areas absent of the Niangua.

Noble

Funded by a USDE Math Science Partnership (MSP) grant through the Oklahoma State Department of Education.

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 replaced them.

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

The bridges could un block waterways and move ment of the stream and prevent blockage of anything.

5. How do you think installing low water bridges will affect the ecosystem?

It could help prevent flooding and any "clogging" of river flow.

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 this claim? What evidence presented might refute this claim?

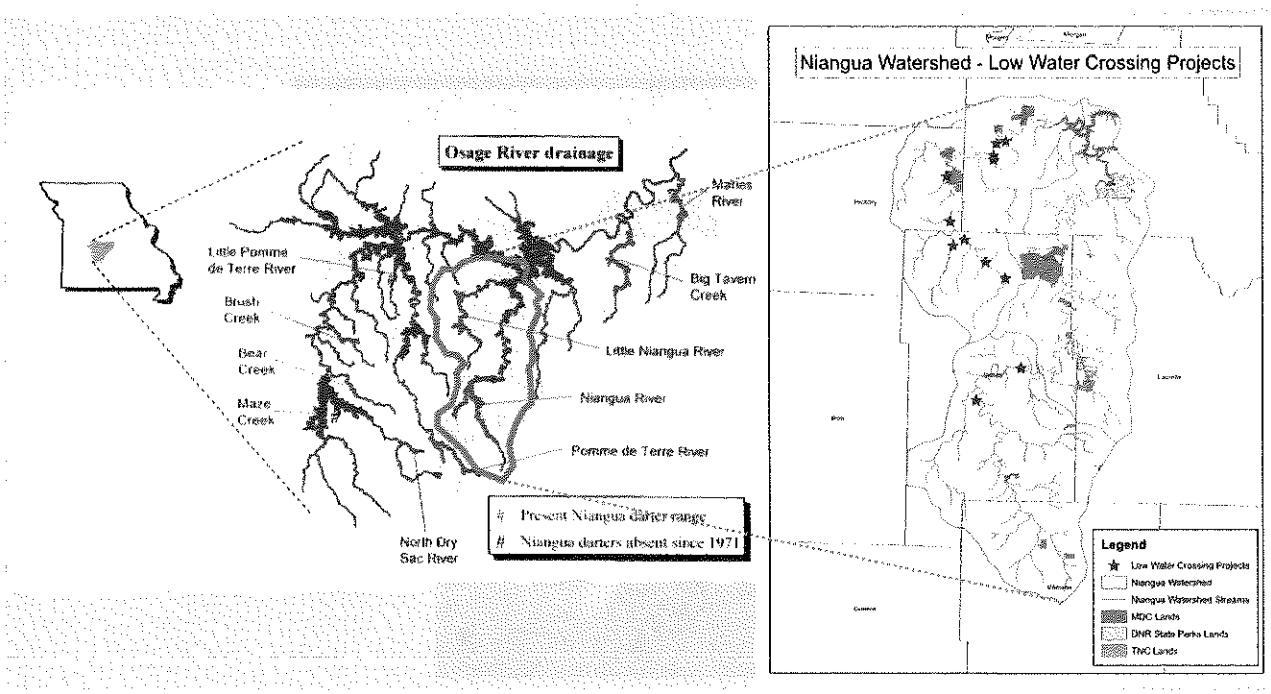
The supporting factor could be that it states that the bridges remove barriers which could be what was trapping the Niangua in one area. Refutelingly im not sure.

Noble
Funded by a USDE Math Science Partnership (MSP) grant through the Oklahoma State Department of Education.

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 Fish.

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 http://www.nianguariverwatershed.org

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

The population became more spred out and maybe even larger.

8. Using information from all parts of the scenario above, provide an explanation that supports your claim and shows your reasoning.

I think that the low water crossings helped the Niangua population spred throughout and travel the river areas.

Noble

Funded by a USDE Math Science Partnership (MSP) grant through the Oklahoma State Department of Education.

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?

The population could have declined due to them not being used to or around the other areas of the river that could have included new predators. The only support I can think of is that the Niangua was clogged in one place for quite some time and the new graph shows less colors.

CORPS

Oklahoma Rural Partnership For Science

Name: [redacted] 3-30-16 Teacher: 4th hour

DON'T BOX ME IN | FORMATIVE ASSESSMENT TASK HS-LS4-5

TASK 1

SCENARIO

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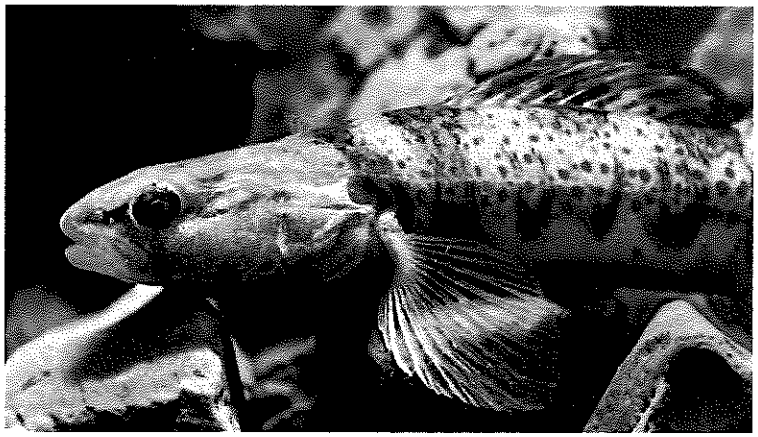

Ningua River Darter

Osage Watershed with Niangua River Watershed marked in red.

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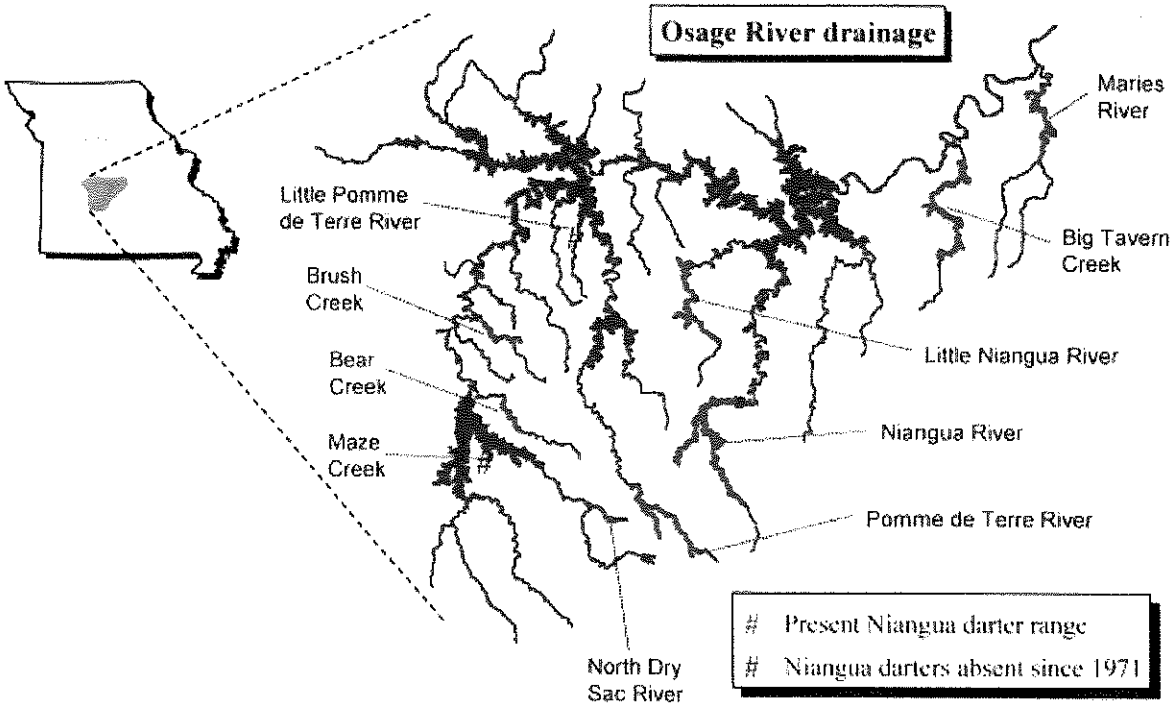


Range where the Niangua Darter is present or absent in the Osage River Watershed

1. What patterns do you observe in the data presented in the map above?

The Niangua darters seem to live in smaller rivers, and towards the end of rivers.

2. What might be possible causes for these patterns?

Humans fishing, pollution, and wide rivers may have high predators in it.

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

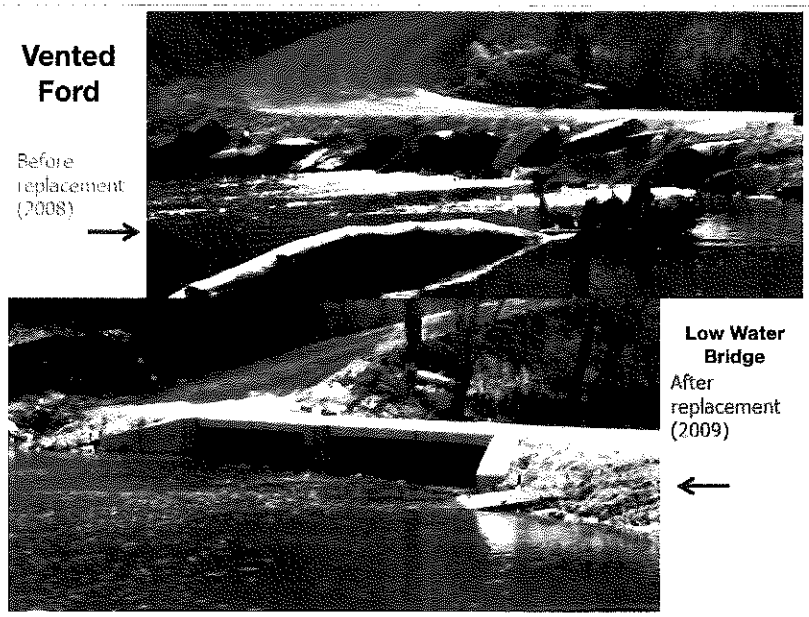
What is the total range of the darters? how the population increase or decreased since 2001.

Noble

Funded by a USDE Math Science Partnership (MSP) grant through the Oklahoma State Department of Education.

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 replaced them.

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

They are wider so large objects can move through them.

5. How do you think installing low water bridges will affect the ecosystem?

I believe that it would be better for the ecosystem because fish and the river species can pass through.

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 this claim? What evidence presented might refute this claim?

It would support because it would be removing barriers and facilitating fish passage.

Noble

Funded by a USDE Math Science Partnership (MSP) grant through the Oklahoma State Department of Education.

TASK 3.

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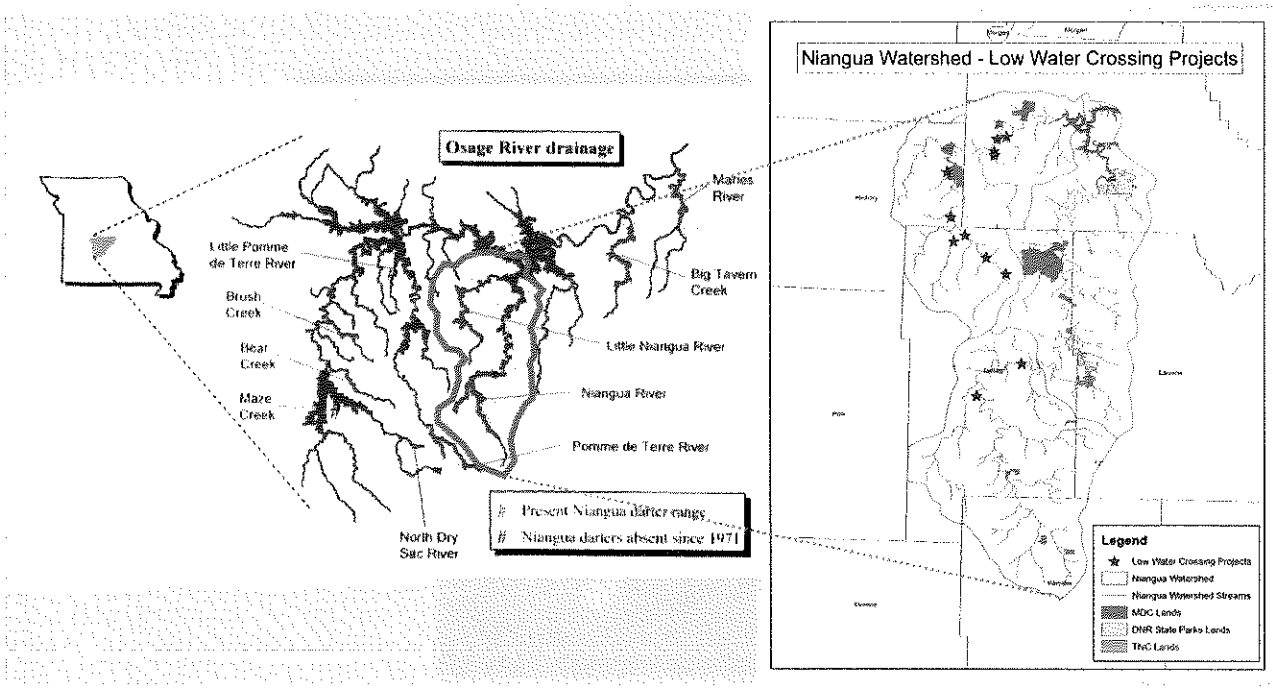
The ten low water bridges constructed throughout the Little Niangua River created more than 55 miles of barrier-free stream flow. These crossings previously restricted the movement of individuals in the Niangua Darter population.



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

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

I believe the population would increase because it would create more free stream flow.

8. Using information from all parts of the scenario above, provide an explanation that supports your claim and shows your reasoning.

The 10 low water bridges constructed throughout the Little Niangua River created more than 55 miles of barrier-free stream flow.

Funded by a USDE Math Science Partnership (MSP) grant through the Oklahoma State Department of Education.

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?

The population could decrease because larger predators can move through them. More than 55 miles of prairies-tall grass floor was created by the 10 Dams water bridge.

CORPS

ership For Science

Nar[redacted] Teacher: _____

DON'T BOX ME IN | FORMATIVE ASSESSMENT TASK HS-LS4-5

TASK 1

SCENARIO

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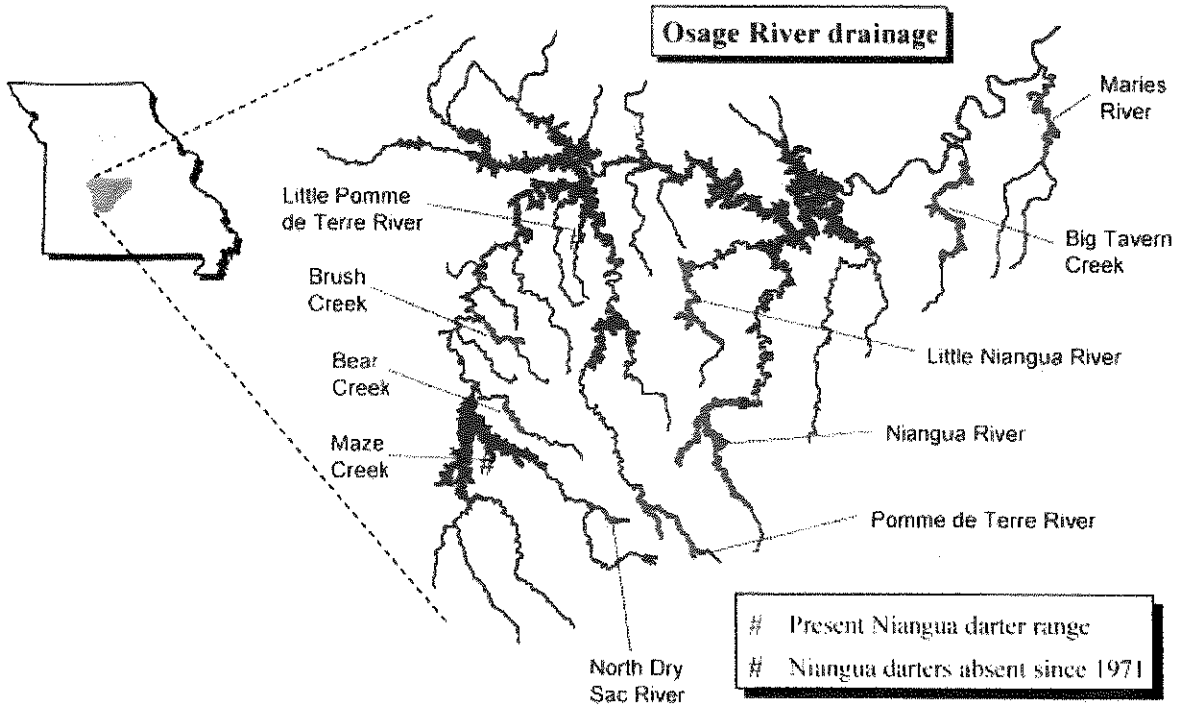
Ningua River Darter

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.



Range where the Niangua Darter is present or absent in the Osage River Watershed

1. What patterns do you observe in the data presented in the map above?

there was a lot more niangua darters to present in 1971 than how many there is now?

they are at drainage that flows down wards and in smaller bodies of streams.

2. What might be possible causes for these patterns?

maybe water is healthier in that certain area

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

why are they flowing down?

why are they not connected?

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TASK 2.

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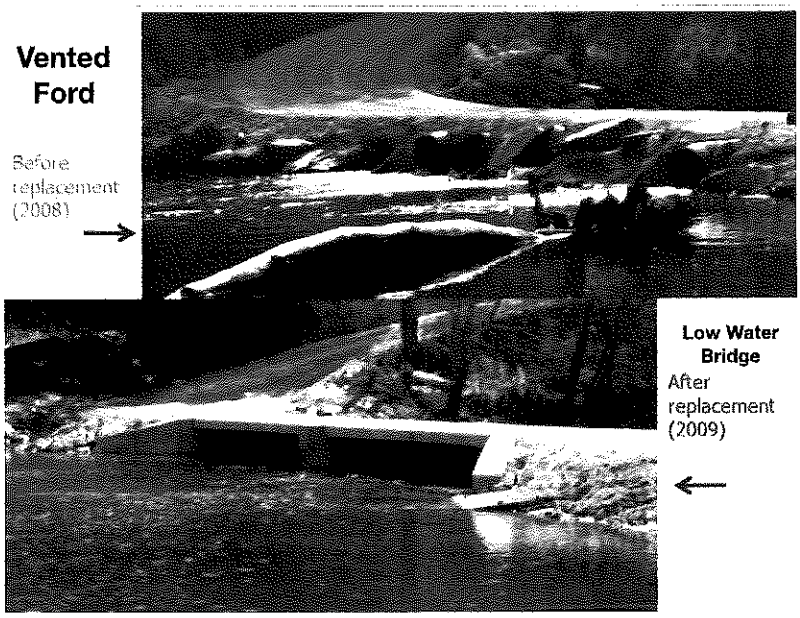

Barriers in the river and the low water crossings replaced them.

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

it is still letting water get through without blocking it and the fish; & not much pollutents trapped in one place

5. How do you think installing low water bridges will affect the ecosystem?

don't think it'll really affect it at all.

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 this claim? What evidence presented might refute this claim?

it would expand because they aren't trapped. what if they aren't trapped and that's not the problem.

Noble
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TASK 3.

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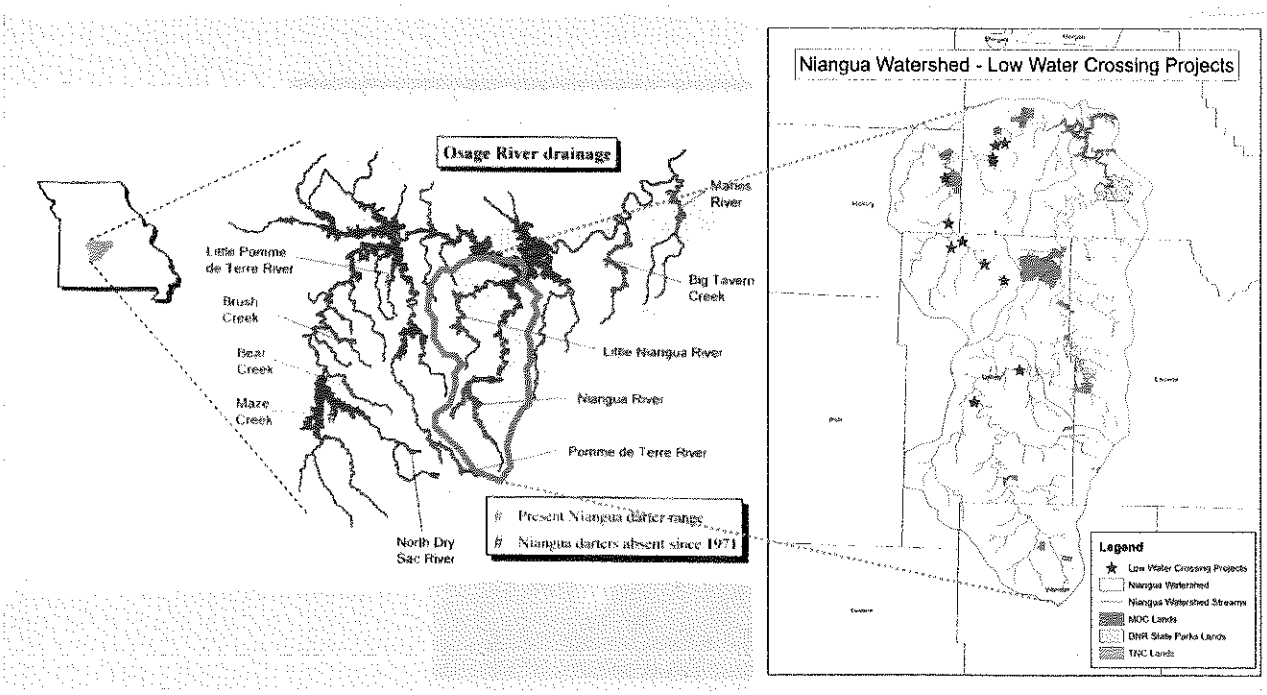

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7. Make a claim about what you think happened to the size of the Niangua Darter population after the low water crossings were installed?

maybe it stoped the faster flow of water and made it harder for the darters to pass thraugh with a slower current

8. Using information from all parts of the scenario above, provide an explanation that supports your claim and shows your reasoning.

with the the low water bridges water is able to flow and makes the current less stronger

Noble

Funded by a USDE Math Science Partnership (MSP) grant through the Oklahoma State Department of Education.

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?

That in reality the fish was not in danger. Maybe the barriers weren't affecting them.

Noble

Funded by a USDE Math Science Partnership (MSP) grant through the Oklahoma State Department of Education.

CORPS

Central Oklahoma Rural Partnership For Science

Name: [redacted] Teacher: _____

DON'T BOX ME IN | FORMATIVE ASSESSMENT TASK HS-LS4-5

TASK 1

SCENARIO

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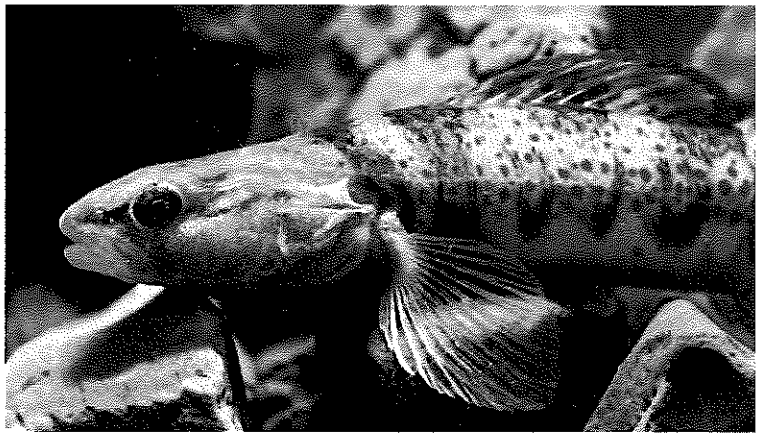

Ningua River Darter

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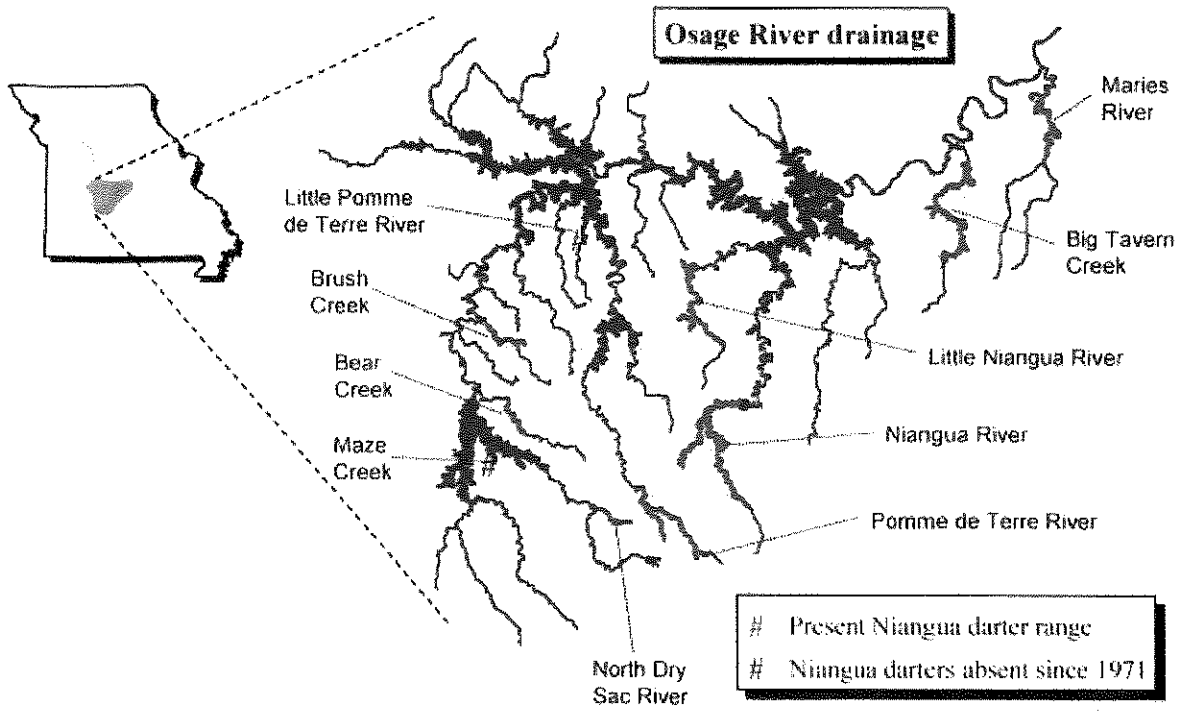

Range where the Niangua Darter is present or absent in the Osage River Watershed

1. What patterns do you observe in the data presented in the map above?

There are fewer and fewer and less of them are at the ends of the streams.

2. What might be possible causes for these patterns?

There might be things in the river that are not suitable for the fish to live in.

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

For where it says most likely, I need to see more to those) areas because they need to live there. Why do they live in those areas?

Noble
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TASK 2.

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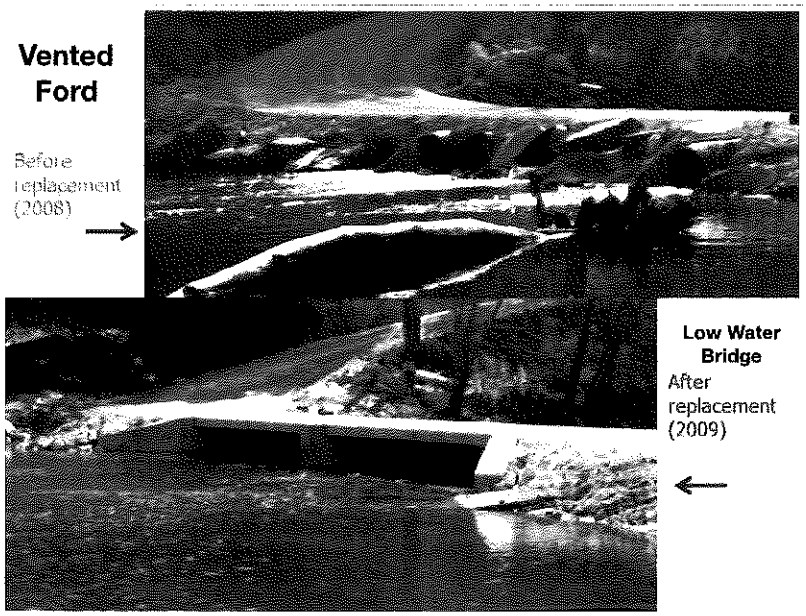

Barriers in the river and the low water crossings replaced them.

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

Nothing can get stuck in them, it will make the fish less confused and they can go from stream to stream easier.

5. How do you think installing low water bridges will affect the ecosystem?

It will make it more accessible for all different species to not have fear, and it will be equal.

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 this claim? What evidence presented might refute this claim?

It removed the barrier that they had and made things easier. Although, it is not going to all is obstacle as well and what if they are still used to not being able to go through that they don't try anymore.

Noble
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TASK 3.

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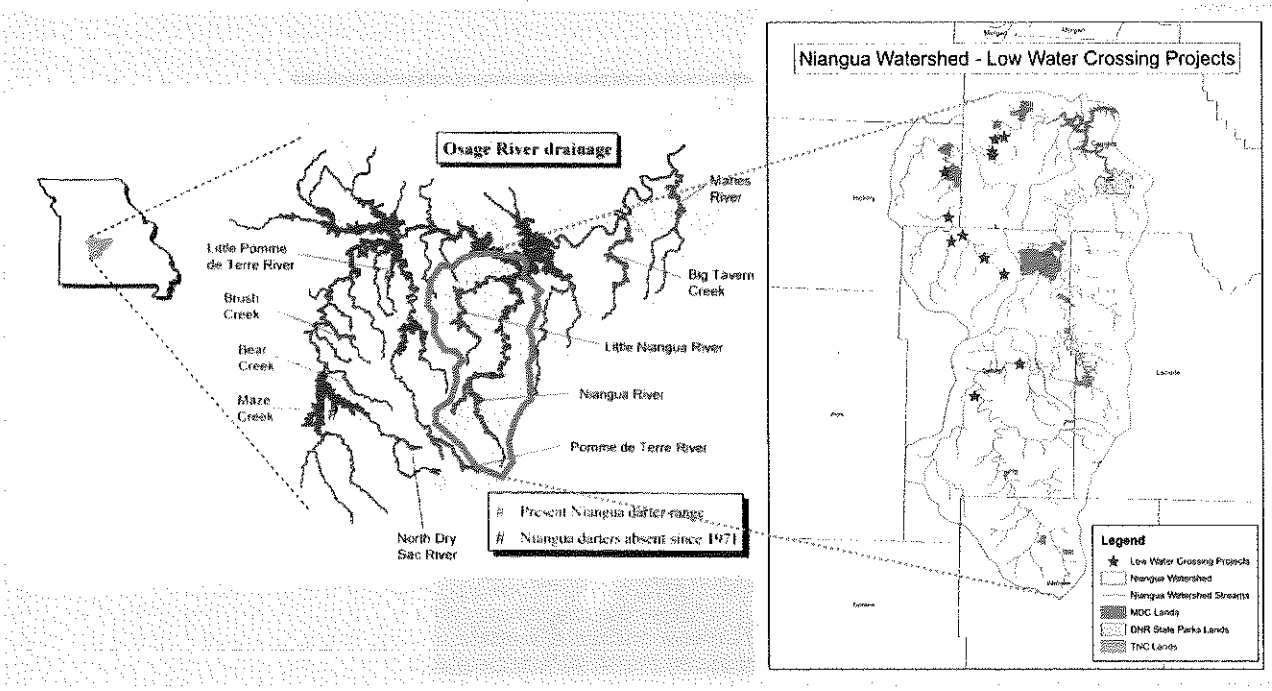

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7. Make a claim about what you think happened to the size of the Niangua Darter population after the low water crossings were installed?

I believe that the population grew back up with an expanded region to also live in.

8. Using information from all parts of the scenario above, provide an explanation that supports your claim and shows your reasoning.

They took away the barrier which means that the fish population was able to expand.

Noble

Funded by a USDE Math Science Partnership (MSP) grant through the Oklahoma State Department of Education.

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?

Another scenario would be that the fish were so used to not swimming around that they didn't try. The map that shows where they replaced the tin homes.

Noble

Funded by a USDE Math Science Partnership (MSP) grant through the Oklahoma State Department of Education.

CORPS

Central Oklahoma Rural Partnership For Science

Name: [redacted] 3-30-18 Teacher: [redacted] 4th hour

DON'T BOX ME IN | FORMATIVE ASSESSMENT TASK HS-LS4-5

TASK 1

SCENARIO

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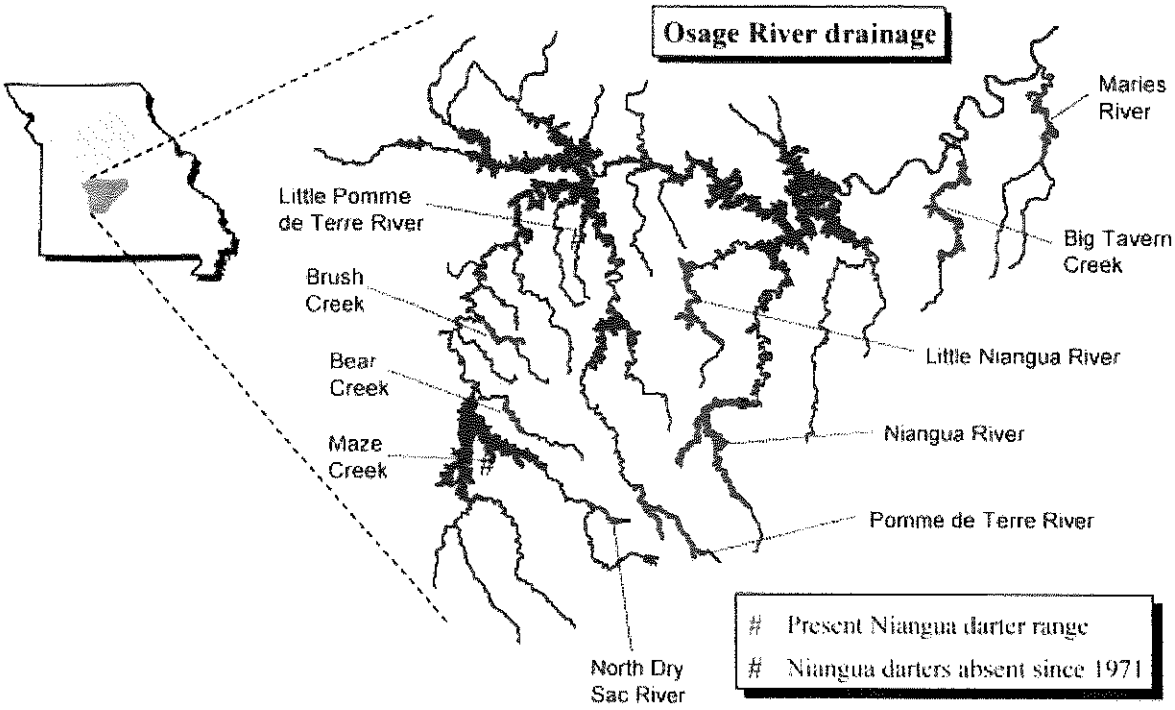

Range where the Niangua Darter is present or absent in the Osage River Watershed

1. What patterns do you observe in the data presented in the map above?
They are all near the "dead end" part of the river ends.

2. What might be possible causes for these patterns?
flowing down stream and being trapped there?

3. What additional observations could you make, or what questions could you ask next, to help explain the patterns in the data?
why are they not at the end of the "dead end"?

Noble
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TASK 2.

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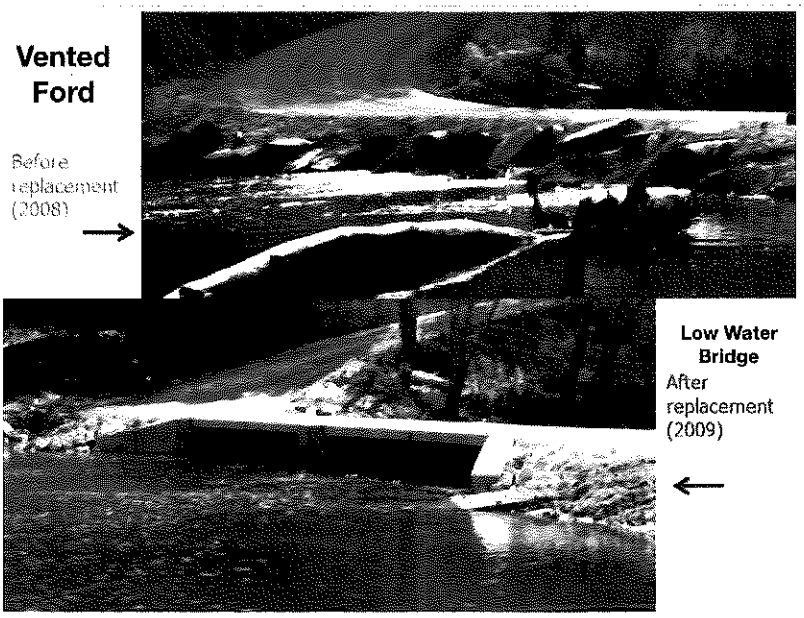


Barriers in the river and the low water crossings replaced them.

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

The water bridge has more room for debris can flow and not clog the stream. So the fish can also go freely as well.

5. How do you think installing low water bridges will affect the ecosystem?

I think it will benefit the ecosystem very much.

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 this claim? What evidence presented might refute this claim?

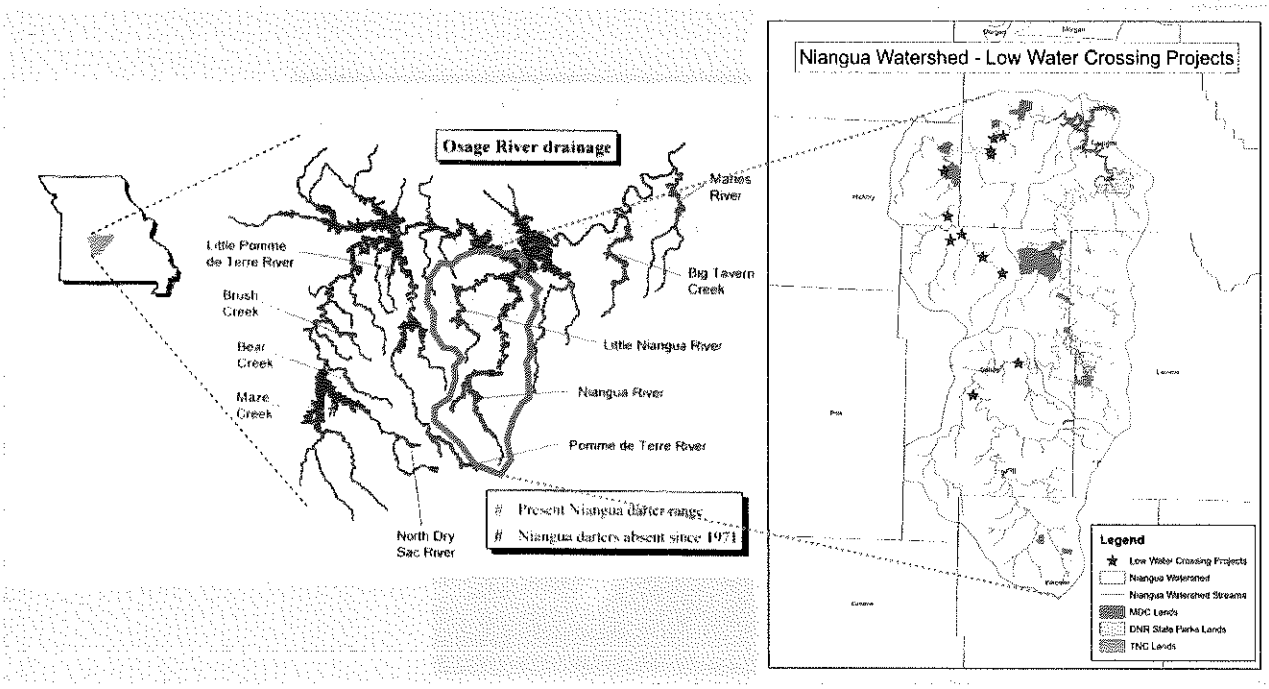
Their path was blocked by the "tin horns" so they couldn't swim freely the water bridges cleared the way.

Noble
Funded by a USDE Math Science Partnership (MSP) grant through the Oklahoma State Department of Education.

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 Fish.

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 http://www.nianguariverwatershed.org

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

I think they lessend to #smaller groups after being seperated By the "tinhorns". They grew after I'm sure.

8. Using information from all parts of the scenario above, provide an explanation that supports your claim and shows your reasoning.

Because they were tagged by the "tinhorns" they couldn't expand or breed Big or have lots of food. Once the waterbridges were put in they could move freely and expanded. I believe they grew rapidly.

Noble
Funded by a USDE Math Science Partnership (MSP) grant through the Oklahoma State Department of Education.

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?

The fishes could have been exposed to more pollutents and died off. The place they were in could have saved them from all the pollution but when they opened it up and let it all in.

IEP
Special Ed

CORPS

Central Oklahoma Rural Partnership For Scien

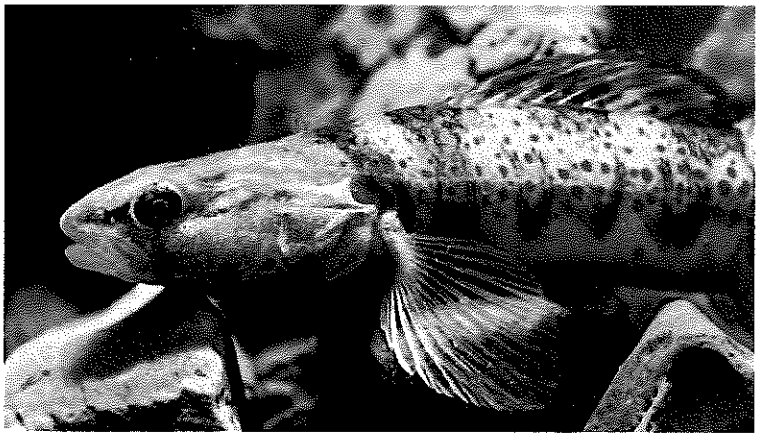
Name: [redacted] 3/30/18 Teacher: [redacted]

DON'T BOX ME IN | FORMATIVE ASSESSMENT TASK HS-LS4-5

TASK 1

SCENARIO

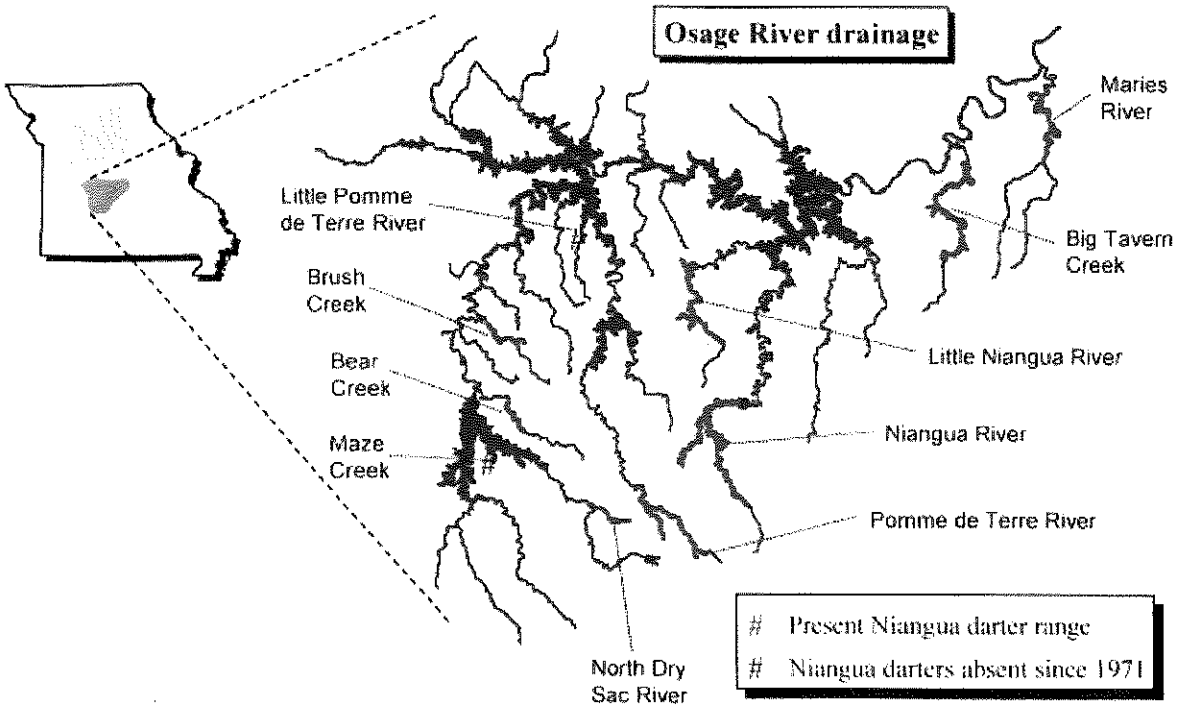
The **Niangua River Watershed** is an example of a diverse stream system, located within the Ozark Highlands in Missouri. The Niangua River feeds into the Lake of the Ozarks which feeds the Osage River. The Niangua River contains 61 species of fish. The Niangua Darter is a small fish listed as State 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.



Ningua River 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.



Range where the Niangua Darter is present or absent in the Osage River Watershed

1. What patterns do you observe in the data presented in the map above?

the Blue is not near the fish like Red is near the fish like they is a Pattern.

2. What might be possible causes for these patterns?

Because the same of the died in the Blue.

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

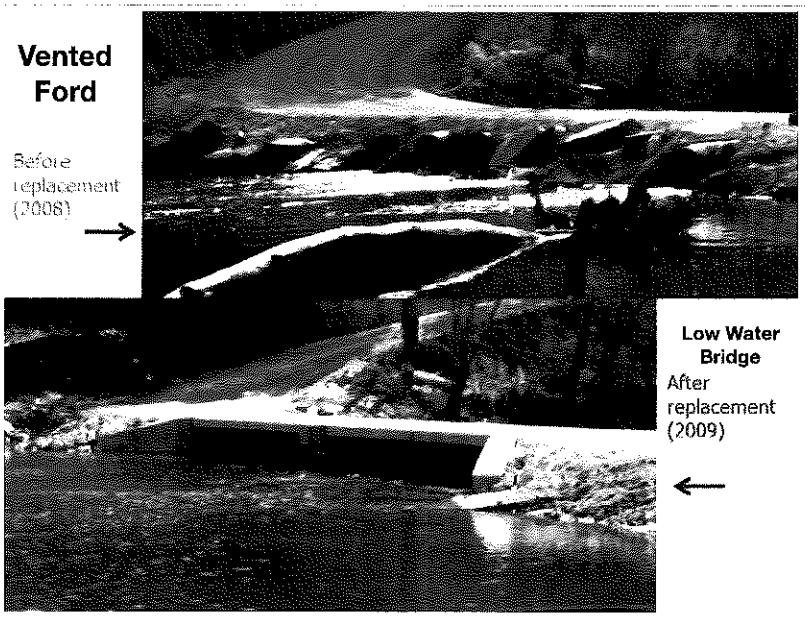
the fish Blue might have fish in it Red they all died.

Noble

Funded by a USDE Math Science Partnership (MSP) grant through the Oklahoma State Department of Education.

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 replaced them.

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

Yes Because they have to take it out.

5. How do you think installing low water bridges will affect the ecosystem?

It will not affect the fish at all.

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 this claim? What evidence presented might refute this claim?

But the fish are happy now.

Noble

Funded by a USDE Math Science Partnership (MSP) grant through the Oklahoma State Department of Education.

TASK 3.

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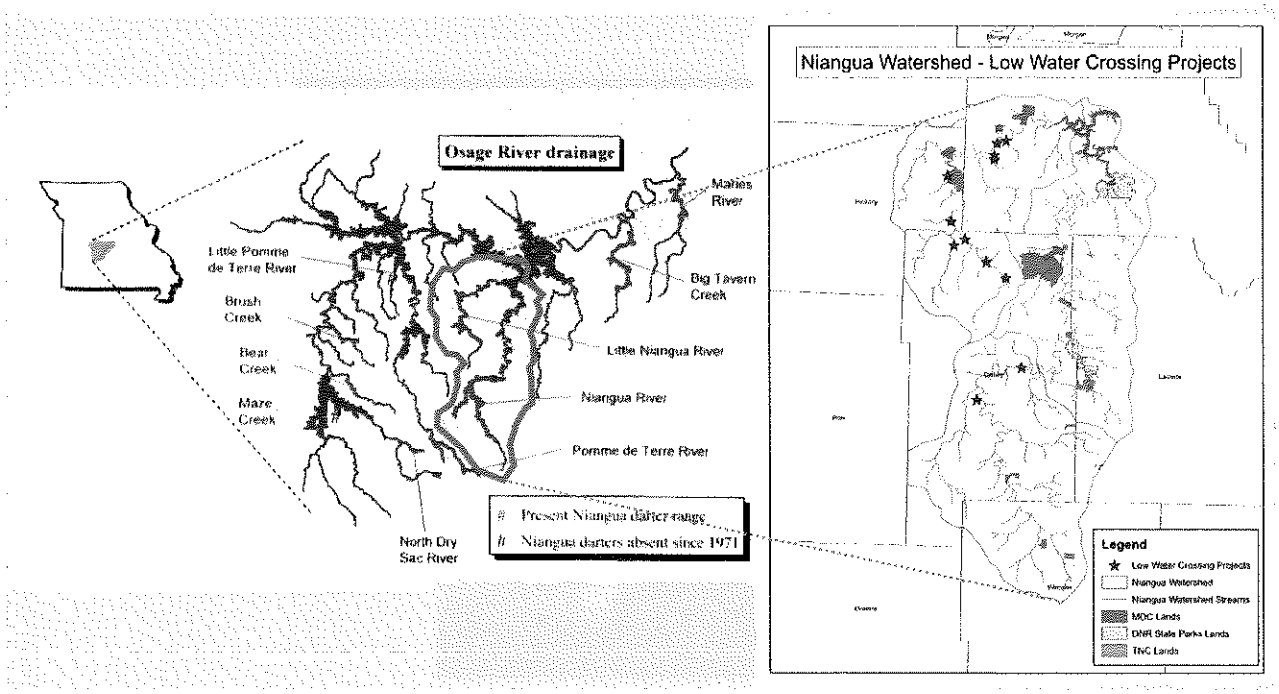

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7. Make a claim about what you think happened to the size of the Niangua Darter population after the low water crossings were installed?

they all of the fish died.

8. Using information from all parts of the scenario above, provide an explanation that supports your claim and shows your reasoning.

When they BUY the new water it is ok.

Noble
Funded by a USDE Math Science Partnership (MSP) grant through the Oklahoma State Department of Education.

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?

How the fish got Save.

[redacted] 3/30/18

CORPS

Central Oklahoma Rural Partnership For Science

Name: _____ Teacher: _____

DON'T BOX ME IN | FORMATIVE ASSESSMENT TASK HS-LS4-5

TASK 1

SCENARIO

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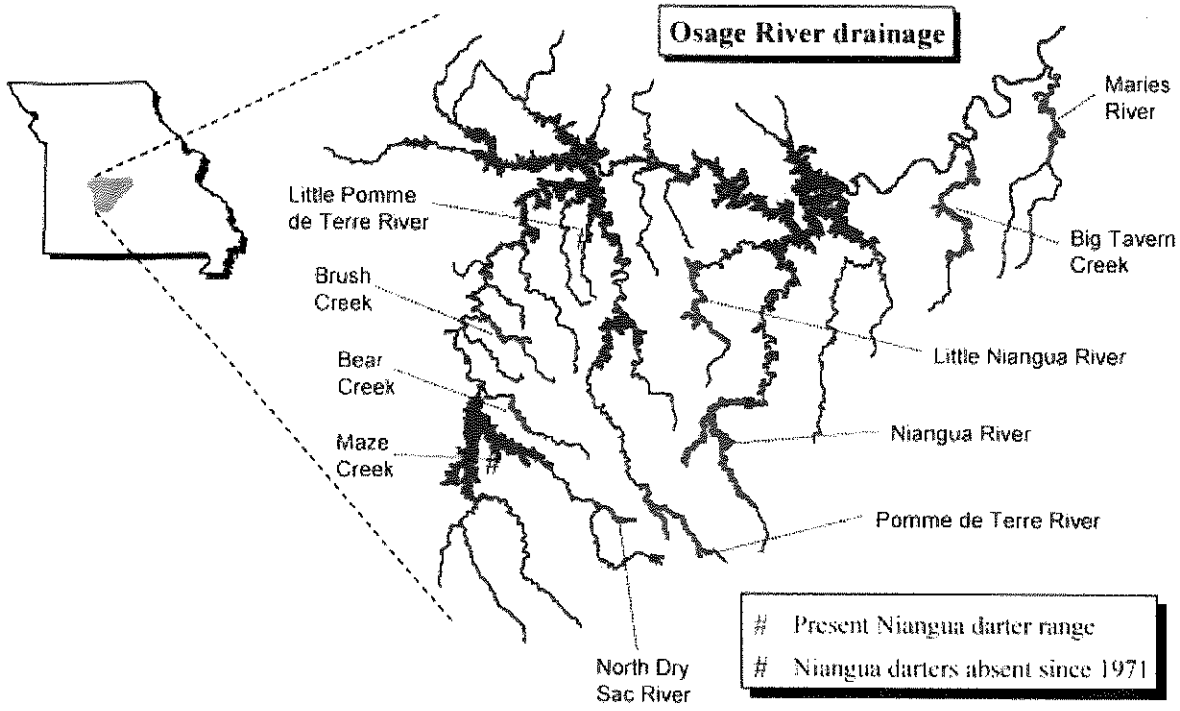
Ningua River Darter

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.



Range where the Niangua Darter is present or absent in the Osage River Watershed

1. What patterns do you observe in the data presented in the map above?

The only places where they existed are towards the end of the streams and away from the big bodies of water.

2. What might be possible causes for these patterns?

All the Big Spots Water was all and they dried up.

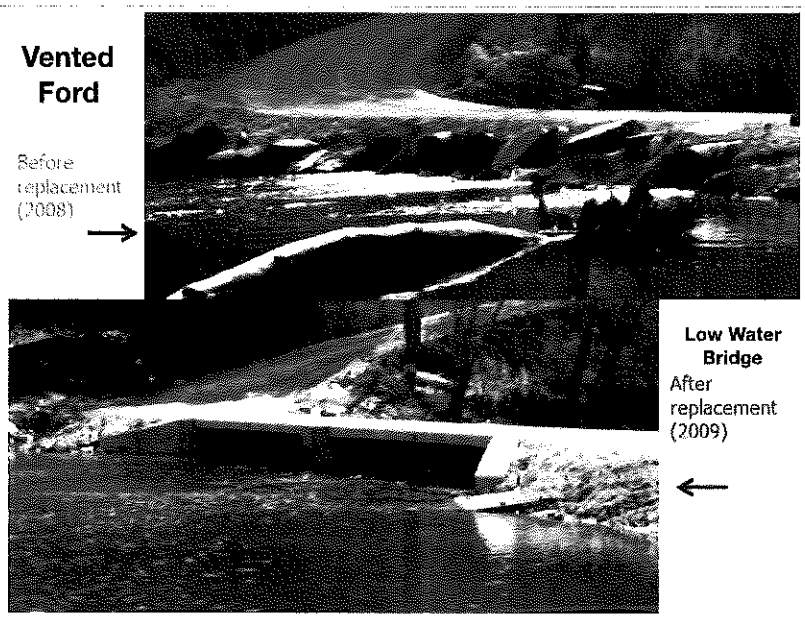
3. What additional observations could you make, or what questions could you ask next, to help explain the patterns in the data?

What happened to all the water?

Funded by a USDE Math Science Partnership (MSP) grant through the Oklahoma State Department of Education.

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 replaced them.

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

The low water bridge would remove the problem of having sticks and other objects in the way. By it being open lets everything come through even if it's big.

5. How do you think installing low water bridges will affect the ecosystem?

It gets organisms through to either better food or better habitat. Or get big animals to eat more fish.

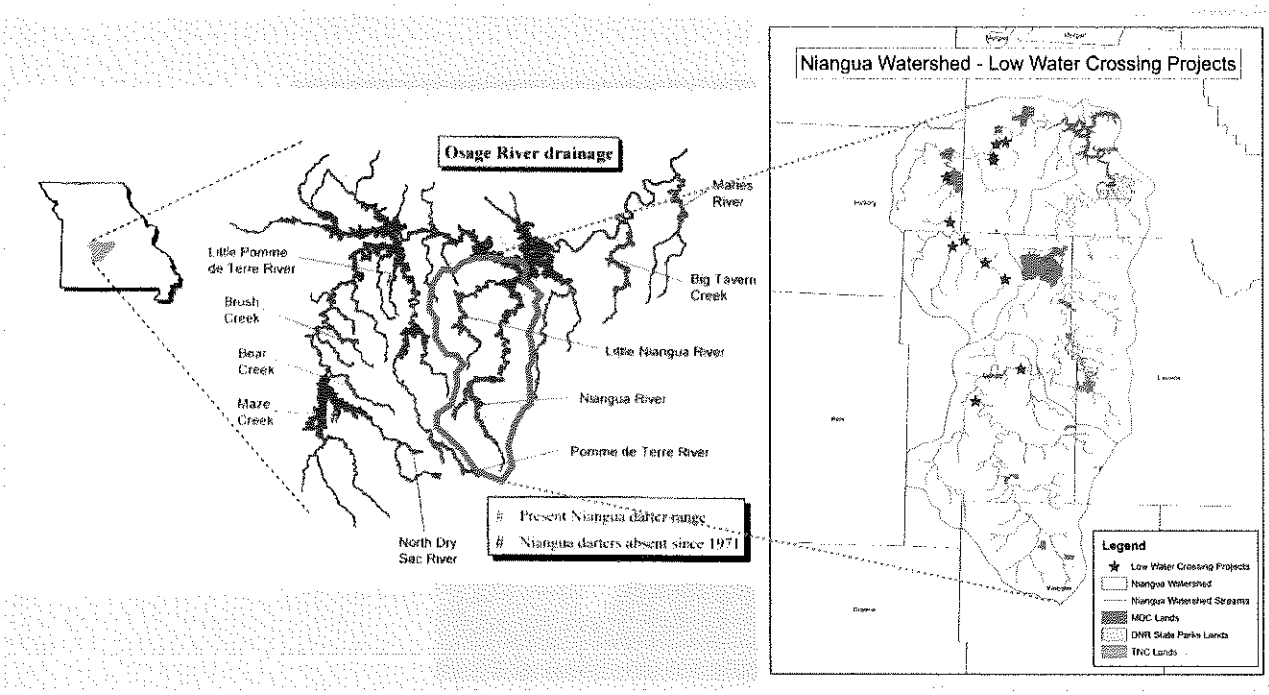
6. The claim could be made that as a result of installing low water bridges, the Niangua Darter will expand their range within the watershed. What evidence presented in the scenario would support this claim? What evidence presented might refute this claim?

With vented ford sometimes the water can't even pass through. With the low water bridge it allows all fish to go where it needs to be. What if it's not same?

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 Fish.

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 http://www.nianguariverwatershed.org

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

It increased because of all the water that able to get through and let the fish flourish

8. Using information from all parts of the scenario above, provide an explanation that supports your claim and shows your reasoning.

Just by looking at the scenario you can see that it is increased Tanyon, and the gap grew.

Noble

Funded by a USDE Math Science Partnership (MSP) grant through the Oklahoma State Department of Education.

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?

CORPS

Central Oklahoma Rural Partnership For Science

Name: [redacted] Teacher: _____

DON'T BOX ME IN | FORMATIVE ASSESSMENT TASK HS-LS4-5

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.

Ningua River Darter

Osage Watershed with Niangua River Watershed marked in red.

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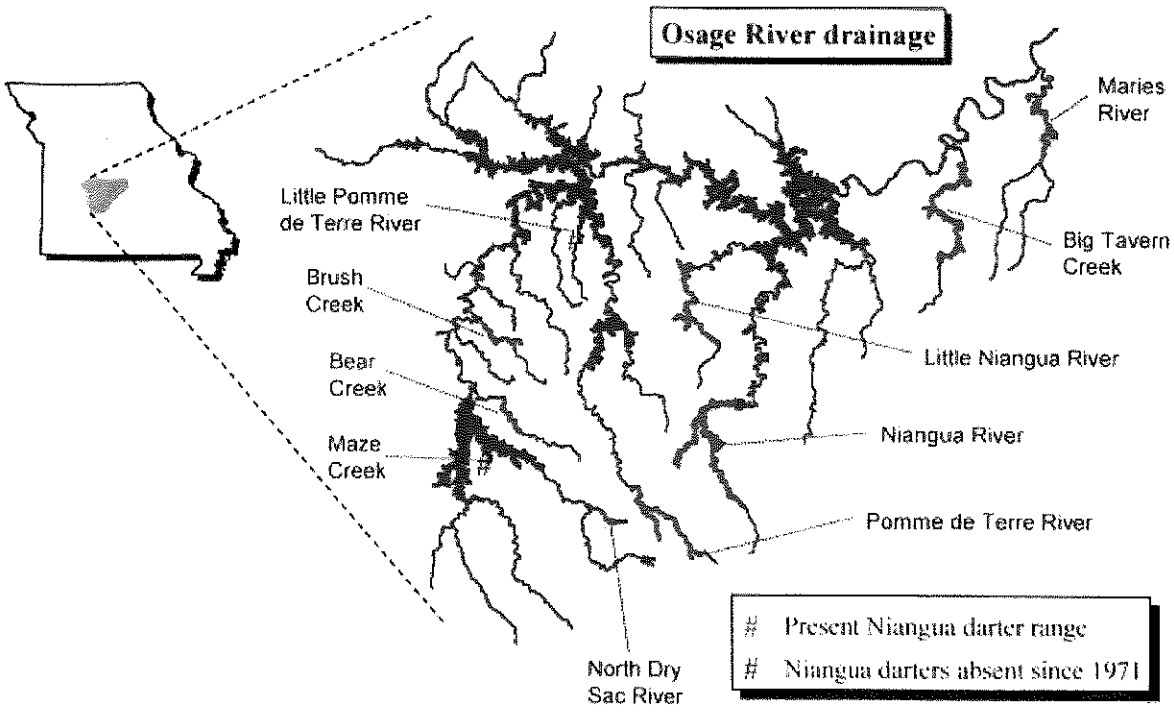
Funded by a USDE Math Science Partnership (MSP) grant through the Oklahoma State Department of Education.



Range where the Niangua Darter is present or absent in the Osage River Watershed

1. What patterns do you observe in the data presented in the map above?
The fish seems to only be present towards the end of the tributaries.

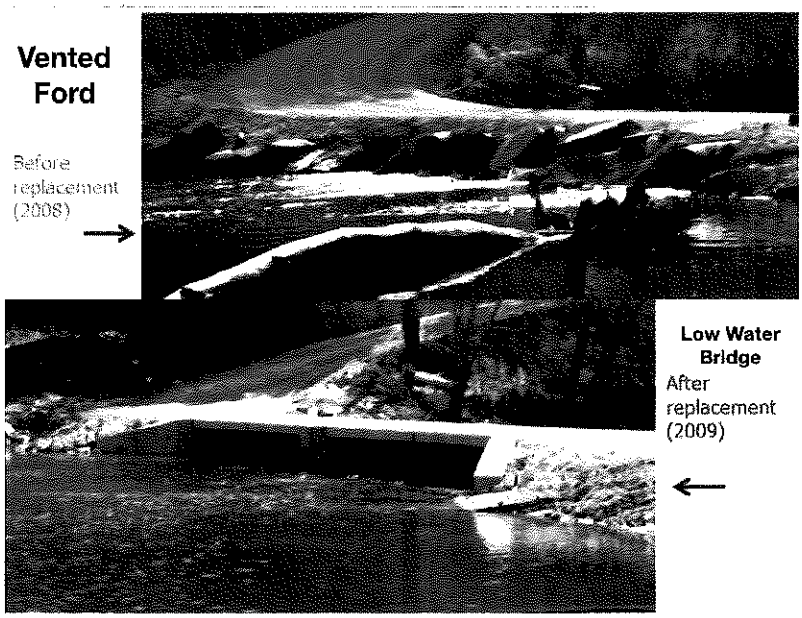
2. What might be possible causes for these patterns?
The ~~fishes~~ over fishing of this species in the main water source. The ends of the streams could be harder to reach by humans.

3. What additional observations could you make, or what questions could you ask next, to help explain the patterns in the data?
If there begins to be over fishing in the streams of the tributaries what happens to the fish?

Noble
Funded by a USDE Math Science Partnership (MSP) grant through the Oklahoma State Department of Education.

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 replaced them.

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

The Vented fords prohibited the fish to pass through, the low bridges allow them to do so.

5. How do you think installing low water bridges will affect the ecosystem?

The ecosystem will thrive more.

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 this claim? What evidence presented might refute this claim?

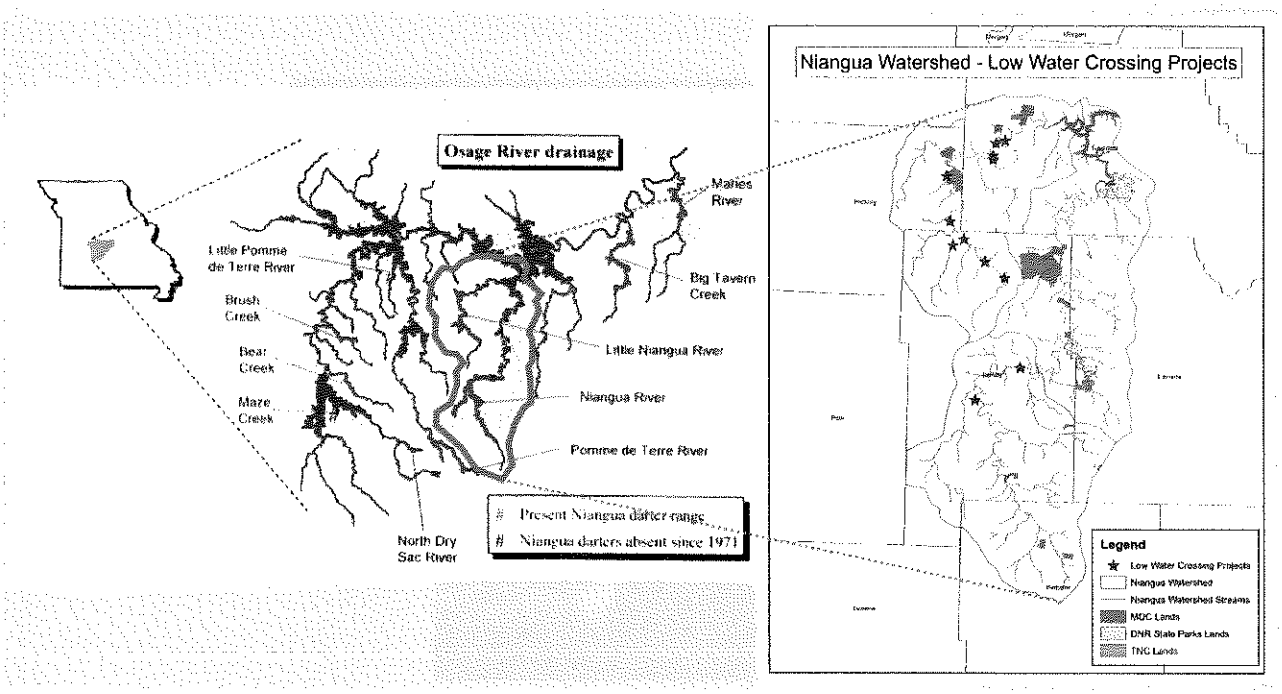
The fish can now swim through the bridges so their population is more likley to spread. The fish have been kept captive in this area for so long because of the vented ford it might be Native to that specific area now.

Noble
Funded by a USDE Math Science Partnership (MSP) grant through the Oklahoma State Department of Education.

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 Fish.

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 http://www.nianguariverwatershed.org

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

The Niangua population became more spread out. The population flourishes now.

8. Using information from all parts of the scenario above, provide an explanation that supports your claim and shows your reasoning.

The new low water bridges has allowed the Niangua fish the further spread out. Because of this, we will now see the fish cover more land & therefore we have the opportunity have more freshwater.

Funded by a USDE Math Science Partnership (MSP) grant through the Oklahoma State Department of Education.

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?

When the low water bridges were installed, the Nianga fish can now pass through but what threats do they face in the waters that they've never explored?

Because of these new bridges the fish can now go to waters that they've never explored. The fish can now have a predator and have the chance of becoming endaged to a threat they've never faced.

CORPS

Central Oklahoma Rural Partnership For Science

Name: [redacted] 3/30/18 1st hr. ECO Teacher: [redacted]

DON'T BOX ME IN | FORMATIVE ASSESSMENT TASK HS-LS4-5

TASK 1

SCENARIO

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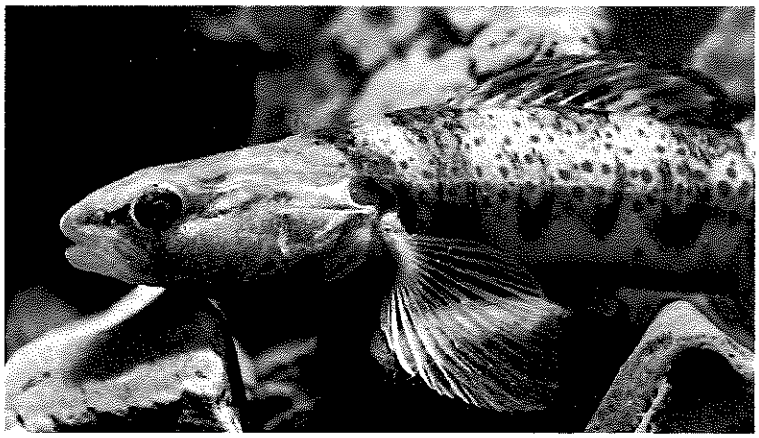

Ningua River Darter

Osage Watershed with Niangua River Watershed marked in red.

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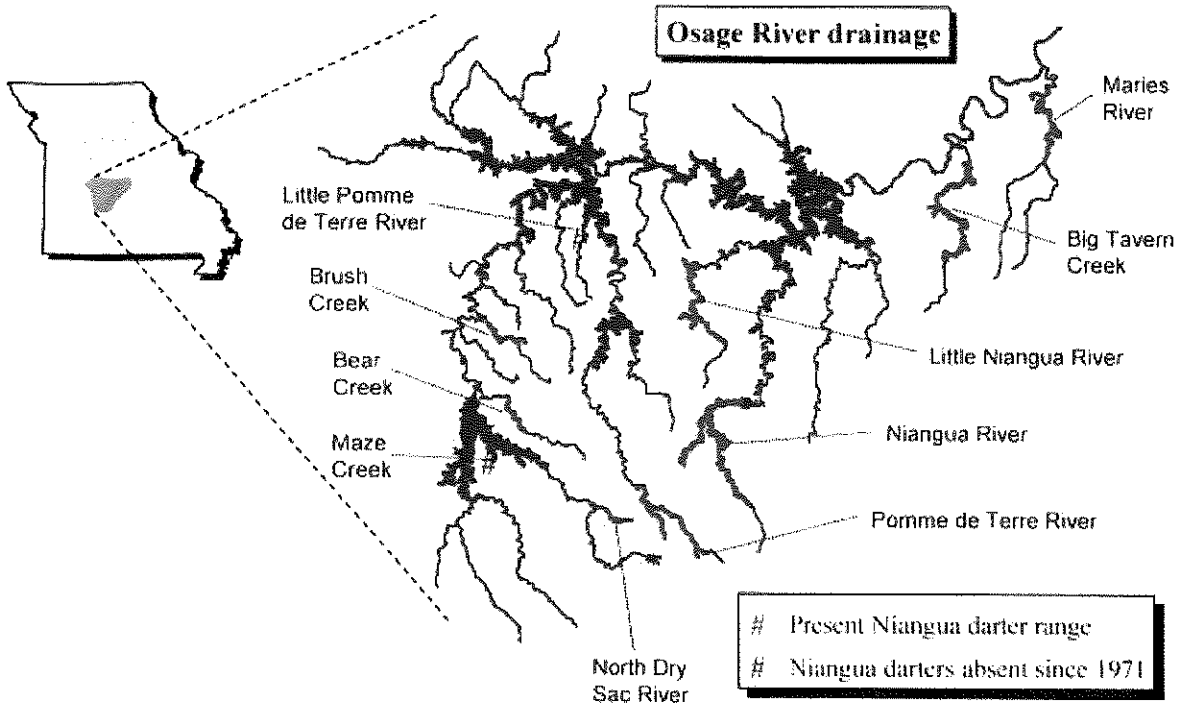


Range where the Niangua Darter is present or absent in the Osage River Watershed

1. What patterns do you observe in the data presented in the map above?

they have dissapeared from the north & western areas, fragmentation.

2. What might be possible causes for these patterns?

human interfearence &/or natural disaster occurance? ex- construction, pollution, tourism, etc.

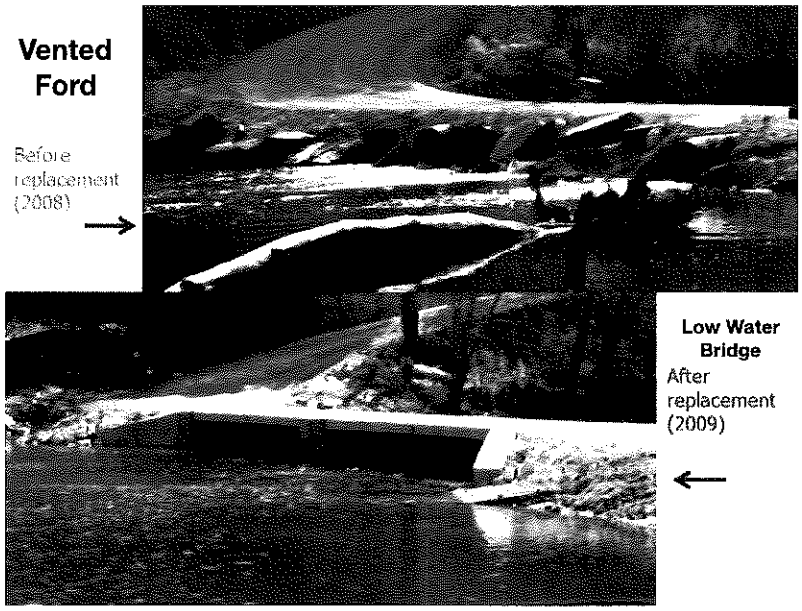
3. What additional observations could you make, or what questions could you ask next, to help explain the patterns in the data?

how rapidly did the Niangua darter fish pop. decline.

Funded by a USDE Math Science Partnership (MSP) grant through the Oklahoma State Department of Education.

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 replaced them.

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

the vented fords are above the waste & become easily clogged & changing elevation // velocity.

5. How do you think installing low water bridges will affect the ecosystem?

low water bridges take away the restrictions that the vented ford had & allows for fish passage.

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 this claim? What evidence presented might refute this claim?

supporting this claim would be less barriers & more options for the fish. Refuting this would take away from a habitat it has become accustomed to.

Noble
Funded by a USDE Math Science Partnership (MSP) grant through the Oklahoma State Department of Education.

TASK 3.

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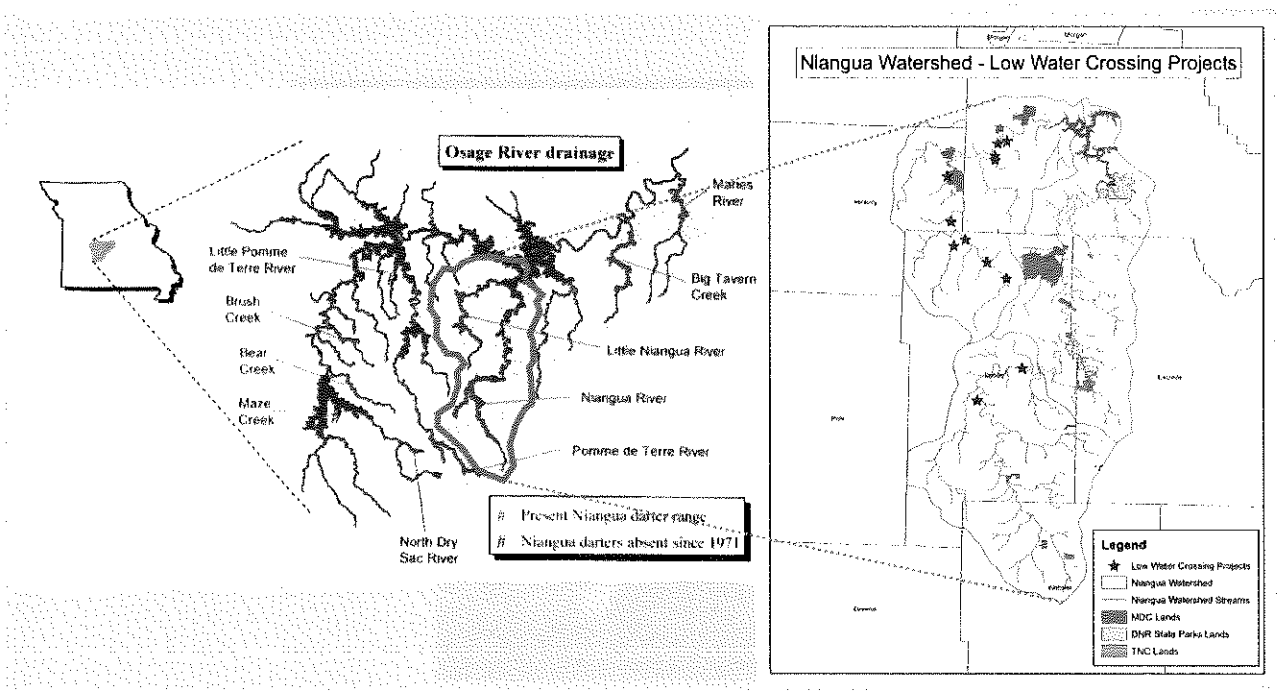

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7. Make a claim about what you think happened to the size of the Niangua Darter population after the low water crossings were installed?

I feel that they increased & spread rapidly.

8. Using information from all parts of the scenario above, provide an explanation that supports your claim and shows your reasoning.

Since the low water bridge building, the Little Niangua River created more than 55 miles of barrier-free stream flow, in 3 counties.

Noble

Funded by a USDE Math Science Partnership (MSP) grant through the Oklahoma State Department of Education.

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?

Mayhaps they did not spread as rapidly or moved at all. Traveling through 55 miles they could ~~possible~~ possibly encounter water conditions not able to sustain them.

CORPS

Central Oklahoma Rural Partnership For Science

Name: [redacted] Teacher: _____

DON'T BOX ME IN | FORMATIVE ASSESSMENT TASK HS-LS4-5

TASK 1

SCENARIO

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Ningua River Darter

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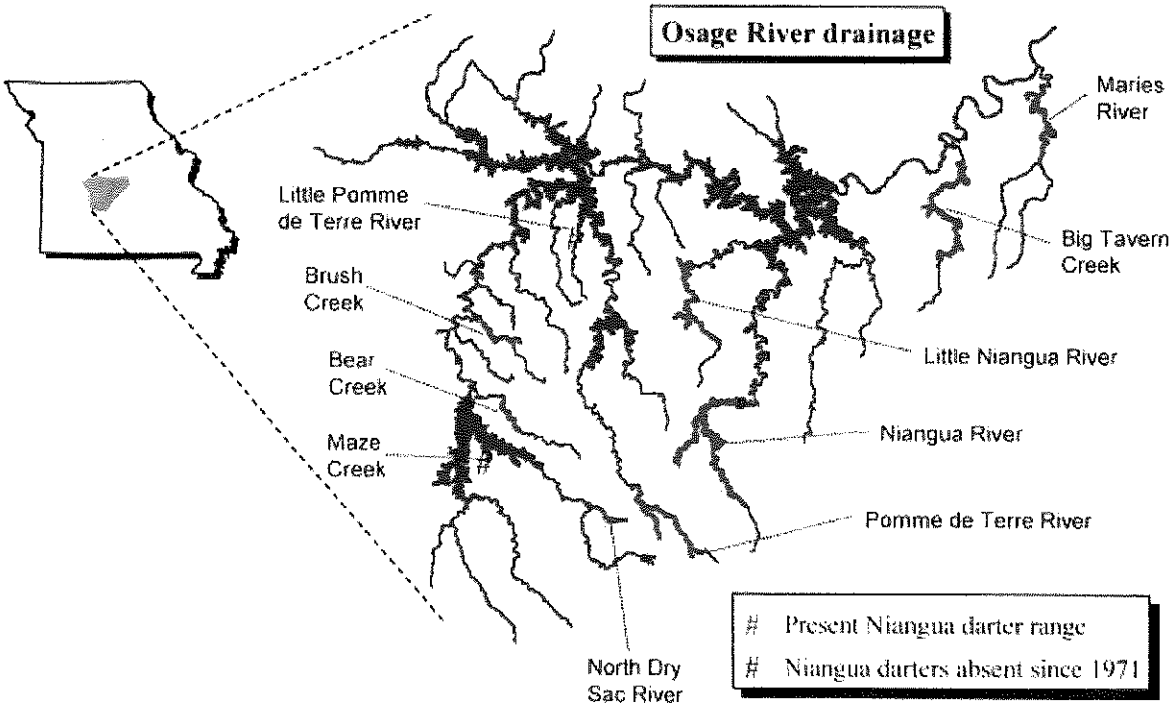


Range where the Niangua Darter is present or absent in the Osage River Watershed

1. What patterns do you observe in the data presented in the map above?

The Niangua Darter is now located in smaller areas and streams. They are located in the Northern Territories

2. What might be possible causes for these patterns?

They are small bottoming or maybe isolated locations

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

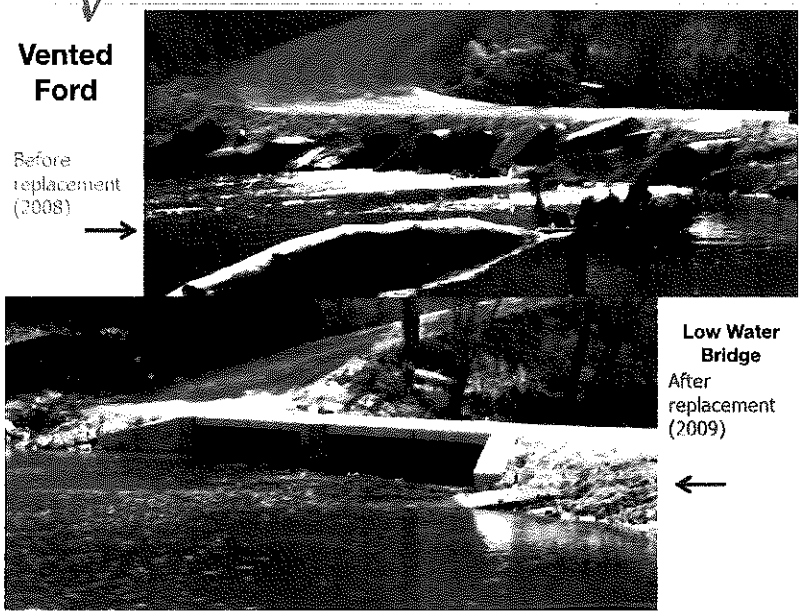
Is the locations where they aren't located high traffic areas? Or

Funded by a USDE Math Science Partnership (MSP) grant through the Oklahoma State Department of Education.

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.

Tim Horns



Barriers in the river and the low water crossings replaced them.

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

It allows the Darter and other fish to move to other areas of tributaries.

5. How do you think installing low water bridges will affect the ecosystem?

It will give back the swimming area to the Niangua River, or any body of water areas of natural space.

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 this claim? What evidence presented might refute this claim?

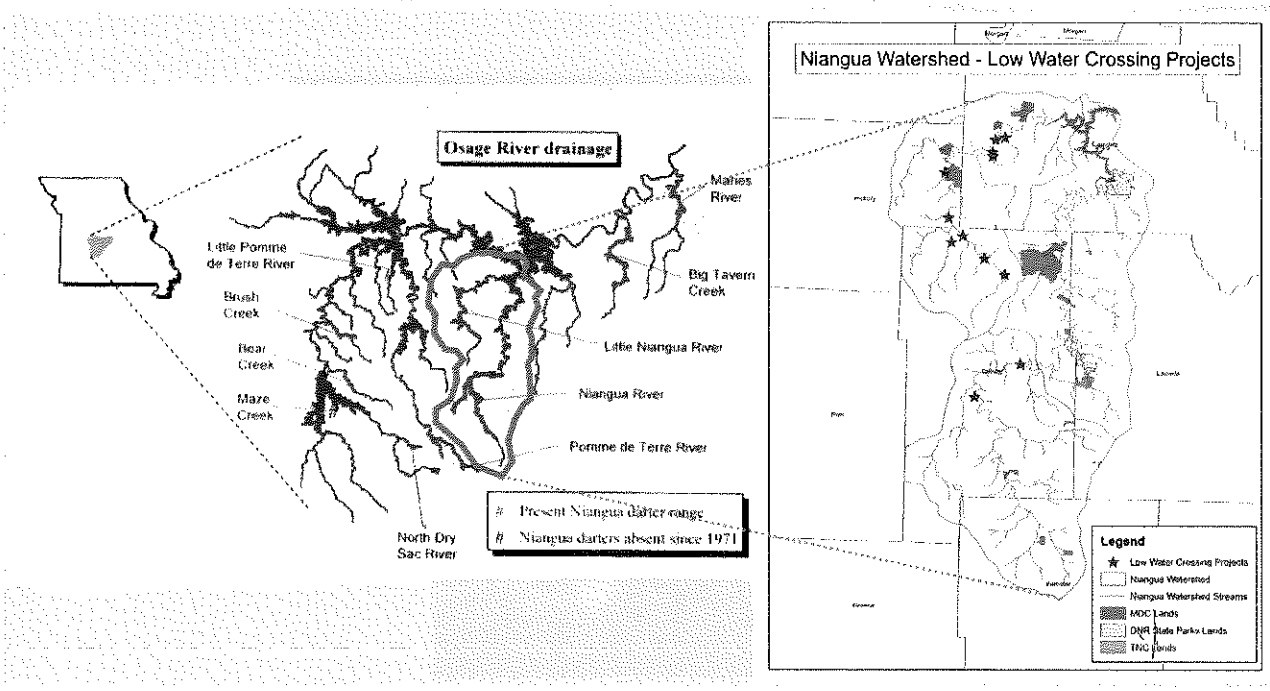
That the Niangua Darter has migrated to a different area of the tributary. The Niangua Darter doesn't swim from its previous location.

Noble
Funded by a USDE Math Science Partnership (MSP) grant through the Oklahoma State Department of Education.

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 Fish.

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 http://www.nianguariverwatershed.org

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

The population may have increased and is now more distributed across the watershed.

8. Using information from all parts of the scenario above, provide an explanation that supports your claim and shows your reasoning.

They were kept from going to other parts of the Water Shed because of the Water Bodies (Low Water) not allowing the Niangua Darter to other portions by the water shed.

Noble

Funded by a USDE Math Science Partnership (MSP) grant through the Oklahoma State Department of Education.

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?

The Nicaragua Darter might become even more threatened because of the water where they are migrating to may be even more contaminated with the water. Pouring into their habitat may become of the polluted water.

CORPS

Oklahoma Rural Partnership For Science

Name [redacted] Date) 3.30.18 Teacher: [redacted] 4th hour

DON'T BOX ME IN | FORMATIVE ASSESSMENT TASK HS-LS4-5

TASK 1

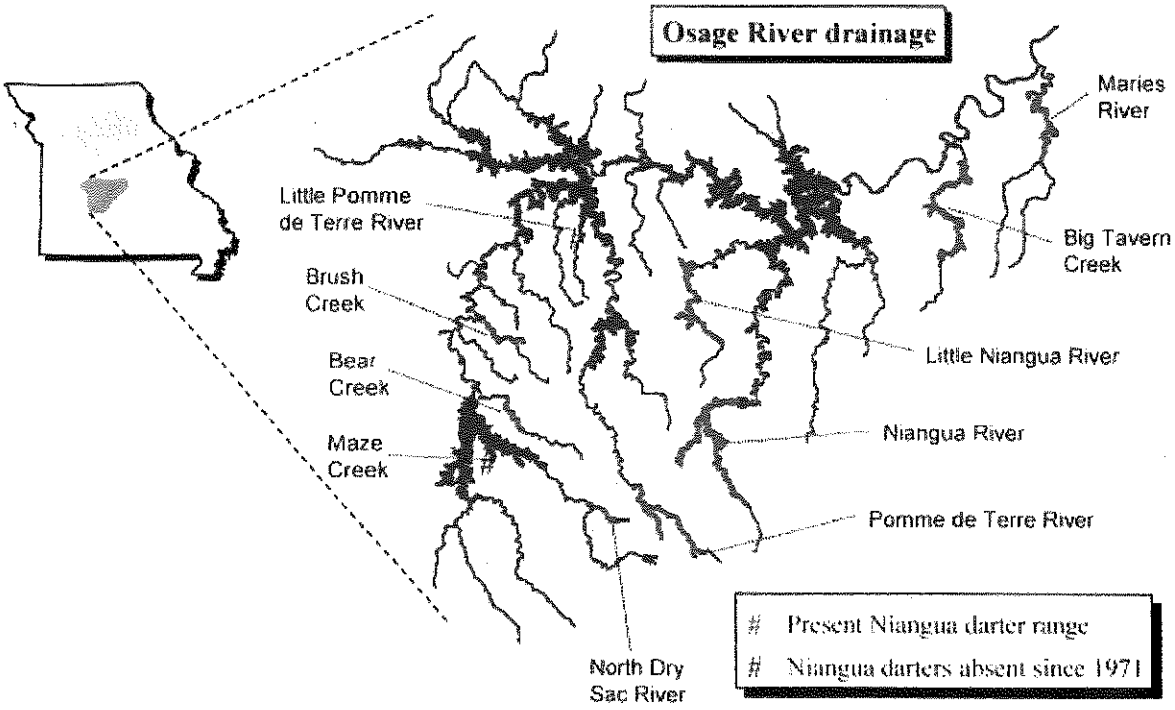
SCENARIO

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.

Ningua River 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.



Range where the Niangua Darter is present or absent in the Osage River Watershed

1. What patterns do you observe in the data presented in the map above?

They are at the end of the rivers, or stuck in the middle

2. What might be possible causes for these patterns?

The water everywhere else is polluted so they can't be there.

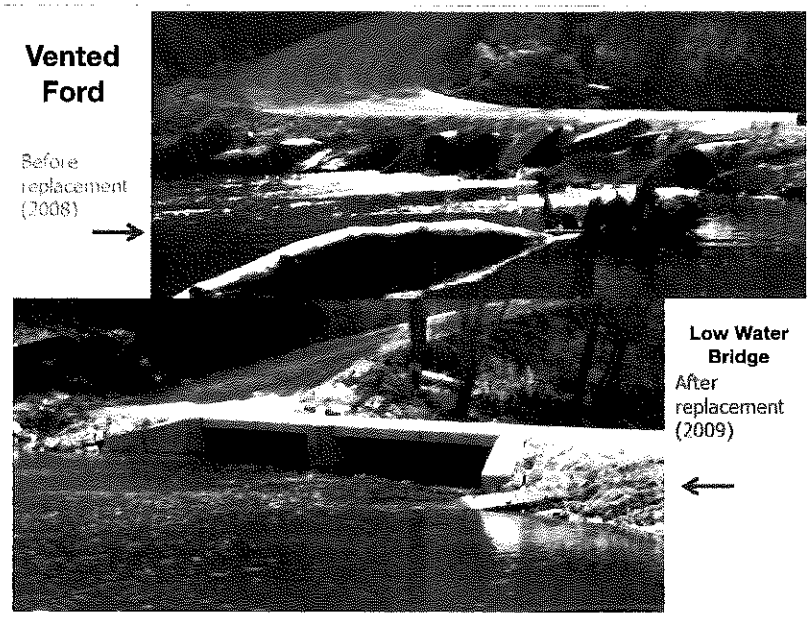
3. What additional observations could you make, or what questions could you ask next, to help explain the patterns in the data?

Sooner or later all the water would be polute/ if we don't fix it and all ~~the~~ those fish will be dead.

Funded by a USDE Math Science Partnership (MSP) grant through the Oklahoma State Department of Education.

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 replaced them.

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

I think it would be better.

5. How do you think installing low water bridges will affect the ecosystem?

I don't think it will because the fish could keep moving, but in a way it could because trash could keep moving as well.

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 this claim? What evidence presented might refute this claim?

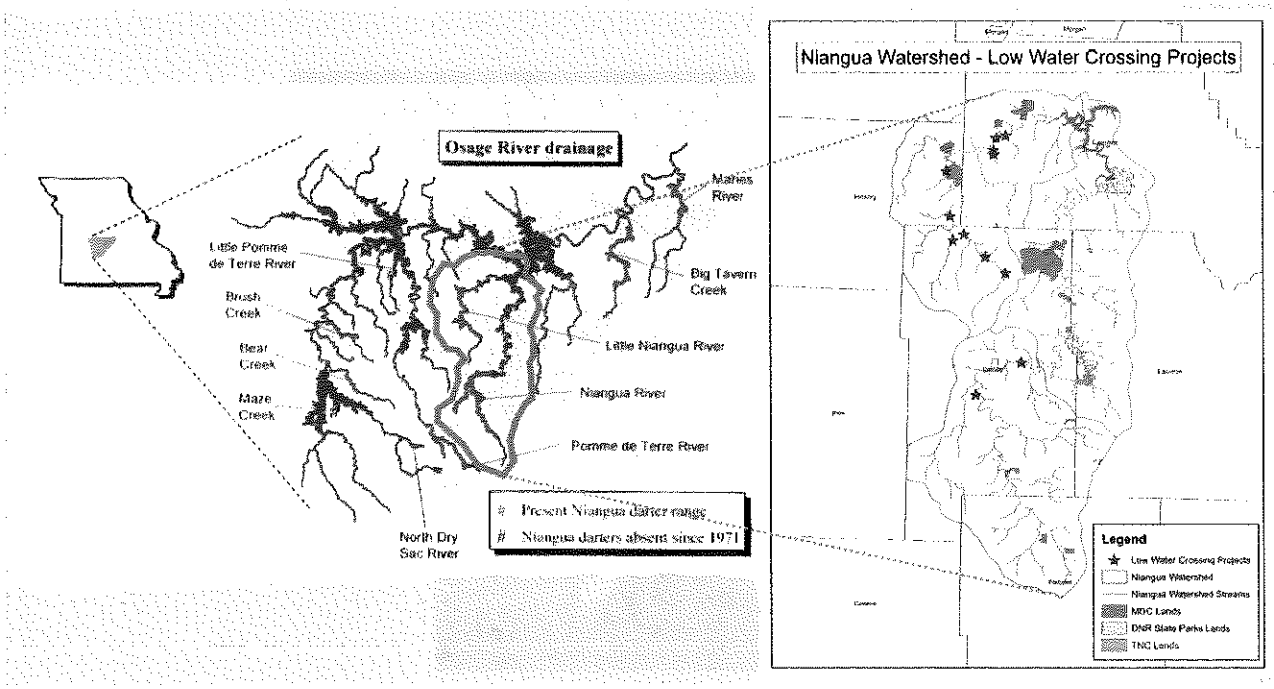
The polluted water could keep going with all the trash in it and could kill other fish we might need.

Noble
Funded by a USDE Math Science Partnership (MSP) grant through the Oklahoma State Department of Education.

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 Fish.

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 http://www.nianguariverwatershed.org

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

I think it probably got bigger because there was more water for more fish.

8. Using information from all parts of the scenario above, provide an explanation that supports your claim and shows your reasoning.

The fish could keep moving throughout the water so there would be more fish and way bigger population

Noble

Funded by a USDE Math Science Partnership (MSP) grant through the Oklahoma State Department of Education.

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?

Or the fish could die because the water could be poluted and it could get around everywhere and I don't think it would be good.

Noble

Funded by a USDE Math Science Partnership (MSP) grant through the Oklahoma State Department of Education.

CORPS

Central Oklahoma Rural Partnership For Science

Name: [redacted] March 30, 2018 Teacher: [redacted]

DON'T BOX ME IN | FORMATIVE ASSESSMENT TASK HS-LS4-5

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.

Ningua River Darter

Osage Watershed with Niangua River Watershed marked in red.

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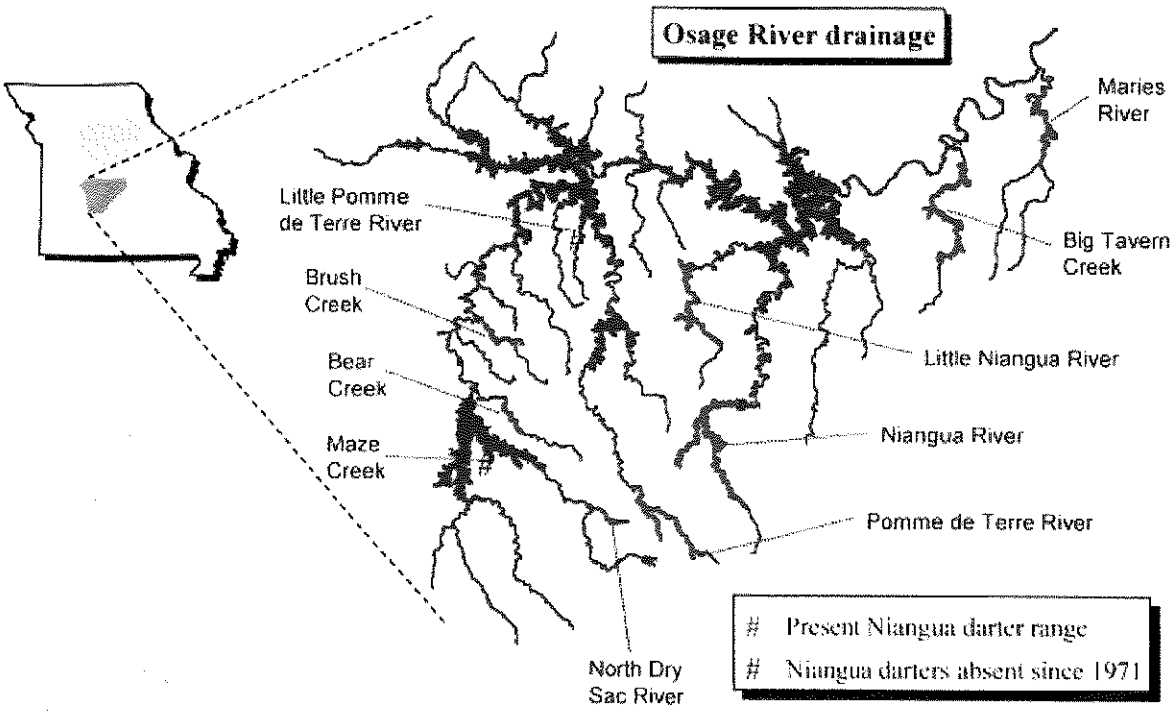

Range where the Niangua Darter is present or absent in the Osage River Watershed

1. What patterns do you observe in the data presented in the map above?

The niangua darters are in more isolated or smaller water areas that are upland.

2. What might be possible causes for these patterns?

The bigger the water supply the greater chance of pollution due to its surroundings. Cleaner water...

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

There is not much area inhabited by the Niangua darter,

Noble

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TASK 2.

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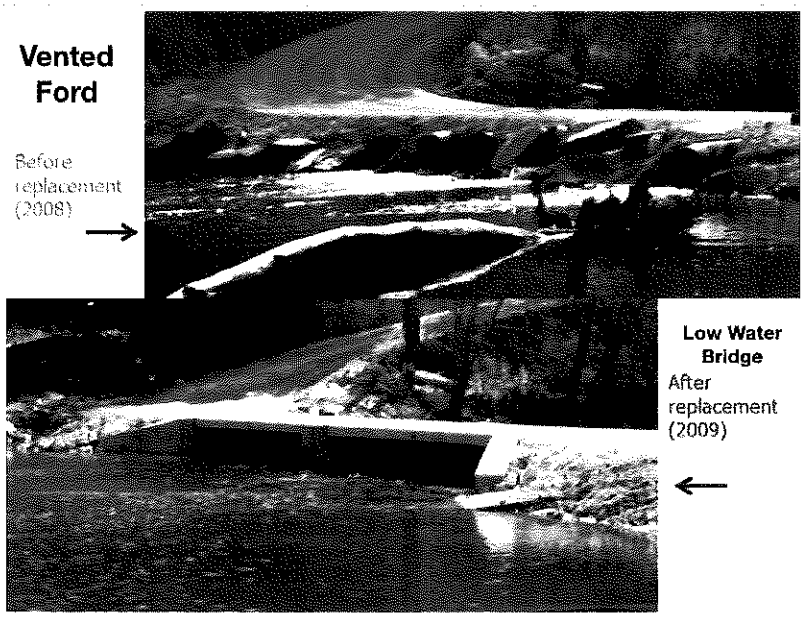

Barriers in the river and the low water crossings replaced them.

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

It won't easily change the elevation, or velocity.

5. How do you think installing low water bridges will affect the ecosystem?

It removes barriers, and makes it easier for fish passage.

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 this claim? What evidence presented might refute this claim?

It's the least expensive way to remove barriers. Vented fords change elevation or velocity.

Noble
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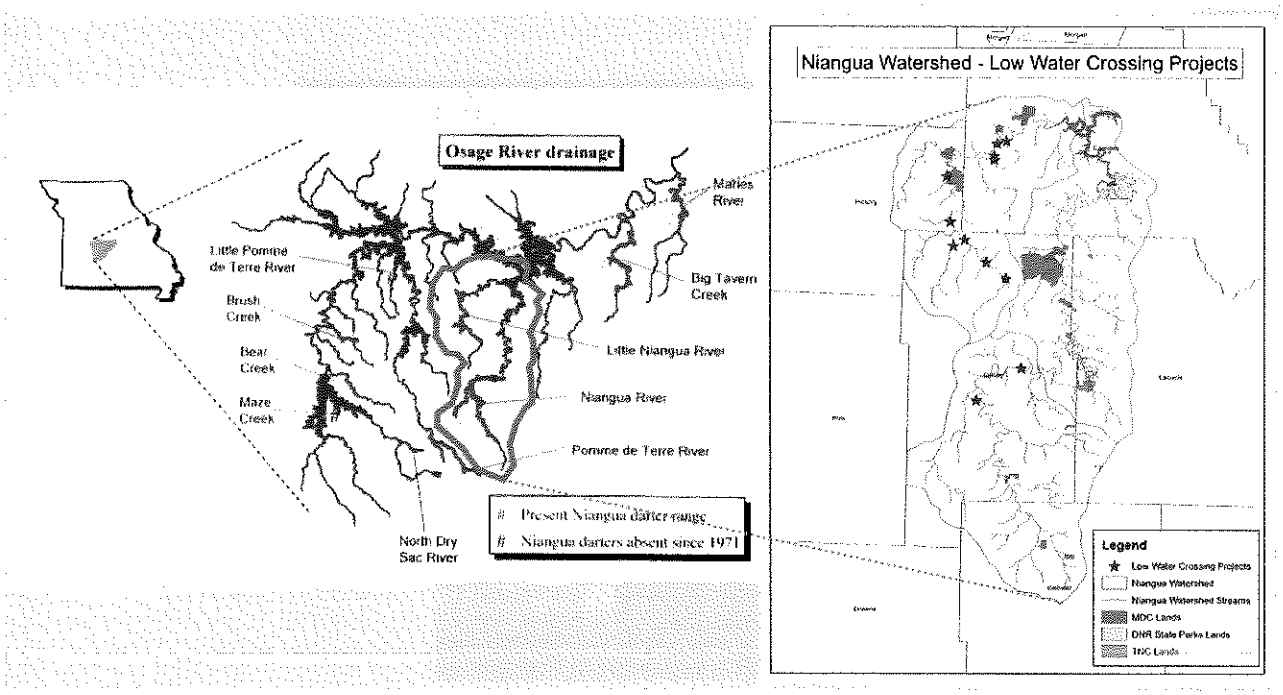

Left Image: Osage Watershed with Niangua River Watershed marked in green. Right Image: Locations of Low Water Crossings installed in Niangua watershed http://www.nianguariverwatershed.org

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

Low water crossings helped the population increase due to a more available way for fish to move around

8. Using information from all parts of the scenario above, provide an explanation that supports your claim and shows your reasoning.

The low water crossings help to facilitate fish passage.

Noble

Funded by a USDE Math Science Partnership (MSP) grant through the Oklahoma State Department of Education.

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?

The darters died off because it allowed pollution to flow through to the area of darter fish.

Noble

Funded by a USDE Math Science Partnership (MSP) grant through the Oklahoma State Department of Education.