SA River & Ecological Restoration

TRICENTENNIAL THEME: San Antonio History
SUBJECT: Science
GRADEBAND/LEVEL: Elementary/Grades 3-5
WRITTEN BY: Megan Arredondo, M.Ed., MELP
TEKS:

3rd	4th	5th
112.14.9A-B	112.15.9B	112.16.9A,C

DESCRIPTION:

Students will learn about ecosystem restoration as it applies to restoration efforts along the San Antonio River. Students will use a variety of methods to determine the overall health of the river and make an assessment of whether or not restoration efforts appear to be successful. 2 class periods- field trip required.

LESSON OBJECTIVES:

1. Understand the concept of ecosystem restoration as it relates to the San Antonio River.

2. Discuss findings and relate data to the health of the ecosystem.

3. Apply their acquired knowledge of ecological restoration.

MATERIALS NEEDED:

Hula Hoops (one per group of students)
Clipboards (one per student)
Pencils (one per student)
Colored pencils/markers (one set per group)
Hand lenses (one per student or group)
Rulers (one per student or group)
Plant/animal identification books (or iPads with identification applications loaded such as Audubon Guides)
Student Sheets #1 & #2 (one per student)
Graph paper (one sheet per student)

Advanced Preparation Needed:
In order to perform the biodiversity exercise, students will need access to the Mission Reach area of the San Antonio River.

ENGAGE (Opening Activity – Access Prior Learning / Stimulate Interest / Generate Questions):

Tell students: "The San Antonio River was approved for channelization by the Army Corps of Engineers in 1954. This process was deemed necessary at the time in order to control devastating floods. Unfortunately, channelization led to the destruction of the river's original riparian and aquatic habitats. Today, the San Antonio River Authority, an organization that helps protect the river, is working hard on ecosystem restoration in order to improve the health of the river. This project will increase the quality, density, and diversity of plants and animals along eight miles of the river. This process will take many years and include many steps. When the project is completed, it will result in the transformation of the river into a more natural state (San Antonio River Authority). Ecologists have developed methods to monitor the health of an environment by measuring its biodiversity. Biodiversity is a measurement of the number of different species of plants and animals that live in a particular habitat. Using your scientific skills, you will be determining whether the restored sections of the river have more, or less, diversity than the parts of the river that have not been restored. Your task is to use your data to determine if the health of the river is improving as a result of the river authority's efforts."

Handout the KWL Chart to each students and give them an opportunity to fill in what they know about the San Antonio River and Ecological Restoration. Discuss.

EXPLORE (Probing or Clarifying Questions):

As a class, complete handout # 1 as an introduction to ecosystem restoration along the San Antonio River. Discuss the handout as you complete it, adding background information where necessary. (Note: This can be completed in the classroom prior to the field visit or in the field.)

EXPLAIN (Concepts Explained):

Divide students into groups of 3 or 4. Pass out one set of materials per group. Once you are in an area of restored habitat, have the groups spread out - they will need plenty of space. One student from each group will close their eyes and gently toss the hoop. As a group, students will observe, study and record everything that's inside the hoop - no matter where it lands. Using their plant/animal/insect identification books, students will work as a team to identify and record what's within the sample area of the hoop. Students need to count the number of each species they find. Students will determine if the species is a producer, consumer, or decomposer (students should have a basic understanding of this concept, but discuss/review their definitions prior to completing the activity). The data is then recorded on handout # 2. (Optional: Use iPad applications such as Audubon Guides in lieu of guidebooks). After completing the data collection form for the first study area, students will move to an unrestored area of the river, repeating the process.

ELABORATE (Applications and Extensions):

Gather the class together and ask each group to report on the sample area that had the most biodiversity. Ask the class to choose the sample area with the highest biodiversity, based on all their reports. Ask the class why they think that area has the most biodiversity and discuss how restoration helps in- crease biodiversity.

Students will then complete the graph activity on handout #2 individually - either in the field or classroom.

Extension Idea-

Public Service Announcement (PSA):

Students create a public service announcement in order to educate the public on the health of the San Antonio River based on their biodiversity, aquatic insect, and/or water monitoring studies. The PSA's can be completed as posters, flyers, brochures, PowerPoint presentations, or skits/TV commercials. Allow students to get creative in how they present the information.

EVALUATE:

Discuss student data and findings, check for understanding, and evaluate their final conclusions via the completion of their handouts and data sheets.

TEACHER ANSWER SHEET

What is Ecosystem Restoration?
Student Information Sheet

Answer Bank
1. Ecosystem 2. Ecosystem Restoration 3. Aquatic 4. River Channel Habitat
5. Riffles, Runs, and Pools 6. Native 7. Diversity 8. Riparian 9. Invasive

An _ecosystem_ is all the living and non-living things existing in a particular area. There are many types of ecosystems. We will be learning about the _aquatic_ and _riparian_ ecosystems along the San Antonio River today. An aquatic ecosystem is the living and non-living things found in the water, while the riparian ecosystem is the living and non-living things found along the riverbank, or the land adjacent to the water.

Many years ago, beginning in 1954, the San Antonio River was *channelized* and changed to an unnatural state to control flooding. The shape of the river and surrounding land was changed drastically. Today, the San Antonio River Authority, a local organization that helps protect the river, is working hard on _ecosystem restoration_. Ecosystem Restoration is important because it will help return 8 miles of the river to its original, or natural, state. One thing that is being done to achieve this goal is the planting of _native_ species, or plants that are original to the area, while removing _invasive_ species, or plants that do not belong in the area. _Diversity_ is very important to a healthy ecosystem. Diversity means having a variety of something. When the ecosystem is fully restored there will be a diverse population of plants and animals to be found.

Part of the process to make the San Antonio River as natural as possible is by creating habitats that once existed, but were removed when the river was channelized. A _river channel habitat_ is a habitat that is usually found in a healthy river. The three types of river channel habitats that are being returned to the San Antonio River through restoration are _riffles, runs, and pools_. Below you will find pictures and information on each type, see if you can match the letter of the description to the correct picture!

B ___

A. Runs- Runs are areas of the river that are of average depth and velocity, or speed. Runs generally connect riffles and pools. While most of a river usually consists of runs, a healthy river does not consist entirely of runs, as the San Antonio River did after it was changed for flood control.

A ___

B. Riffles – A riffle is a shallow area of river with a bottom consisting of rocks. Water usually runs quickly over these areas, creating a choppy surface. Riffles help add oxygen to the water, serve as an area to protect fish from predators, and are a place where many insect species reproduce or grow to maturity.

C ___

C. Pools – Pools are deep areas of water where currents move slowly. Pools are important in maintaining water quality in the river by removing impurities, or unwanted things, from the water, such as sediments. Sediments, such as sand and dirt, can make water murky, which makes it hard for fish to see.

Image Credits: San Antonio River Authority

Name:_____

Date:_____

What is Ecosystem Restoration?
Student Information Sheet

Answer Bank

1. Ecosystem   2. Ecosystem Restoration   3. Aquatic   4. River Channel Habitat **5. Riffles, Runs, and Pools   6. Native   7. Diversity   8. Riparian   9. Invasive**

An_____is all the living and non-living things existing in a particular area. There are many types of ecosystems. We will be learning about the_____and_____ecosystems along the San Antonio River today. An aquatic ecosystem is the living and non-living things found in the water, while the riparian ecosystem is the living and non-living things found along the riverbank, or the land adjacent to the water.

Many years ago, beginning in 1954, the San Antonio River was *channelized* and changed to an unnatural state to control flooding. The shape of the river and surrounding land was changed drastically. Today, the San Antonio River Authority, a local organization that helps protect the river, is working hard on _____. Ecosystem Restoration is important because it will help return 8 miles of the river to its original, or natural, state. One thing that is being done to achieve this goal is the planting of _____species, or plants that are original to the area, while removing_____species, or plants that do not belong in the area._____is very important to a healthy ecosystem. Diversity means having a variety of something. When the ecosystem is fully restored there will be a diverse population of plants and animals to be found.

Part of the process to make the San Antonio River as natural as possible is by creating habitats that once existed, but were removed when the river was channelized. A_____is a habitat that is usually found in a healthy river. The three types of river channel habitats that are being returned to the San Antonio River through restoration are_____. Below you will find pictures and information on each type, see if you can match the letter of the description to the correct picture!

_____

A. Runs- Runs are areas of the river that are of average depth and velocity, or speed. Runs generally connect riffles and pools. While most of a river usually consists of runs, a healthy river does not consist entirely of runs, as the San Antonio River did after it was changed for flood control.

_____

B. Riffles – A riffle is a shallow area of river with a bottom consisting of rocks. Water usually runs quickly over these areas, creating a choppy surface. Riffles help add oxygen to the water, serve as an area to protect fish from predators, and are a place where many insect species reproduce or grow to maturity.

_____

C. Pools – Pools are deep areas of water where currents move slowly. Pools are important in maintaining water quality in the river by removing impurities, or unwanted things, from the water, such as sediments. Sediments, such as sand and dirt, can make water murky, which makes it hard for fish to see.

Image Credits: San Antonio River Authority

NAME: _____

KNOW	WONDER	LEARNED
Write what you know about Ecological Restoration AND/OR the San Antonio River	Write what you wonder, or want to know, about Ecological Restoration and the San Antonio River.	Write what you learned about Ecological Restoration and the San Antonio River.

Name:_____

**Date:**_____

What is Ecosystem Restoration?
San Antonio River Biodiversity Data Collection Sheet

Draw and write about everything that you see within your random hoop sample. Use field guides and/or identification sheets to identify the different types of plants, animals, and insects. Make sure to note how many species of each you find and whether it is a producer, consumer, or decomposer.

Location on the river (circle one): *Restored* or *Unrestored*
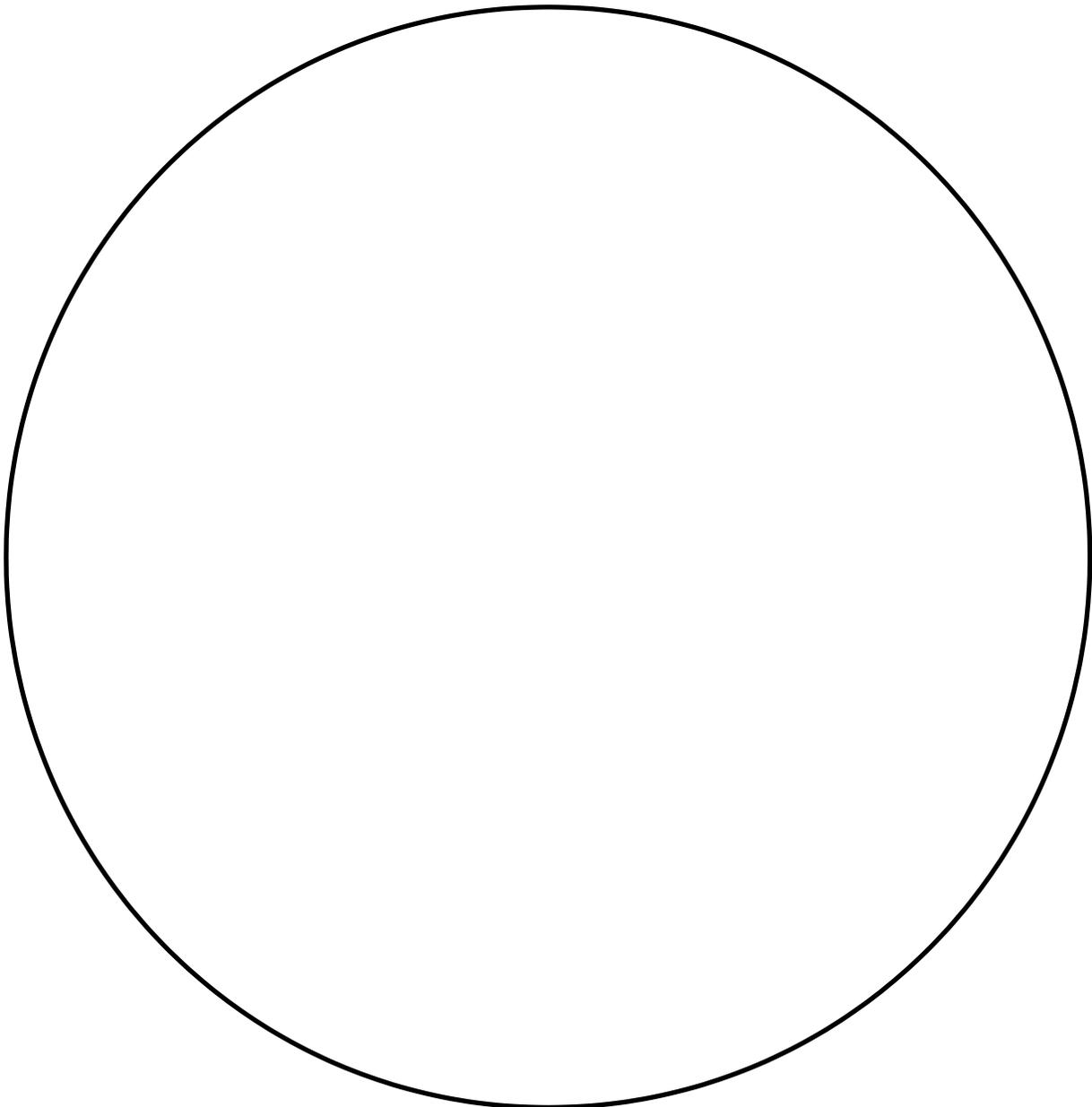
Location on the river (circle one): *Restored* or *Unrestored*
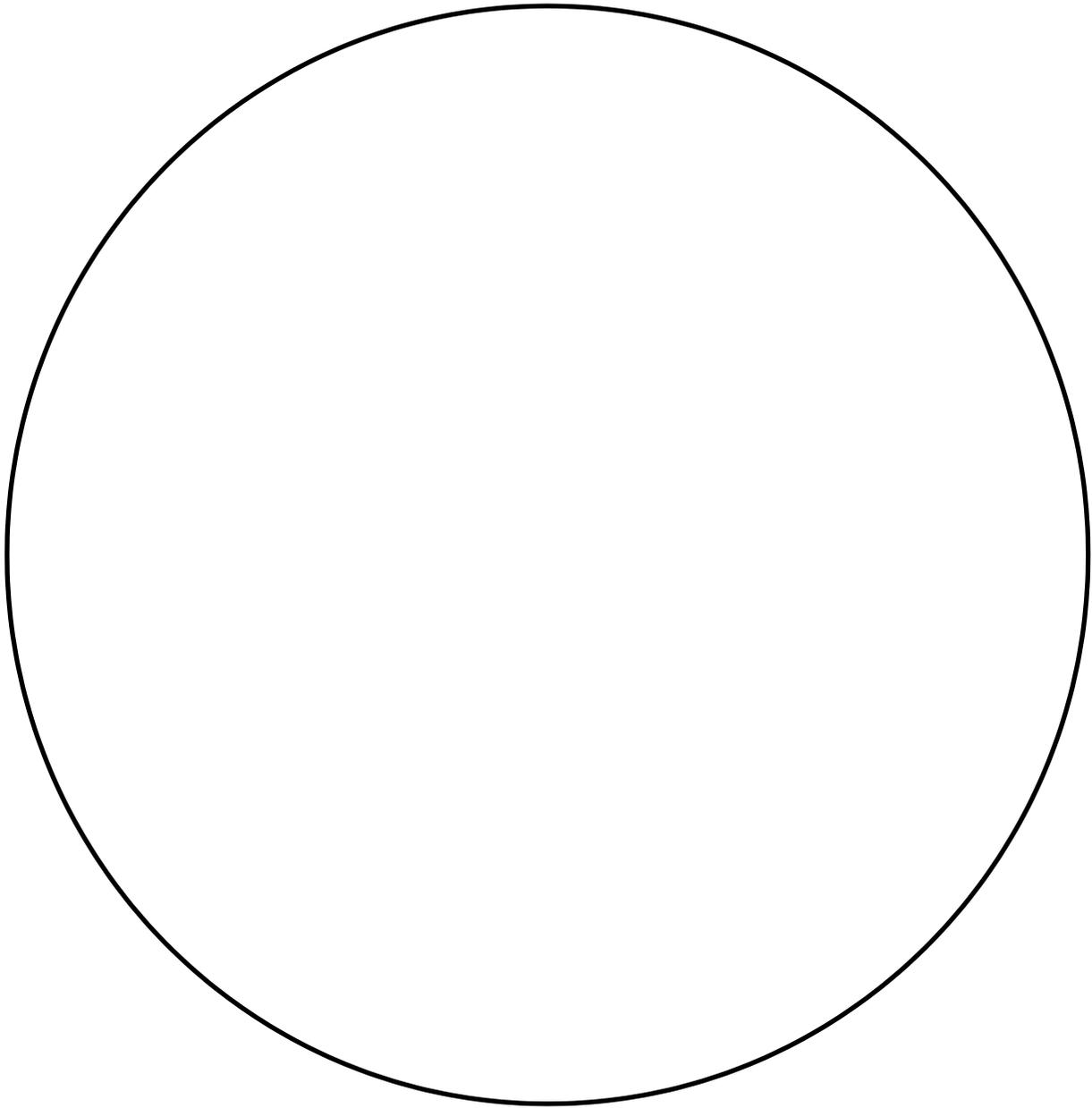
Reflection

1. Which sample had the most biodiversity, the restored or unrestored ecosystem?

2. Why do you think you found the results that you did?

On a separate sheet of graph paper, create an appropriate graph comparing the biodiversity in restored versus the unrestored locations.