Earth Camp
Austin, Texas

CURRICULUM

Welcome to Earth Camp's classroom curriculum.

Earth Camp is the City of Austin Watershed Protection Department's four-day, outdoor, environmental education program for fifth-grade elementary school students. This curriculum was developed to aid the classroom teacher in preparing students for Earth Camp. The theme of this curriculum is watersheds, aquifers, and water quality. The content was chosen to correlate to the Texas Essential Knowledge and Skills and to integrate into Austin Independent School District fifth-grade science curriculum, while keeping the focus on water quality.

If you can not view the video or need more info, go to

www.austintexas.gov/earthcamp

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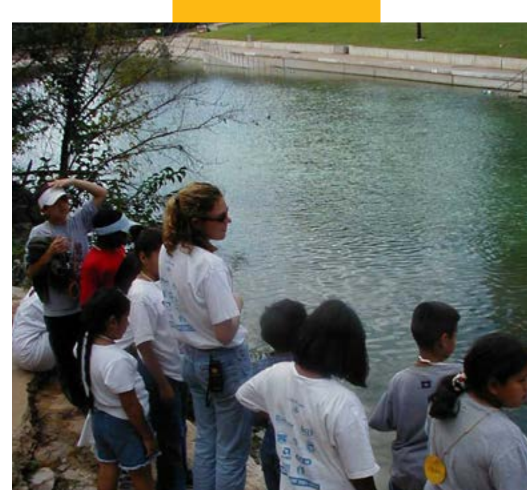

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City of Austin Watershed Protection Department

Name ________________________________ Date ________________

School _______________________ Teacher ________________________

1. Where does your drinking water come from?
   a. Colorado River b. Ocean c. Edwards Aquifer d. Groundwater

2. A watershed is...
   a. another word for a creek.
   b. area of land that drains to a creek, lake, or river.
   c. another word for a river.
   d. area of land where you find water treatment plants.

3. Every schoolyard is part of a watershed. What is the name of the watershed where your school is located? ____

4. Is your school located over the Recharge Zone? Yes No

5. Why is it important for clean water to understand a watershed and recharge zone?
   a. to understand the geography of Austin.
   b. to understand how water erosion formed the creeks and aquifer.
   c. to know where dinosaur bones have been discovered.
   d. to understand how pollution from the land can flow to the creek and aquifer.

6. Where does water go that drains into the stormdrain on your street?
   a. water treatment plant b. creek c. water tower

7. The Edwards Aquifer is an underground layer of _______ with holes and channels that hold water.
   a. limestone rock b. sand c. clay

8. Could oil spilled on your driveway get into the creek water? Yes No

9. My own actions can help protect Austin's creeks and river. True False

Name ______________________________ Date ____________________

School _________________________ Teacher _________________________

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   a. limestone rock   b. sand   c. clay

8. Could oil spilled on your driveway get into the creek water?   Yes   No

9. My own actions can help protect Austin's creeks and river.   True   False

10. Have you changed any habits because of your experience at Earth Camp?   Yes   No

If yes, explain what changed. ____

____

____

Nombre ______________________________ Fecha _________________

Escuela ____________________________ Maestro/a _______________________

1. ¿De dónde viene nuestra agua potable?

   a. Río Colorado b. el océano c. el Acuífero Edwards d. agua subterránea

2. Una *cuenca hidrográfica* es ...

   a. otra palabra para *arroyo*

   b. una área de terreno que envía el agua que recoge a un arroyo, lago o río en particular.

   c. otra palabra para *río*

   d. el terreno donde se encuentran las plantas del tratamiento de aguas residuales

3. Cada patio de una escuela forma parte de una cuenca hidrográfica. ¿Cuál es el nombre de lacuenca más cercana a tu escuela? ____

4. ¿Está tu escuela localizada sobre la Zona de Recargo del acuífero? Sí No

5. Para que la cualidad del agua sea buena, ¿por qué es impo rtante aprender sobre la cuenca y la zona de recargo del acuífero?

   a. para aprender sobre la geografía de Austin

   b. para entender cómo la erosión del agua formó los arroyos y el acuífero

   c. para saber dónde se han descubierto huesos de dinosaurios

   d. para entender cómo la contaminación de la tierra puede llegar a los arroyos y al acuífero

6. ¿Hacia dónde se va el agua que corre por el drenaje de las calles cerca de donde vives?

   a. planta para el tratamiento de agua b. arroyo c. torre de agua

7. El Acuífero de Edwards es una capa subterránea de ____________ con agujeros y canales que retienen agua.

   a. piedra caliza b. arena c. arcilla

8. ¿Puede el aceite que se tira en la entrada de tu casa llegar hasta el agua del arroyo?

   Sí No

9. Mis propias acciones pueden ayudar a proteger los arroyos y el río de Austin.

   Verdadero Falso

Nombre ____________________________ Fecha _______________

Escuela __________________________ Maestro/a _____________________

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    Sí No

9. Mis propias acciones pueden ayudar a proteger los arroyos y el río de Austin.

    Verdadero Falso

10. ¿Te ha ayudado tu experiencia en *Earth Camp* a cambiar algunos de tus hábitos?

Si tu respuesta es *Sí*, explica lo que cambió _______________________________________

What Is a Watershed?

A watershed is the area of land that rain washes over on its downhill flow towards a specific creek, river, or lake. Each body of water has a watershed, defined by rises in elevation that separate it from a neighboring creek or river. A watershed gets its name from the local creek, river, or lake. In Austin, we have small creek watersheds which are all part of the larger Colorado River Watershed.

What Is the Difference Between a Watershed and a Recharge Zone?

A watershed drains to surface water (creeks, rivers, lakes), and a recharge zone drains into groundwater (aquifers).

Why Should Elementary Students Learn About Watersheds?

As the saying goes, children are our most precious resource. Since clean water is a resource we cannot live without, teaching children the science of clean water will help them to make decisions and develop habits that will preserve both these precious resources. Approximately seventy-five percent of the pollution in America's rivers and lakes occurs from the actions of people living in the watershed, not from factory discharge. Watersheds are the key to understanding how each of us individually affects water quality. Understanding watersheds means understanding choices for a cleaner and healthier environment.

Does the Curriculum Include Information About the Aquifer?

Yes, there is a lesson on aquifers. The better choices for a cleaner watershed also apply to an aquifer recharge zone.

How Do I Use the Curriculum?

The classroom curriculum consists of three hands-on, activity-oriented lessons, which encourage students with any learning style to become involved with learning. All lessons meet the requirements of the Texas Essential Knowledge and Skills for Science, but can be integrated into Social Studies as well.

Can I Be Flexible In Using the Lessons?

Yes. Lessons can be reduced, adapted, skipped, or even expanded according to your planning needs. However, since lesson one is a concrete model of a watershed students easily understand, it is suggested this lesson not be skipped, but taught first. The other lessons are in an order that encourages students to build upon previous knowledge, but lessons can stand alone, integrate into other subjects, or be taught throughout the school year in conjunction with other subject matter (e.g. maps, scientific method). Please cover as much as possible before attending Earth Camp.

CURRICULUM INTRODUCTION CONTINUED

What Materials Do I Need?

This curriculum requires some special materials that are in an Earth Camp Curriculum Kit. The kits are delivered to schools participating in the City of Austin Watershed Protection's Earth Camp program. All other materials needed are normal school supplies.

How Will I Get Materials to Continue Teaching this Curriculum in Years to Come?

Teachers continuing to participate in Earth Camp through the Teacher-Led Earth Camp program will be scheduled to receive an Earth Camp Curriculum Kit. If your school would like to put together your own kit, a list of suppliers is located at the back of the Curriculum Guide under "Resources." You can also call the Earth Camp Director for information at 512-974-2550.

What About the Texas Essential Knowledge and Skills (TEKS), and STAAR?

The lessons in this curriculum and at Earth Camp are correlated to the Texas Essential Knowledge and Skills for fifth-grade science, social studies, language arts, math, and health. The TEKS are located in the next tabbed section. The knowledge and skills in these lessons will aid student success on the STAAR test.

What If I Have Questions or Suggestions?

We want your participation and feedback!
Call the Earth Camp Director at 512-974-2550.

Earth Camp Classroom Curriculum Alignment With 5th Grade TEKS (2010 version

SCIENCE	Lesson 1	Lesson 2	Lesson 3
1 (A) demonstrate safe practices and the use of safety equipment as described in the TX Safety Standards during classroom and outdoor investigations			◆
1 (B) make informed choices in the conservation, disposal, and recycling of materials			◆
2 (A) describe, plan and implement simple experimental investigations testing one variable	◆		◆
2 (B) collect information by detailed observations and accurate measuring	◆		◆
2 (C) analyze and interpret information to construct reasonable explanations from direct and indirect evidence	◆	◆	◆
2 (D) analyze and interpret information to construct reasonable explanations from direct (observable) and indirect (inferred) evidence	◆	◆	◆
2 (E) demonstrate that repeated investigatins may increase the reliability of results			◆
2 (F) communicate valid conclusions in both written and verbal forms	◆		◆
3 (A) in all fields of science, analyze, evaluate, and critique scientific explanations by using empirical evidence, logical reasoning, and experimental and observational testing, including examining all sides of scientific evidence of those scientific explanations, so as to encourage critical thinking by the student	◆	◆	◆
4 (A) collect and analyze information using tools including ...metric rulers ...	◆		◆
7 (B) recognize how landforms ... are the result of changes to Earth's surface by wind, water and ice	◆		◆
8 (D) identify (and compare) the physical characteristics of the (Sun), Earth (and Moon)	◆		◆
9 (C) predict the effects of changes in ecosystems caused by living organisms, including humans			
SOCIAL STUDIES	**Lesson 1**	**Lesson 4**	**Lesson 3**
5 a) analyze various issues and events of the 20th century such as urbanization, industrialization, increased use of oil and gas, world wars, and the Great Depression	◆	◆	◆
6 a) apply geographic tools, including grid systems, legends, symbols, scales, and compass roses, to construct and interpret maps	◆		◆
7 a) describe a variety of regions in the United States such as political, population, and economic regions that results from patterns of human activity		◆	
7 b) describe a variety of regions in the United States such as landform, climate, and vegetation regions that result from physical characteristics	◆		◆

SOCIAL STUDIES (cont'd)	Lesson 1	Lesson 2	Lesson 3
8 a) identify and describe the types of settlement and patterns of land use in the United States		◆	
8 b) describe clusters of settlement in the United States and explain their distribution		◆	
9 a) describe ways people have adapted to and modified their environment in the United States, past and present			
9 b) identify reasons why people have adapted to and modified their environment in the United States, past and present, such as the use of human resources to meet basic needs			
9 c) analyze the consequences of human modification of the environment in the United States, past and present	◆		◆
24 d) analyze environmental changes brought about by scientific discoveries and technological innovations such as air conditioning and fertilizers			◆
25 b) analyze information by sequencing, categorizing, identifying cause-and-effect relationships, comparing, contrasting, finding the main idea, summarizing, making generalizations and predictions, and drawing inferences and conclusions			◆
25 c) organize and interpret information in outlines, reports, databases, and visuals including graphs, charts, timelines, and maps		◆	◆
27 a) use a problem-solving process to identify a problem, gather information, list and consider options, consider advantages and disadvantages, choose and implement a solution, and evaluate the effectiveness of the solution	◆		
27 b) use a decision-making process to identify a situation that requires a decision, gather information, identify options, predict consequences, and take action to implement a decision	◆		
LANGUAGE ARTS	**Lesson 1**	**Lesson 2**	**Lesson 3**
1 b) eliminate barriers to effective listening	◆	◆	◆
1 c) understand the major ideas and supporting evidence in spoken language	◆	◆	◆
2 a) interpret speakers' messages, purposes, and perspectives	◆	◆	◆
2 d) monitor his/her own understanding of the spoken message and seek clarification as needed	◆	◆	◆
6 a) apply knowledge of letter-sound correspondences, language structure, and context to recognize words			
7 b) read regularly in instructional-level materials that are challenging but manageable			
7 d) adjust reading rate based on purposes for reading			
8 c) read for varied purposes such as to be informed, to be entertained, to appreciate the writer's craft, and to discover models for his/her own writing	◆	◆	◆
9 b) draw on experiences to bring meanings to words in context such as interpreting figurative language and multiple-meaning words	◆	◆	◆

LANGUAGE ARTS (cont'd)	Lesson 1	Lesson 2	Lesson 3
9 c) use multiple reference aids, including a thesaurus, a synonym finder, a dictionary, and software, to clarify meanings and usage			
9 e) study word meanings systematically such as across curricular content areas and through current events	◆		◆
10 a) use his/her own knowledge and experience to comprehend	◆	◆	◆
10 b) establish and adjust purposes for reading such as reading to find out, to understand, to interpret, to enjoy, and to solve problems			
10 c) monitor his/her own comprehension and make modification when understanding break downs such as by rereading a portion aloud, using reference aids, searching for clues, and asking questions			
10 e) use the text's structure or progression of ideas such as cause and effect or chronology to locate and recall information			
10 f) determine a text's main ideas and how those ideas are supported with details			
10 h) draw inferences such as conclusions or generalizations and support them with text evidence and experience			
10 k) answer different types and levels of questions such as open-ended, literal, and interpretative as well as test-like questions such as multiple choice, true-false, and short answer	◆	◆	◆
11 a) offer observations, make connections, react, speculate, interpret, and raise questions in response to texts	◆		
11 b) interpret text ideas through such varied means as journal writing, discussion, enactment, and media			
11 c) support responses by referring to relevant aspects of text and his/her own experiences			
11 d) connect, compare, and contrast ideas, themes, and issues across text			
13 b) use text organizers, including headings, graphic features, and tables of contents, to locate and organize information			
13 c) use multiple sources, including electronic texts, experts, and print resources, to locate information relevant to research questions			
13 d) interpret and use graphic sources of information such as maps, graphs, time lines, tables, or diagrams to address research questions	◆	◆	◆
13 e) summarize and organize information from multiple sources by taking notes, outlining ideas, and making charts		◆	
13 g) draw conclusions from information gathered from multiple sources	◆	◆	◆
14 a) compare text events with his/her own and other readers' experiences			

LANGUAGE ARTS (cont'd)	Lesson 1	Lesson 2	Lesson 3
15 a) write to express, discover, record, develop, reflect on ideas, and to problem solve	◆		◆
15 c) write to inform such as to explain, describe, report, and narrate	◆		◆
16 a) write legibly by selecting cursive or manuscript as appropriate	◆	◆	◆
21 c) take notes from relevant and authoritative sources such as guest speakers, periodicals, or on-line searches			
23 b) interpret important events and ideas gleaned from maps, charts, graphics, video segments or technology presentations	◆	◆	◆
23 c) use media to compare ideas and points of view			
HEALTH	**Lesson 1**	**Lesson 2**	**Lesson 5**
8 d) identify environmental protection programs that promote community health			
9 c) utilize critical thinking in decision making and problem solving	◆	◆	◆
MATH	**Lesson 1**	**Lesson 2**	**Lesson 5**
5 a) use concrete objects or pictures to make generalizations about determining all possible combinations			
5 b) use lists, tables, charts, and diagrams to find patterns and make generalizations such as a procedure for determining equivalent fractions			
7 b) use critical attributes to define geometric shapes or solids			
10 a) measure volume using concrete models of cubic units	◆		◆
11 a) measure to solve problems involving length, weight, capacity, time, temperature, and area			
12 b) use experimental results to make predictions	◆		◆
14 b) use a problem-solving model that incorporates understanding the problem, making a plan, carrying out the plan, and evaluating the solution for reasonableness	◆		◆
14 c) select or develop an appropriate problem-solving strategy, including drawing a picture, looking for a pattern, systematic guessing and checking, acting it out, making a table, working a simpler problem, or working backwards to solve a problem	◆		◆
14 d) use tools such as real objects, manipulatives, and technology to solve problems	◆		◆
15 a) explain and record observations using objects, words, pictures, numbers, and technology			◆
16 a) make generalizations from patterns or sets of examples and non-examples	◆	◆	◆
16 b) justify why an answer is reasonable and explain the solution process	◆		◆

LESSON 1

BACKGROUND

Everyone lives in a watershed, an area of land that drains water into a particular creek, river, or lake. Creeks, rivers and lakes interconnect to form a large watershed basin that drains to the ocean. The entire watershed basin of the Colorado River begins above Colorado City, and includes all the land that drains water into the Colorado River as it travels down to Matagorda Bay and the Gulf of Mexico. The Austin segment of the Colorado River Watershed Basin is composed of many smaller watersheds that drain to the Colorado River. Urban and natural areas within Austin city limits drain water to: (1) creeks, (2) the Barton Springs/Edwards Aquifer, and (3) Lake Travis, Lake Austin, and Lady Bird Lake. Rainwater travels over all the surfaces in a watershed, so water quality is greatly affected by the condition of the land, streets, buildings, etc. within the boundary of a watershed.

Gravity forces water downhill, so a watershed's boundary is defined by high points, such as peaks and ridges, that divide two water systems. One of the largest and most famous watershed boundary line is the North American Continental Divide, which defines the boundary between all the water systems flowing to the Atlantic Ocean and the Pacific Ocean. Topographic maps are used to define a watershed boundary, along with a walk of the area to observe flow.

A watershed map prepared by the City of Austin can be used to locate your school's watershed. It is useful for elementary students to define the boundary of the smaller watershed where they live and go to school. The condition of the body of water in their watershed will be an indicator of the environmental problems facing their neighborhood. Students can relate to the effect of their own behavior and choices, and focus efforts on cleaning up pollution sources close to home.

LESSON 1

Description of the class: 5th Grade Science
Length of lesson: One 45 minute class period

I. Overview

A. Students will learn how water on the land runs off into a particular creek, river or lake. This is important for students to understand because it helps students realize how pollution on the land can get into the water.

B. Vocabulary

watershed – an area of land that drains water into a particular creek, river or lake. Water flows downhill, so hills ridges and other high points define the boundary of a watershed.

runoff – water that washes over the land (rather than soaking in) into a creek, river or lake.

surface water – water that is on the earth's surface, such as in creeks, rivers and lakes.

groundwater – water found underground that flows through soil or fractured rock supplying water to springs and water wells.

infiltration – when water slowly enters the ground

topography – the shape of the land

II. Objectives (performance or learner outcomes)

A. Students will be able to:

(1) define a watershed

(2) predict the flow of water in a watershed, and

(3) define groundwater and surface water

III. Resources, materials and supplies needed

A. Watershed Riddle

B. Copies of Wandering Water lab sheet for each student

C. Additional resources/materials/supplies included in kit:

(1) Watering can with a sieve on the spout

(2) Two watershed models (one with green hills and red houses and one that the students build with puzzle pieces, a tray and surface cover)

(3) 3000 ml pitcher (fill with water)

(4) Food coloring

D. Pieces of yarn or string

IV. Teacher Preparation

A. Prepare a table with a flat surface for the watershed rainstorm demonstration. If doing this demonstration inside, use an area that can get wet. This demonstration can also be done outside.

B. Fill the pitcher with 3000 ml of water.

C. Copy Wandering Water lab sheet for each student.

LESSON 1 - Part 1

ENGAGE

Teacher will capture student interest using a Watershed Riddle.

Project the Watershed Riddle. Present the students with the riddles. Discuss the Watershed Riddle as a class. Encourage students to explain their answers. Tell the students they will do an activity that will help them answer the Watershed Riddle.

Critical questions that will establish prior knowledge and create a need to know:

- How would the fertilizer get from the yard to the creek?
- Why is fertilizer bad for the creek?
- Which house do you think used the lawn fertilizer that polluted Blunn Creek? Why?

EXPLORE

Description of hands-on / minds-on activity:

Students will look at a physical watershed model with houses on hills and discuss how they think the water will flow from the yards to a creek; write a hypothesis about which house used the lawn fertilizer that polluted Blunn Creek and where they think the water will flow on the model during their rainstorm experiment (on the Wandering Water lab sheet).

Students will conduct experiments with the watershed model to observe how topography

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(the shape of the land) affects where water will flow during a rainstorm and how pollution on the land can affect the water quality of creeks and rivers. First, students will place a drop of food coloring to represent pollution near the house that they think used the lawn fertilizer that washed into Blunn Creek causing the algae to overgrow. Next, students test their hypothesis by using the pitcher with a sieve to rain over the polluted yard to see if the food coloring pollutes Blunn Creek. Then, they can 'rain' over the entire model to observe and discuss how the water flows from the land surface to the creeks.

Questions the teacher will use to encourage and/or focus students' exploration:

- What do the red squares on the model represent? (houses)
- What does the food coloring represent? (fertilizer or any chemical pollution)
- What does the low area in the middle of the hills represent? (a creek, stream, or river)
- Can you locate which creek receives runoff from each house?

EXPLAIN

Explain to students that a watershed is an area of land that drains to a creek, river, or lake. Ask students what they think forms the boundary of a watershed. Ask the students to point to the high points, or hilltops. Lay one piece of colored yarn from hilltop to hilltop. These high points of land form watershed boundaries.

Questions and techniques teacher will use to help students connect their exploration to the concept under investigation:

- What do we call the area of land that drains to a creek, river, or lake? (a watershed)
- What are the boundaries of a watershed? (the highpoints)
- Can you point to the highpoints, or hilltops on the model?
- Can you use the yarn to outline Blunn Creek Watershed (the area of land that drains to Blunn Creek)?

LESSON 1 - Part 2

List of higher order thinking questions which teachers will use to solicit student explanations and help them to justify their explanations:

- In what ways does this model represent the real world?
- What does the surface water in this model represent? (three Austin creeks that drain into the Colorado River)
- What are some limitations of this model?
- In the real world, does water soak into the land? (yes)
- Does this model represent water that soaks into the land? (no)
- Where does the water that does not soak into the land flow? (over the land into a creek, river, or lake)
- What does the pitcher that caught the water represent? (runoff from the rainstorm that drains into a bigger creek, stream, river, lake or the ocean)

ELABORATE

Descriptions of how students will develop a more sophisticated understanding of the concept:

Organize students into five groups. Give each group matching watershed puzzle pieces to build one hill in the model (i.e. group A, B, C, D, and E). When the hills are finished, allow groups to piece the hills together inside the tray making sure the mouth of the creek is located a the cut in the frame.

Show the 3000 ml pitcher of water. Ask students to hypothesize how much of the 3000 ml 'rainstorm' they think will run off the watershed. Pour the water into the pitcher with

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a sieve. Have a student hold the 3000 ml pitcher under the mouth of the creek to catch the runoff. Allow other students to pass the watering can and 'rain' on the watershed. Students observe and discuss how the water flows from the land surface to the creek. When the 'rainstorm' is over, measure the amount of water in the 3000 ml pitcher.

Questions to ask the students:

- Why isn't the pitcher filled to 3000 ml, since this was the amount in the 'rainstorm'? (some water stayed underground and some pooled in the creek)
- After it stops raining, is water still flowing? Where? (yes, the groundwater continuously flows)

How this knowledge is applied in our daily lives:

Some water soaked into the ground, becoming part of the groundwater. During the 'rainstorm', water soaked into the hill, then stopped when it came to a part of the hill that would not soak up water and flowed out and over this layer. When groundwater reaches a layer it cannot pass through, it comes out at the surface again. Groundwater provides continuous flow to the creek during the time when it is not raining.

Optional extension activity:

Students can 'rain' on the model a second time to compare the amount of runoff to the first demonstration. Ask students: What causes flooding? (When the ground is saturated, most of the water from a large rainstorm will run off, causing flooding.)

LESSON 1 - Part 3

EVALUATE

ANSWER RIDDLE – Show the Watershed Riddle on the overhead. Discuss with the students what the lines and enclosed circular shapes represent (the lines represent elevation and enclosed circular shapes represent hilltops). Ask if anyone can use the lines to identify the yard that polluted Blunn Creek.

List of higher order thinking questions which teachers will use to solicit student explanations and help them to justify their explanations (Project Riddle on the screen):

- What are these wavy lines on the map?
- What do hilltops look like on the map?
- Can you use the lines on the map to identify the yard that used the fertilizer that polluted Blunn Creek? (answer B)
- How can you tell which of these houses may have polluted Blunn Creek by putting fertilizer on their lawn?
- What are other chemicals people put on their lawns and gardens that can pollute the creek? (Pesticides and Herbicides)

On the Wandering Water lab sheet students will:

(1) write their hypothesis for how they think the water will flow,
(2) describe the results from their experiments
(3) write what formed the boundaries of the watersheds
(4) define the differences between groundwater and surface water

EXTENSION; Technology Activity- Copy "Find Your Watershed" for each student. Students use the interactive map found on the website included on the worksheet to identify and answer questions about their watershed.

LESSON 1
BACKGROUND
LESSON PLANS
WORKSHEETS

NAME:____

A **watershed** is an area of **land** that drains water into a particular creek, river, or lake. Watersheds have high points where one watershed ends and another watershed begins. You can look at the shape of the land to predict the flow of water to the creek.

Hypothesis:

Which house do you think used a lot of fertilizer that polluted Blunn Creek?

A, B, C, D E

Predict where the water will flow during a rainstorm on the watershed model?

I think ____

Materials:

Watershed pieces, tray,

3000 ml beaker filled with water, watering can

Procedure:

1. Build a hill using the matching watershed pieces.
2. Put your hill inside the tray, fitting it together like a puzzle with the other hills.
3. Measure 3000 ml of water into the watering can. Pour the rain on the watershed. Look for patterns in the flow of the water as it rains.

Results:

1. Where did the water flow? ______________________________________
2. Did all the water flow into one creek? ______________________________

   Explain your answer. ____
3. Where did the creek flow? ______________________________________
4. What formed the boundary of the creek's watershed? ___________________
5. What is the difference between groundwater and surface water? ___________

____

Conclusion:

Where does water flow in a watershed? ________________________________

____

Nombre: ____

Una **cuenca hidrográfica** es una área de tierra que envía el agua que recibe a un arroyo, río o lago en particular. Las cuencas tienen puntos altos donde termina una cuenca y empieza otra. Puedes ver la forma del terreno para predecir el flujo de agua hacia el arroyo.

Hipótesis:

¿Cuál casa crees que uso mucho fertilizante que contamino al Blunn Creek (Arroyo Blunn)? A, B, C, D, E

Predice hacia donde fluirá el agua durante una tormenta en el modelo de la cuenca.

Yo creo ____

Materiales:

Piezas de la cuenca, bandeja, vaso de laboratorio de 3000 ml lleno de agua, regadera de plantas

Procedimiento:

1. Forma una colina usando las piezas del juego de la cuenca.
2. Coloca la colina dentro de la bandeja, acomodándola como un rompecabezas con las otras colinas.
3. Mide 3,000 ml de agua de agua en la regadera. Deja caer la lluvia sobre la cuenca.

   Busca patrones en la corriente de agua al llover.

Resultados:

1. ¿Hacia dónde fluyó (corrió) el agua? ______________________________________
2. ¿Corrió toda el agua hacia un arroyo? ______________________________________

   Explica tu respuesta. ____
3. ¿Hacia dónde corrió el agua del arroyo? ____________________________________
4. ¿Qué formó el límite de la cuenca del arroyo? _________________________________
5. ¿Cuál es la diferencia entre agua subterránea y agua superficial? __________________

____

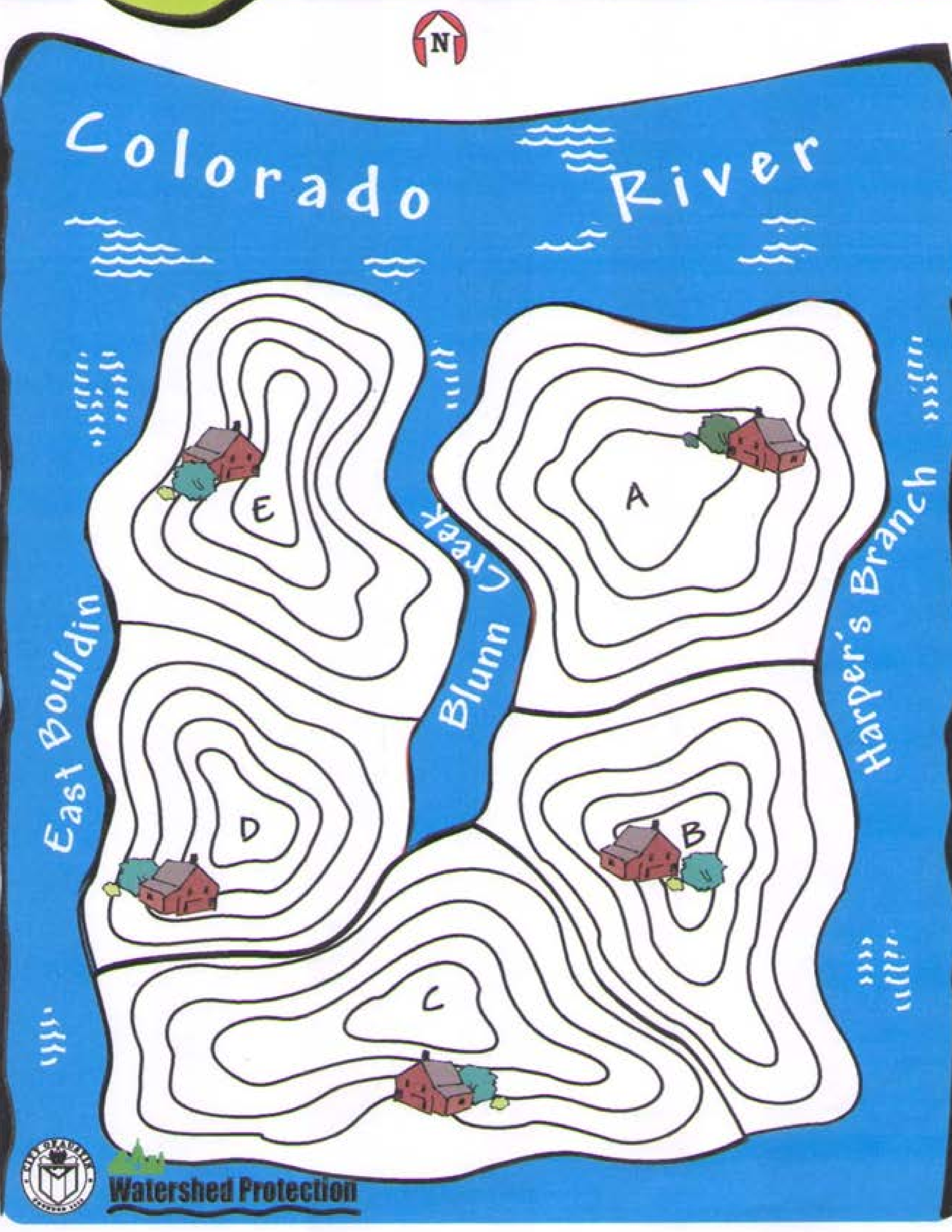
Conclusión:

¿Hacia dónde corre el agua de una cuenca? ____________________________________

____

WATERSHED RIDDLE

Lawn fertilizer washes into Blunn Creek causing the algae to overgrow and the creek to become thick and green. Which yard do you think the fertilizer is probably coming from?



Find Your Watershed

Name: ______________________________

DIRECTIONS: Requires a computer with internet access.

Check the boxes as you complete each step. Answer questions 1-5.

☐ **Open the internet. Go to http://austintexas.gov/GIS/FindYourWatershed/**

☐ **Type your home address in the box above the map.**

☐ **Click "Find Your Watershed."**

☐ **Find the name of your watershed in the right hand corner, in blue type under "Watershed found."**

1. Write the name of your watershed. ______________________________

2. The name of your neighborhood creek is the same as your watershed. What is the name of your creek? ______________________

3. The water from your yard, driveway, and street drains into ________________ creek.

☐ **Locate your street: Zoom in using the arrows on the upper left side of the map. Click and hold the mouse button, then move the mouse around to move the map. Find your street with the red dot that locates your home.**

4. What is the color of the watershed where your home is located? ___________

☐ **Find the color key in the column on the left.**

5. Circle the "Watershed Integrity Score" for the color you identified in number 4.

Excellent	Very good	Good	Fair	Marginal
Poor	Bad	Very bad	No rating	

Encuentra tu cuenca

Nombre: ___________________________________

INSTRUCCIONES: Se requiere una computadora con acceso a Internet.

Marca el cuadró al completar cada paso. Contesta las preguntas 1-3.

Abre la página de Internet.
Ve a la página: http://austintexas.gov/GIS/FindYourWatershed/

Escribe la dirección de tu casa en la línea arriba del mapa, y haz clic en "Find Watershed".

El nombre de tu cuenca aparecerá en la esquina derecha en color azul, debajo de "Watershed found".

1. Escribe el nombre de tu Cuenca _________________________________.

2. El nombre del arroyo de tu vecindario es el mismo que el de tu cuenca.

   ¿Cómo se llama tu arroyo? ___________________________.

3. El agua de tu patio, entrada y calle se desagua en el arroyo _______________.

Usando la flecha superior en el lado izquierdo de tu mapa, agrándalo y sostén el botón del ratón de la computadora hasta que puedas localizar tu calle, la cual estará marcada con un punto rojo.

4. ¿De que color es la Cuenca donde se localiza tu calle?______________________.

Observa al color que se encuentra en la columna de la izquierda.

5. De la siguiente lista, encierra en un circulo la calificación que le corresponde al color que identificaste al hacer el paso 4.

Excelente Buey Bueno Bueno Suficiente Justo

Marginal Pobre Malo Muy malo Sin calificación

LESSON 2

BACKGROUND

Austin is comprised of many different watershed areas surrounding creeks, as well as watersheds that drain directly into Lake Austin and Lady Bird Lake. Not every creek's watershed is completely within the city limits. Most of the watersheds located on the boundaries of Austin begin in one city or county, then flow through Austin to the Colorado River. The creeks in Austin are part of the Colorado River watershed basin. A basin is the entire land area from which a river and its tributaries receive water. The entire Colorado River basin is shown on the Major Basins of Texas map. IMPORTANT NOTE: Two Austin creeks, Lake Creek and Rattan Creek, do not flow to the Colorado River, but are part of the Brazos River Watershed. They flow through the City of Round Rock to the San Gabriel River, which then flows to the Brazos watershed basin.

Since high points and ridges define the boundary of a watershed, the boundary of the Colorado River watershed is a good place to view the basin of the Colorado River in Austin. The watershed map shows major streets, and gives a good idea of places to view the entire Austin/Colorado River watershed basin. On IH 35 just south of Onion Creek (#20 on the map) is the southern boundary, or high point, of the watershed, while the northern boundary is located on Burnet Road north of Wells Branch Parkway. The largest water tower in the world marks this high point, and was placed there because the rest of northern Austin is located downhill, allowing water flow to rely on gravity.

In this lesson, students will use map skills to locate watersheds and interpret information, identify the watershed where they live and go to school, and understand through building a puzzle how all land is in a watershed. The "Extension," and activities during Earth Camp will teach students that when it rains, rainwater washes trash, excess fertilizer, pesticides, oil, and other pollutants on the land into the local creek or river. What students and others do in their neighborhood affects their local creek and the Colorado River, which is our drinking water source.

LESSON 2

Description of the class: 5th Grade Social Studies or Science
Length of lesson: One 45 minute class period

I. Overview

A. Students will become familiar with the smaller watersheds in Austin that form the tributaries to the Colorado River. This is important for students to realize that where they live impacts the water in their local creek.

B. Vocabulary

watershed - an area of land that drains water into a particular creek, river, or lake. The boundaries of a watershed are the highest elevation points. The creek flows through the lowest area of the watershed basin.

tributary - a creek, stream, or river that flows into a larger creek, stream, or river.

basin - the entire land area from which a river and its tributaries receive water.

II. Objective

A. Students will be able to:

(1) explain how all land is in a watershed;

(2) explain how all bodies of water have a watershed;

(3) explain that most creeks in Austin flow to the Colorado River, and;

(4) identify their school's watershed.

III. Resources, mateirals and supplies needed

A. Teacher Materials

(1) Major Basins of Texas (map)

(2) Do You Know Your Watershed (poster)

(3) AISD Watersheds (map for projection)

B. Student Materials

(1) AISD Watersheds (map) for each pair of students (non-consumable)

(2) In Kit: 10 watershed puzzle pieces for each group

(3) "Puzzling Watersheds" worksheet for each student

IV. Teacher Preparation

A. Prepare an area for students to build the class watershed puzzle.

B. Hang the Major Basins of Texas map and Do You Know Your Watershed? posters where all students can see and use them.

C. Write vocabulary on the board.

D. Organize students into five groups.

LESSON 2

ENGAGE

Ask students what they know about watersheds? Have students use the hand gesture of putting their two palms together to form a watershed. If it rained on their hands, which represent the land, the water would runoff to the low area near their pinkie finger, collect and form a creek.

(Answer/Review: Watershed means land. High points of the land are the boundaries of a watershed, middle or low area is the creek. Water flows over the land to a creek.)

Ask students to connect their individual watersheds made by their hands to someone else's watershed. (This represents how the creek would drain into a river.)

Critical questions:

- Could litter in your neighborhood's watershed wash into another watershed?
- How?
- If you were trying to locate the litterer, which watershed would you look around first?

EXPLORE

- Project the "AISD Watersheds" map - Give each pair of students a copy of the map.
- **Locate your local watershed -** Colored areas represent an area of land that drains to a creek (watershed). The creek is the blue line flowing through the middle of the watershed.
- **Identify your neighborhood creek** - Use the key at the bottom to locate the watershed for your local creek. Ask students to put a symbol where the school is located and add it to the key at the bottom.
- **Define tributary and basin -** Explain to students every Austin creek has a watershed (or land area that drains to a particular creek), and the creeks are part of the larger Colorado River watershed. The creeks in Austin are tributaries to the Colorado River, which together form the Colorado River Basin. However, sometimes one creek enters a bigger creek before draining into the Colorado River (e.g. Williamson drains into Onion which drains into the Colorado River). Students will be identifying the water body (creek or river) into which each watershed drains.
- **Recharge zone -** Ask the students to use the legend on the map to identify the meaning of the white crosshatch on the map. (represents the Edwards Aquifer recharge zone) The water in this part of the watershed goes underground into the aquifer.
- **Model answers for one watershed piece -** Demonstrate how to use a watershed puzzle piece, the "AISD Watersheds" map, and "Puzzling Watersheds" worksheet to answer questions about a watershed.
- **Do the activity -** Organize students into five groups. Give each student a "Puzzling Watersheds" worksheet and 10 watershed puzzle pieces. Allow students time to work together with their group to identify the characteristics of each watershed piece.

EXPLAIN

- Locate the Colorado River watershed on the Major Basins of Texas map Use the map to explain to students how all land is a watershed, and all bodies of water are surrounded by a land area that drains to it. The major rivers of Texas have large watershed basins. Austin is in the Colorado River watershed basin. Within the Colorado Rver basin, we have many smaller watersheds surrounding tributaries (creeks).

- Watershed Puzzle - Discuss how watersheds fit together like a puzzle. Every piece of land is part of a watershed, and every body of water has a watershed. Creeks, rivers, lakes and oceans are connected, so any water in one part of a creek or river, will eventually flow into connecting rivers, lakes, and the ocean downstream. It is important to keep the creek in your neighborhood clean, because it flows to the Colorado River, where Austin gets its drinking water, and because Bastrop, Smithville, and other cities are downstream.
- Finding the pollution source – Not all watersheds are polluted by a litterer in one watershed. The creek, river or ocean water located downstream is effected. This is helpful to know when investigating the source of pollution.

EVALUATION

On the "Puzzling Watersheds" worksheet, students will identify characteristics of 10 watershed puzzle pieces by name and number, recharge zone, tributary, street and cardinal direction in relation to the Colorado River.

EXTENSION

Putting together the puzzle - When groups finish the worksheet, students can use the "AISD Watersheds" map as a guide to fit the puzzle pieces on the class puzzle. Keep the puzzle at a center for students to use during the rest of the unit.

ELABORATE

Instruct students to use the "AISD Watersheds" map to answer the following:

- Which streets could you travel to get to Barton Creek from your school?
- At a point before Barton Creek watershed, tell the students someone in the car threw trash out the window. Ask students which creek was polluted?
- Ask students if the trash could also pollute the Colorado River/Ladybird Lake? Explain.

LESSON 2
BACKGROUND
LESSON PLANS
WORKSHEETS

WORKSHEET

DIRECTIONS: Use the chart on the back to write your answers.

1. Watershed Number & Watershed Name: Use the AISD Watersheds map to locate each watershed puzzle piece. Write thenumber and name for each watershed.

2. N or S: Locate the Colorado River. Write N if the watershed is located north (above) the Colorado River. Write S if the watershedis located south (below) the Colorado River.

3. Tributary: Most of the creeks in Austin flow to the Colorado River. Sometimes one creek will flow into another creek, but eventually Drain into the Colorado River. Use the AISD Watersheds map to look at each watershed puzzle piece. If the watershed connectsto Lady Bird Lake (which is the Colorado River), write Co. R. If the watershed connects to a creek, write the name of that watershed. If you have #33 or #34, they are tributaries of the Brazos River.

4. Street: Write the name of a street located in each watershed.

5. Recharge: The white crosshatch represents the Edwards Aquifer Recharge Zone. If the watershed has recharge zone, write yes.If not, write no.

6. Put the watershed puzzle pieces together with the class to complete the entire Austin Watershed Puzzle.

WORKSHEET

Group Names:____

Number	Watershed Name	N or S	Tributary	Street	Recharge

HOJA DE PRÁCTICA

INSTUCCIONES: Usa la tabla en el reverse de esta hoja para escribir tus respuestas.

1. Numero y nombre de la cuenca: Usa el mapa de las Cuencas Hidrográficas de AISD para localizar cada pieza del rompecabezas. Escribe el numero y el nombre de cada cuenca.

2. N o S: Localiza el Río Colorado. Escribe N si la cuenca está localizada al norte (arriba) del Río Colorado. Escribe S si la cuenca está localizada al sur (abajo) del Río Colorado.

3. 3. ¿Hacia donde va el arroyo?: La mayoría de las aguas de las cuencas hidrográficas de Austin fluyen o corren hacia el Río Colorado. Algunas veces un arroyo desemboca o lleva sus aguas hacia otro arroyo (tributario), las aguas entonces fluyen hacia el Río Colorado. Usa el mapa de las cuencas de AISD y observa cada pieza de las cuencas. Si la cuenca se conecta o lleva sus aguas a Lady Bird Lake (el cual forma parte del Río Colorado), escribe Co. R. Si la cuenca se conecta a otra cuenca diferente, escribe el nombre de sea cuenca. Si tienes # 33 o #34, estas llevan sus aguas o corren hacia el Río Brazos.

4. Calle: Escribe el nombre de la calle en donde está localizada cada cuenca.

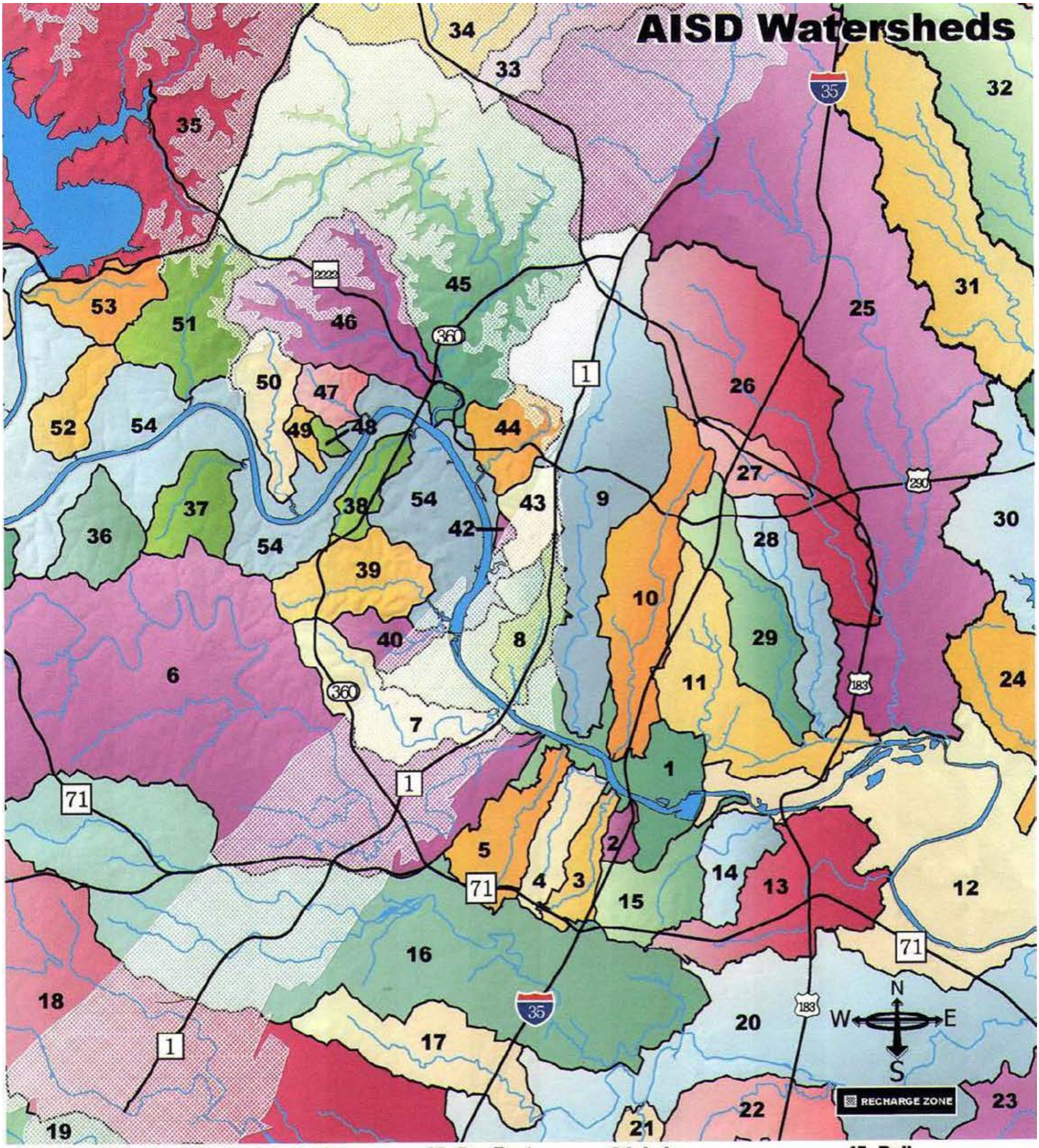
5. Zona de Recargo: El área sombreada con líneas que se entrecruzan representa la Zona de Recargo del Acuífero Edwards. Si la cuenca tiene una zona de recargo, escribe Si. Si no, escribe No.

6. Coloca las piezas del rompecabezas de las cuencas junto con las de la clase para completar el Rompecabezas de las Cuencas Hidrográficas de Austin.

HOJA DE PRACTICA

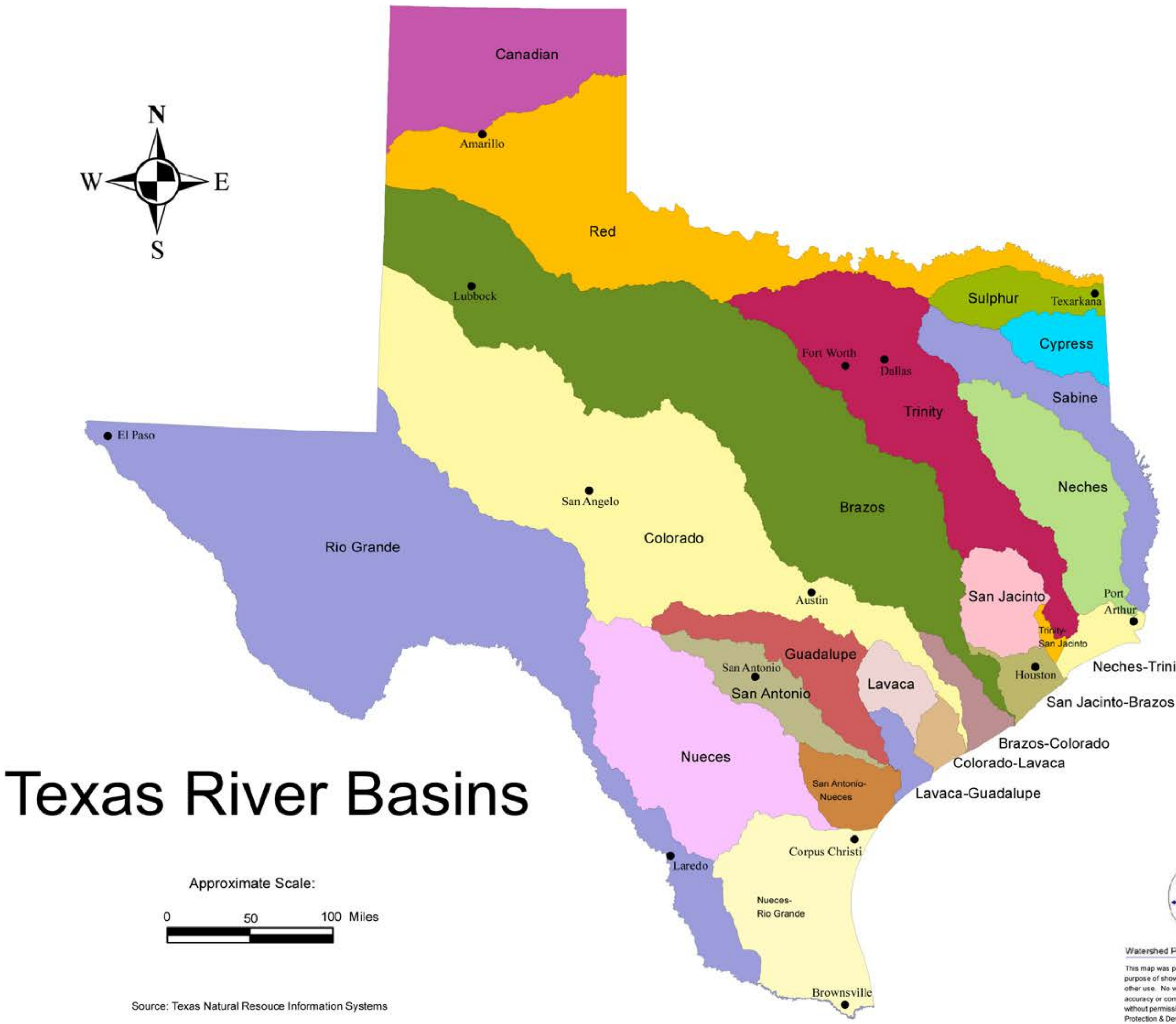
Nombres:____

Número	Nombre de la cuenca	N o S	¿Río Tributario?	Calle	¿Zona de Recargo?



1. Town Lake
2. Harpers Branch
3. Blunn
4. East Bouldin
5. West Bouldin
6. Barton
7. Eanes
8. Johnson
9. Shoal
10. Waller
11. Boggy
12. Colorado River
13. Carson
14. East Country Club
15. West Country Club
16. Williamson
17. South Boggy
18. Slaughter
19. Bear
20. Onion
21. Marble
22. Cottonmouth
23. Dry East
24. Elm
25. Walnut
26. Little Walnut
27. Buttermilk
28. Fort
29. Tannehill
30. Decker
31. Harris Branch
32. Gilleland
33. Rattan
34. Lake
35. Lake Travis
36. Commons Ford
37. Cuernavaca
38. St. Stephens
39. Bee
40. Little Bee
41. Taylor Slough South
42. Hucks Slough
43. Taylor Slough North
44. Dry North
45. Bull
46. West Bull
47. Coldwater
48. Hog Pen
49. Connors
50. Turkey
51. Panther Hollow
52. Steiner
53. Bear West
54. Lake Austin

Texas River Basins



Source: Texas Natural Resouce Information Systems

Watershed Protection & Development Review

This map was produced by the City of Austin for the sole purpose of showing Texas river basins and is not for any other use. No warranty is made by the City regarding its accuracy or completeness. Reproduction is not permitted without permission from: City of Austin - Watershed Protection & Development Review.

LESSON 3

BACKGROUND

Aquifers are underground rock layers that store groundwater. The most common aquifers are made up of sand, gravel, or limestone. The Edwards Aquifer in Austin is formed from layers of limestone. Some layers of the limestone are easily dissolved by water, creating holes, channels and caves. This can create a type of land surface called karst. A karst area has many sinkholes, caves and underground channels that can store a lot of water. The limestone that forms a karst area is very porous and appears 'honeycombed'. Karst aquifers are especially susceptible to pollution because the openings on the surface (sinkholes, cave openings, cracks, and fractures) can be direct conduits to the aquifer, allowing water to flow into the aquifer without any filtration through the soil.

There are three major zones in the aquifer:

The contributing zone: watersheds upstream of a recharge zone whose creeks and rivers flow downstream to the recharge zone

The recharge zone: land with caves, sinkholes, cracks and fractures that rainwater and streamflow drain through to an aquifer

The confined zone: area of land where the aquifer is capped by clay or shale so the groundwater is under pressure

Water from the Edwards Aquifer is usually crystal clear and cold. However, because water moves quickly through the limestone cavities, there is little filtering to remove pollutants. Water must enter the aquifer clean to come out clean at the springs.

LESSON 3

Description of class: 5th Grade Science
Length of lesson: One 45 minute class period

I. Overview

A. Students will compare the earth materials that comprise the Edwards Aquifer to other types of earth materials that form aquifers. This is important for students to understand that water flowing though the Edwards Aquifer karstic aquifer does not filter pollution.

B. Vocabulary

aquifer – an underground layer of earth, gravel or rock that holds water. The Edwards Aquifer is an underground system of caves, cracks and openings that channel water underground through the passages in the rock.

karst – an area of land that has caves, sinkholes, and underground drainage. The Edwards Aquifer is a karst aquifer.

II. Objectives

The students will be able to:

(1) identify three types of earth materials that can form aquifers (sand, soil, and karstic limestone);

(2) describe the differences in flow rates through the three types of aquifers; and

(3) explain why a karstic aquifer does not filter pollution

III. Resources, materials and supplies needed

A. Teacher Materials

(1) In Kit: karstic limestone

B. Student Materials for each group of 6 students

(1) "Aquifer Research" (group labsheet for each group)

In Kit:

(2) 3 clear plastic bottles (cut in half and marked #1, #2, #3)

(3) 3 paper coffee filters

(4) 1 bottle of "pollution" (food coloring)

(5) 1 quart bag each of rocks, soil, and sand

(6) 100 ml beaker for measuring water

IV. Teacher Preparation

A. Become familiar with the materials that each group will need.

B. Make copies of the Aquifer Research labsheet for each group.

LESSON 3
BACKGROUND
LESSON PLANS
WORKSHEET

LESSON 3

ENGAGE

Explain to students that they will be conducting research on what earth materials best filter pollution underground. Show students a sample of karstic limestone. Define karst. Explain that the aquifer in Austin is made of karstic limestone.

Critical questions:

- What other types of earth materials hold groundwater in enough quantities to form an aquifer?
- How would different earth materials affect the groundwater flow?
- Which earth material do you think will filter pollution the best? Why?

EXPLORE

- **Work in cooperative groups -** Divide students into groups of six. Give each group a copy of the Aquifer Research labsheet. Help students assign each person in the group a job: POLLUTION MANAGER, WATER MANAGER, TIME KEEPER, RECORDER (READER), MATERIALS MANAGER, PRESENTER. Explain that the RECORDER will read the instructions that will tell them what to do at a given time.
- **Distribute Materials -** Pass out lab materials to each group. Assist students in setting up the examples of the three aquifers correctly.
- **Form a hypothesis –** The teacher will read the instructions for forming a hypotheses. The group will discuss and the RECORDER will write the hypothesis agreed upon by their group on the "Aquifer Research" labsheet. Students should not start the experiment until the hypothesis is finished.
- **Run the flow rate section of the experiment -** The WATER MANAGER uses the beaker to add 100 mL of water to the #1 aquifer (pour all at once). The TIMEKEEPER keeps track of seconds until all the water has come through (dripping doesn't count as flow). Repeat this procedure for #2 and #3 aquifer. The RECORDER will write the results on the "Aquifer Research" labsheet.
- **Run the pollution section of the experiment -** The POLLUTION MANAGER uses red food coloring to add 3 dropperfuls (not individual drops) to each aquifer model. The RECORDER will write the results on the "Aquifer Research" labsheet.
- **Conclusions -** Ask the PRESENTER from each group to describe which aquifer is the worst filter of pollution and why.
- **Clean Up -** The MATERIALS MANAGER washes out the plastic bottles and aquifer rocks and returns all materials except the used sand and soil to the kit.

EXPLAIN

Spaces between the individual pieces of earth material vary in size. In soil, the spaces are so tiny it usually requires a microscope to see them. The spaces between sand particles are usually a little bigger than those found in soil, but can still be difficult to see without a microscope. The spaces that form in the Edwards Limestone can be as big as a cave and are easily observed! The large spaces of the Edwards Aquifer are represented by the large spaces between the stones. The spaces between a type of earth material are called pores. The smaller the pore size, the greater the water filtration. The bigger the pore size, the less water filtration. The Edwards Aquifer in Austin has big pore spaces. Does it filter water pollution well? (no)

EVALUATION

Collect the completed "Aquifer Research" labsheet .

INTEGRATED ACTIVITY

"A Journey Through the Edwards Aquifer" DVD

WORKSHEET

Directions: Write your name by your job description.
Follow the directions to complete the lab.

RECORDER: ____

MATERIALS MANAGER: ____________________________________

TIMEKEEPER: ____

WATER MANAGER: ____

POLLUTION MANAGER: ____________________________________

PRESENTER: ____

RECORDER: Read out loud to the group the question: What natural materials such as sand, rocks and soil are best for keeping underground water clean by keeping pollution out of the aquifer?

Talk over with the group answer to the question and fill in your hypothesis:

We think that (circle one) sand soil rock will be the most effective filter of pollution in an aquifer.

Read out loud to the group the following: We are now going to conduct an experiment to test our hypothesis. We will compare Austin's Edwards Aquifer (#1) the Miami Sand Aquifer (#2) and the Oklahoma Soil Aquifer (#3) to see which materials are the best pollution filter.

MATERIALS MANAGER: Put the lids marked #1, #2, #3 upside down into the bottoms of the bottles. Place a paper filter in each one.

In #1 place rocks into the filter. This represents the karstic limestone of the Edwards Aquifer in Austin.

In #2 place sand into the filter. This represents the Miami Sand Aquifer.

In #3 place dirt into the filter. This represents the Oklahoma Aquifer.

FLOW RATES

TIMEKEEPER AND WATER MANAGER: Work together. The WATER MANAGER uses the beaker to add 100 ml of water to the first container #1 (all at once), while the TIMEKEEPER keeps track of seconds until all the water has come through the container. Dripping does not count as flow.

RECORDER: Write down the number of seconds for each container as reported by the TIMEKEEPER.

#1__________ sec. #2____________ sec. #3___________ sec.

Do you think a slow flow rate or a fast flow rate filters pollution better? Why?

____

____

POLLUTION SENSITIVITY

POLLUTION MANAGER: Take the bottle of pollution (food coloring). Add three full droppers to each aquifer.

ALL SCIENTISTS: Work together to describe how much pollution entered the aquifer in each container.

RESULTS: Recorder writes the answers.

#1 Edwards Aquifer (rock)____

#2 Miami Aquifer (sand)____

#3 Oklahoma Aquifer (soil)____

CONCLUSIONS: We studied three aquifers to see which earth material is the best filter for pollution. Based on our research, we found the following:

#1 Edwards Aquifer (rock)

____

#2 Miami Aquifer (sand)

____

#3 Oklahoma Aquifer (soil)

____

Our original HYPOTHESIS was that ________________ was the best filter of pollution.

In our experiment we found that _______________ is the best filter of pollution in an

aquifer. We believe that the people who live in the _____________ Aquifer have to be

the most careful with their pollution because __________________________________

____.

HOJA DE PRÁCTICA

Instrucciones: Escribe tu nombre junto al título de tu trabajo.
Sigue las instrucciones de la investigación.

Anotador: ______________________________

Encargado de los materiales: ______________________________

Encargado del tiempo: ______________________________

Encargado del agua: ______________________________

Encargado del contaminante: ______________________________

Presentador(a): ______________________________

Anotador: Lee la pregunta en voz alta al grupo: De los materiales naturales tales como arena, piedras y tierra, ¿cuál sirve mejor para impedir la contaminación del acuífero y mantener pura el agua subterránea?

Comenta la respuesta con el grupo y escribe la hipótesis:

Pensamos que la (marca una) ____arena ______tierra ____piedra

es el mejor filtro contra la contaminación de un acuífero.

Lee en voz alta lo siguiente al grupo: Ahora vamos a hacer un experimento para comprobar nuestra hipótesis. Compararemos el Acuífero Edwards de Austin (#1) con el Acuífero Miami (#2) y el Acuífero Oklahoma (#3) para determinar cuál de los materiales es el mejor filtro contra la contaminación.

Encargado de los materiales: Pon las tapas #1, #2 y #3 boca abajo dentro de la base de las botellas. Pon un filtro de papel en cada una.

Pon las piedras en el filtro #1. Esto representa la caliza cársica del Acuífero Edwards de Austin.

Pon la arena en el filtro #2. Esto representa al Acuífero Miami.

Pon la tierra en el filtro #3. Esto representa al Acuífero Oklahoma.

Encargados del tiempo y del agua: Trabajen juntos. El estudiante encargado del agua vacía 100 ml de agua al recipiente #1 (toda el agua a la vez), mientras que el encargado del tiempo cuenta hasta que toda el agua pasa por el filtro.

Repite el mismo proceso con los recipientes #2 y #3.

Anotador: Anota el número de segundos para cada recipiente según contó el encargado del tiempo.

#1 = ________segundos   #2 = ________segundos   #3 = ________segundos

Encargado del contaminante: Agrega 3 goteros llenos de contaminante (colorante de alimentos en la botella pequeña) a cada acuífero.

Todos los científicos: Trabajen juntos para describir la cantidad de contaminante que entró en cada acuífero.

Anotador(a): escribe las respuestas:

#1 Acuífero Edwards (piedras) ____

#2 Acuífero Miami (arena) ____

#3 Acuífero Oklahoma (tierra) ____

Conclusiones: Estudiamos tres acuíferos para saber cuál material terrestre es el mejor filtro para la contaminación. Basándonos en nuestra investigación, descubrimos lo siguiente:

#1 Acuífero Edwards (piedras)

_______________________________ _______________________________________

#2 Acuífero Miami (arena)

_______________________________ _______________________________________

#3 Acuífero Oklahoma (tierra)

_______________________________ _______________________________________

Nuestra hipótesis original decía que la ________________ era el mejor filtro contra l

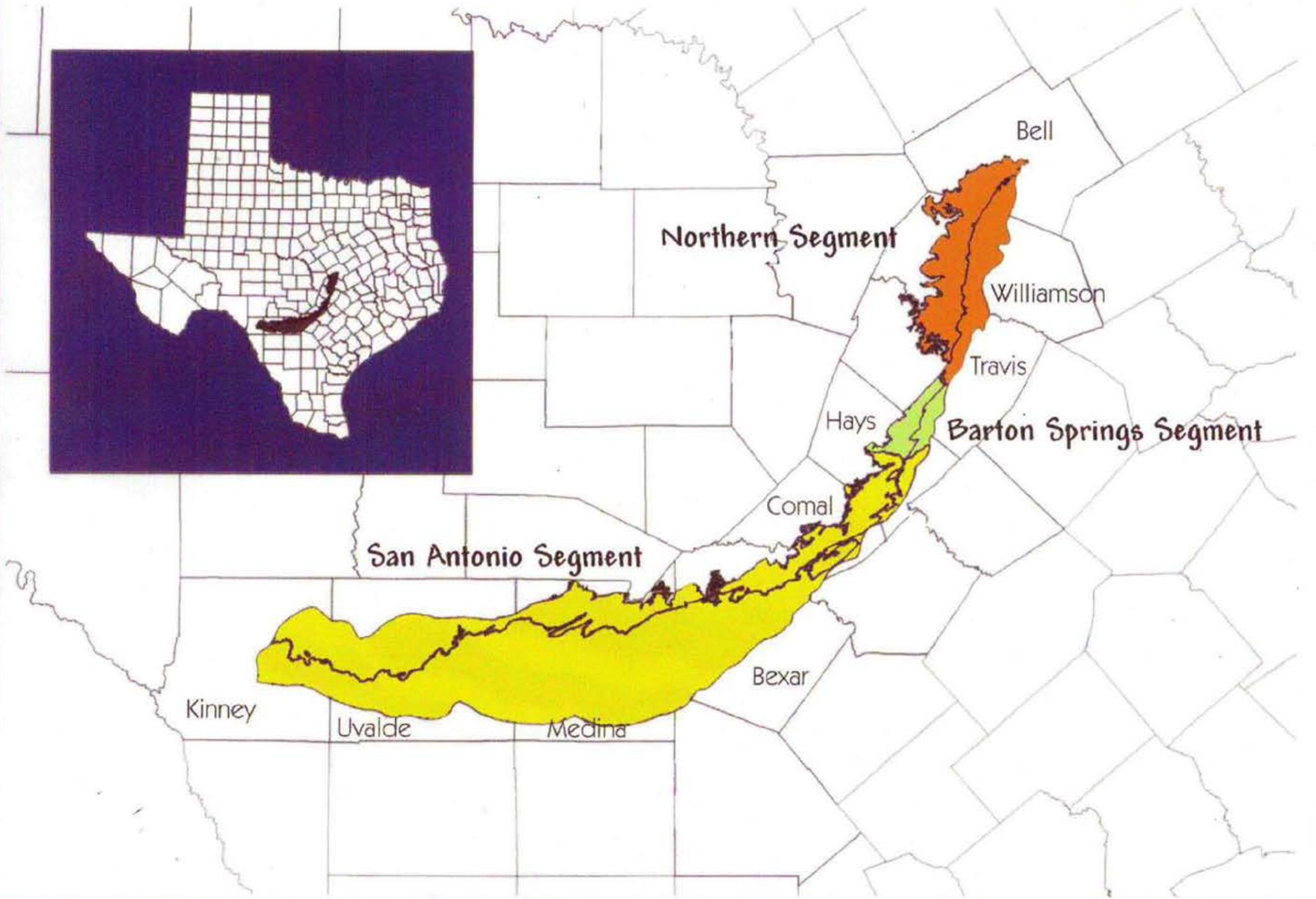
a contaminación. En nuestro experimento descubrimos que la_____________ es el

mejor filtro contra la contaminación del acuífero. Creemos que las personas que viven

en el Acuífero _________________________tienen que tener más cuidado con la

contaminación porque ____

EDWARDS AQUIFER REGIONAL MAP



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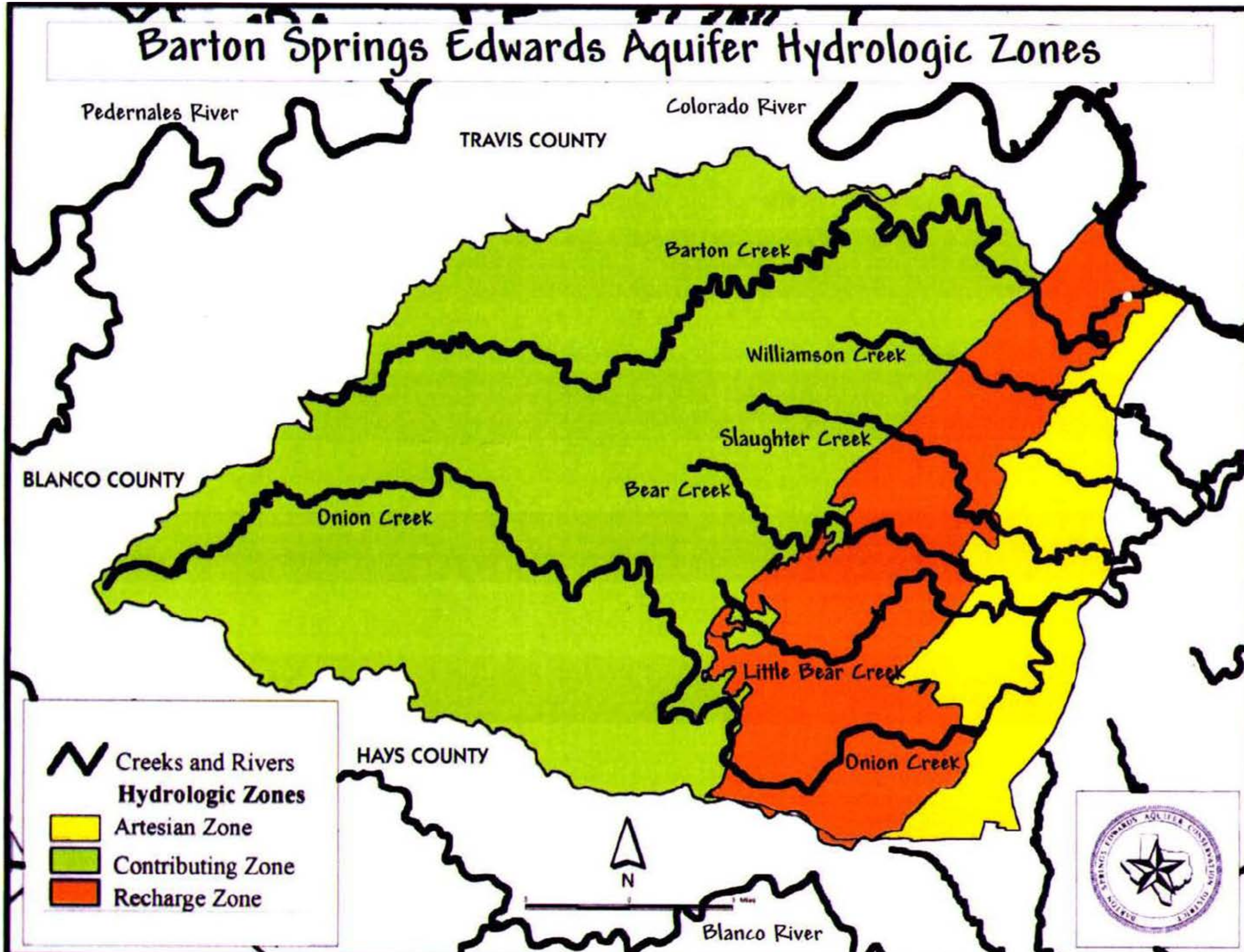

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Web: www.acornnaturlists.com

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Web: www.lamotte.com
elementary chemical water tests

ENDANGERED SPECIES:

Project WILD
Texas Parks and Wildlife Department
4200 Smith School Road
Austin, Texas 78744
Contact: Project WILD Coordinator
Phone: (512) 328-6035
TPWD Website: www.tpwd.state.tx.us

Wild Basin Preserve
805 North Capital of Texas Highway
Austin, Texas 78746
Phone: (512) 327-7622
Website: www.wildbasin.org

National Wildlife Foundation
Website: www.nwf.org

HOUSEHOLD HAZARDOUS WASTE EDUCATION:

Beat the Baron Waste
Lower Colorado River Authority
Phone: (512) 473-3200
McKinney Roughs Workshops
LCRA Website: www.LCRA.org

PLANT EDUCATION:

National Wildflower Research Center
4801 La Crosse Avenue
Austin, Texas 78739
Phone: (512) 292-4200
Website: www.wildflower.org

Project Learning Tree
Contact: Cheryl Stanco
Texas Forestry Assn.
PO Box 1488
Lufkin, TX 75901
Phone: 936-632-8733
Fax: 936-632-9461
Email: cstanco@texasforestry.org
Web: www.plttexas.org

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Keep Austin Beautiful (KAB)
www.keepaustinbeautiful.org/educate
Phone: (512) 391-0617

WATER EDUCATION:

Aquatic WILD
Texas Parks and Wildlife Department
4200 Smith School Road
Austin, Texas 78744
Contact: Project WILD Coordinator
Phone: (512) 328-6035

City of Austin – Watershed Protection Department
Phone: (512) 974-2550
Website: www.austintexas.gov/watershed/youthed

The Pondwater Tour
LaMotte Company
Phone: 1-800-344-3100
Website: www.lamotte.com

Project WET Texas

PROFESSIONAL ORGANIZATIONS

Science Teachers Association of Texas (STAT)
(Coordinates CAST, Conference for the Advancement of Science Teaching)
STAT
P.O. Box 4828,
Austin, TX 78765
(512) 451-STAT [7828]
Website: www.statweb.org

Texas Association for Environmental Education (TAEE)
Website: www.statweb.org/TAEE/