Earth Camp

Austin, Texas

If you can not view the video or need more info, go to
www.austintexas.gov/earthcamp

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.

Earth Camp

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Austin Independent School District

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FUNDING

City of Austin Watershed Protection Department

Before Teaching the Curriculum:

1. Give the *Pretest*.

Before Earth Camp Begins:

1. Order buses at least 10 working days before Earth Camp. Choose Earth Camp Four Day in AISD Webtrips. Enter your start date and end date. That should take care of it!
2. Teach the curriculum. Send home:
   » *Student Waiver*
   » *Parent Letter*
   » *Schedule*
   » *Picture of Poison Ivy*
3. Make nametags.
4. Teach Earth Camp Rules and Trash Reducing, Reusing, Recycling.

Day 1 Morning:

The director will meet you at the field trip site at 9:30 a.m.

1. Collect City of Austin Waivers for each student and adult participants and bring to
2. Earth Camp. NO WAIVER - NO CAMP - NO EXCEPTIONS!
3. Bring pretests.
4. Check that each student has a bottle of water.
5. Pack lunches and drinks in coolers. (Use your school's coolers.)
6. Put on nametags.
7. Distribute and allow students to change into Earth Camp T-shirts.
8. Review Earth Camp Rules.
9. Take a restroom break.
10. Load the bus by 9:00 a.m. to arrive at the site by 9:30 a.m.

Day 2 - 4 Mornings:

The director will meet you at the field trip site at 9:30 a.m.

1. Give 3 stamps for completed homework.
2. Finish journaling about previous day's activities and review Earth Camp Rules.
3. Review the Day's Schedule.
4. Make sure students have nametags and water.
5. Collect waivers from new students or volunteers.
6. Pack lunches and drinks in coolers.
7. Bring Earth Camp Stamps.
8. Take a restroom break.
9. Load the bus by 9:00 a.m. to arrive at the site by 9:30 a.m.

Susan Wall, Earth Camp Director
cell phone: 512-751-7999,
office: 512-974-6571

Earth Camp

Rules

1. Leave the environment cleaner than you found it.
2. Keep the animals, trees, leaves, plants, rocks, land, and each other unharmed.
3. Stay with the group.
4. Respect supervising adults.
5. Participate in the lessons.
6. Return all equipment.
7. Follow the rules of AISD buses.

Reglas

1. Deja el medio ambiente más limpio de lo que estaba.
2. No maltrates animales, árboles, hojas, plantas, rocas, terreno o a ninguno de tus compañeros.
3. Quédate siempre con el grupo.
4. Respeta a los adultos que te cuidan.
5. Participa en las lecciones.
6. Devuelve todo el equipo que usaste.
7. Obedece las reglas en los autobuses de AISD.

Information:
Picking up trash correctly will be rewarded with Earth Camp stamps.

IMPORTANT! - PICK UP TRASH ONLY IF IT IS SAFE.

- Do not touch hazardous trash
  (needles, syringes, firearms, chemicals, dead animals, sharp objects, broken glass, etc.) Tell the Earth Camp Leader.
- Never put your hands into an area that is not visible
- Other trash to avoid
  If you have to hike away from the group, wade into deep water, or the trash is too nasty to pick up, leave it.
- If you are unsure, ASK!
  (Earth Camp leader, teacher, or parent volunteer)
  Picking up unsafe trash will not earn you a stamp.

IMMEDIATELY PUT THE TRASH IN THE EARTH CAMP TRASH BAG. Carrying the trash bag will earn extra stamps. Be sure to keep your hands out of your mouth and away from eyes and ears until you are at a place where you can wash. Hand sanitizer will be available every day at lunchtime. Use it!!

ZERO WASTE IDEAS FOR LUNCH:

Recycle:
Tin cans, aluminum cans, aluminum foil, plastic, brown lunch sacks.

Reuse:
Brown lunch sacks, plastic bottles that are designed like a water bottle, sandwich bags.

Reduce:
Use a reusable lunch kit, reuse your sack, make a sandwich rather than buying prepackaged food.

Throw in the trash: Milk cartons, any remaining food,

NOTA: El recoger la basura correctamente se recompensa con estampillas de Earth Camp.

¡IMPORTANTE! – Recoge la basura solo si extremas tu seguridad.

- NO TOQUES BASURA PELIGROSA: agujas, jeringas, armas de fuego, químicos, animales muertos, objetos puntiagudos, vidrios rotos, etcétera. INFÓRMALE A TU LIDER DE EARTH CAMP.
- NUNCA INTRODUZCAS TUS MANOS EN UN ÁREA QUE NO SEA VISIBLE.
- EVITA ESTA BASURA: si tienes que caminar lejos del grupo, adentrarte en aguas profundas o si la basura es bastante desagradable. ¡DÉJALA DONDE ESTA!
- SI NO ESTAS SEGURO/A, ¡PREGUNTA! a tu líder de Earth Camp, a tu maestro, o a cualquiera de los padres voluntarios. Perderás tu estampilla si recoges basura peligrosa.

DEPOSITA LA BASURA INMEDIATAMENTE EN LA BOLSA PARA BASURA DE EARTH CAMP. Si cargas la bolsa de la basura te ganaras más estampillas. Asegúrate de mantener tus manos lejos de tu boca, de tus ojos y oídos hasta que llegues a algún lugar donde puedas lavártelas. El desinfectante de manos siempre estará disponible durante la comida. ¡Úsalo!

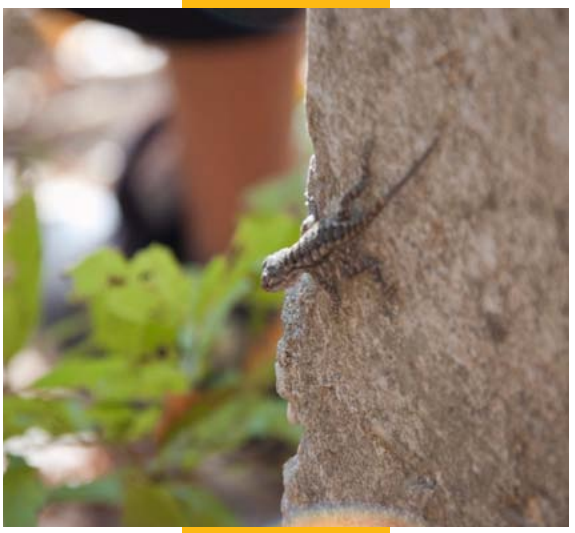
IDEAS PARA UNA COMIDA CON CERO BASURA:

RECICLA: las latas, papel aluminio, plástico reciclable y bolsas de papel para llevar la comida.

VUELVE A USAR: bolsas para llevar comida, botellas de plástico especiales para llevar tu agua, bolsas de emparedados.

REDUCE: el uso de cajas de comida desechable, vuelve a usar tu bolsa de comida, prepárate un emparedado en vez de comprar comida ya empaquetada.

MANDA AL BOTE DE LA BASURA: los cartones de leche, sobras de comida y bolsas de plástico no reciclables.



Earth Camp

DATE _____

Dear Parents,

Earth Camp is the City of Austin Watershed Protection Department's award-winning outdoor, environmental education program partnered with AISD. Your child has the opportunity to attend Earth Camp the week of _____.

Students attending Earth Camp travel to outdoor sites and participate in environmental science activities. Preparing your child for the challenges of the outdoors will contribute to a safe and fun learning experience. The following is a list of the possible risks, and suggestions for planning.

Waiver:

"The City of Austin Release of Liability" form attached to this letter must be completed, signed, and returned before the week of Earth Camp for your child to be allowed to attend. If you do not wish your child to participate, the classroom teacher will make alternative arrangements.

Poisonous Plants:

Use the drawings provided with this letter to help your child identify and avoid Poison Ivy.

Wildlife:

Austin has various types of wildlife: snakes, coyotes, ticks, spiders and other potentially dangerous animals. Students are taught appropriate behavior for animal encounters, and first-aid kits are carried to all sites. Bug repellent (especially around the ankles where chiggers like to bite) will help protect your child from bug bites.

Traffic:

AISD provides bus service for Earth Camp. Bus drivers are instructed to park so students do not have to cross a road; however, traffic can still present a danger. Please emphasize to your child to stay with the group at all times, walk on the grassy side of the road (off of the street), and follow directions, particularly when in an area where cars travel. Your child should never cross a street without adult supervision.

Clothing:

The students will do a lot of walking. Some of the natural areas have rocky, uneven trails. Tuesday students will wade in the water. A comfortable pair of walking shoes is recommended. Tuesday students should wear shoes that can get wet. Send a dry pair for changing. The Earth Camp T- shirt should be worn daily.

Weather:

Earth Camp goes on rain or shine (unless it is a dangerous storm). Prepare your child for the outdoors: warm or cool clothing, raincoat, sunscreen, bug repellent, water, and one sport drink.

Food:

Send a lunch everyday of Earth Camp. No sodas please!

Rules:

Students earn rewards for following directions. If rules are broken and/or behavior presents a danger, the student will be sent back to school. The school will make alternative arrangements for a student that has lost the privilege to attend Earth Camp.

Earth Camp Rules:

1) Leave the environment cleaner than you found it; 2) Keep the animals, trees, leaves, plants, rocks, land, and each other unharmed; 3) Stay with the group; 4) Respect supervising adults; 5) Participate in the lessons; 6) Return all equipment; and 7) Follow the rules of AISD buses.

Supervision:

The City of Austin provides the leader for Earth Camp (an experienced classroom and outdoor educator), and additional expertise and assistance for selected activities. Your child's classroom teacher has gone through six hours of training and will assist with camp. Additional supervision is helpful. Please plan to attend a day at Earth Camp with your child's class if possible. Your help would be appreciated, and you might enjoy Earth Camp as much as your child!

Questions? If you want more information, call the Earth Camp Director at 512-974-2550.

We hope to see you and your child at Earth Camp!

Sincerely,

Susan Wall

Earth Camp Director

_____,

Teacher

FECHA _____
Estimados padres de familia:

El Campamento Tierra (Earth Camp) es el programa premiado por sus actividades al aire libre y educación sobre la calidad del agua de la Ciudad de Austin, Departamento de Protección de Cuencas en asociación con AISD. Su hijo/a tiene la oportunidad de asistir al campamento la semana de _____ _____.

Los estudiantes que asistan al Campamento Tierra (Earth Camp) viajaran a sitios al aire libre y participaran en actividades científicas sobre el medio ambiente. El preparar a su hijo para los retos de la naturaleza le ayudará a tener una experiencia de aprendizaje segura y divertida. A continuación encontrará una lista de riesgos posibles y sugerencias para evitar esos riesgos y planear la excursión.

Dispensa:

Adjunto a ésta carta encontrará la forma de "Liberación de Responsabilidad a la Ciudad de Austin" la cual debe ser completada, firmada y regresada antes de la semana del Campamento Tierra (Earth Camp) para que su hijo/a pueda asistir. Si usted no desea que su hijo/a asista al Campamento Tierra, el/la maestro/a de su clase hará arreglos alternativos.

Plantas Venenosas:

Utilice los dibujos incluidos en esta carta para ayudar a su hijo/a a identificar y evitar contacto con la Hiedra Venenosa (poison ivy).

Fauna:

Austin tiene varios tipos de fauna: serpientes, coyotes, garrapatas, arañas y otros animales potencialmente peligrosos. A los estudiantes se les enseña cómo reaccionar y comportarse al encontrarse con animales. Además, siempre tendremos con nosotros un estuche de primeros auxilios. El repelente para insectos, (especialmente alrededor de los tobillos, donde las garrapatas acostumbran picar), protegerá a su hijo/a contra las picaduras de insectos.

Tráfico:

AISD nos proporcionará el servicio de autobuses para el Campamento Tierra (Earth Camp). Los choferes de los autobuses tienen instrucciones de estacionarse de manera que los estudiantes no tengan que cruzar ninguna calle, sin embargo, el tráfico siempre representará un peligro. Por favor enfatícele a su hijo/a el permanecer siempre con el grupo, que camine en la parte de la calle que tiene césped (lejos del tráfico) y que siga las instrucciones, particularmente cuando se encuentre en un área donde circulan los autos. En ningún momento su hijo/a deberá cruzar la calle sin la supervisión de un adulto.

Ropa:

Los estudiantes caminarán mucho. Algunos de los caminos son rocosos y disparejos. Se les recomienda que usen zapatos cómodos para caminar. El martes los estudiantes caminaran en el agua. Ese día deben usar zapatos que se puedan mojar. Por favor mande un par de zapatos extras para que se puedan cambiar después de la actividad. Deben usar la camiseta del Campamento Tierra (Earth Camp) cada día.

Clima:

El Campamento Tierra (Earth Camp) se llevará a cabo si esta asoleado o lloviendo (y solo se suspenderá si hay riesgo de una tormenta peligrosa). Sus hijos deben de ir preparados para las actividades al aire libre. Asegúrese de enviarles ropa adecuada para el clima frio o caliente, impermeable, paraguas, bloqueador solar, repelente de insectos, agua, y una bebida que contenga electrólitos, de la que toman los deportistas.

Comida: Envíele a su hijo/a comida para cada día del Campamento Tierra (Earth Camp) de lunes a jueves. ¡Por favor no les mande refrescos o bebidas gaseosas.

Reglas: Los estudiantes ganarán premios por seguir instrucciones. Si su hijo/a rompe las reglas y/o su comportamiento representa un peligro, será enviado de regreso a la escuela. La escuela hará arreglos alternativos para cualquier estudiante que haya perdido el privilegio de asistir al Campamento Tierra (Earth Camp).

Reglamentos de Earth Camp: 1) Deja el medio ambiente más limpio de como estaba; 2) No maltrates los animales, los árboles, las hojas, las plantas, las rocas, el terreno o a ninguno de tus compañeros; 3) Permanece siempre con el grupo; 4) Respeta a los adultos que te cuidan; 5) Participa en las lecciones; 6) Devuelve todo el equipo que usaste; 7) Obedece las reglas de los autobuses de AISD.

Supervisión: La Ciudad de Austin proveerá al líder del Campamento Tierra (Earth Camp) (el cual es un instructor con experiencia en actividades del salón y al aire libre), así como asistencia adicional para actividades selectas. El maestro/a de su hijo/a ha asistido a un entrenamiento de 6 horas y nos asistirá en el campamento. Cualquier supervisión adicional será de gran ayuda. Si le es posible, por favor acompáñenos por lo menos a un día del Campamento Tierra (Earth Camp). ¡Apreciaremos muchísimo su ayuda y estamos seguros que usted disfrutará del Campamento Tierra (Earth Camp) tanto como su hijo/a!

Si tiene preguntas o desea mayor información, por favor comuníquese con el Director del Campamento Tierra (Earth Camp) al número telefónico 512-974-2550.

¡Esperamos verlos a usted y a su hijo/a en el Campamento Tierra (Earth Camp) Atentamente,

Susan Wall

Director del Campamento Tierra (Earth Camp)

_____

Maestro/a

CAMPERS and HIKERS BEWARE!

Poison Ivy

CAMPERS and HIKERS BEWARE!

City of Austin
Founded by Congress, Republic of Texas, 1839
Watershed Protection Department
P.O. Box 1088, Austin, Texas 78767

EARTH CAMP - Student Participation Form

School Name: _____ Teacher: _____

Participant: _____ Age: _____

Address: _____ Zip Code: _____

Parent or Guardian: _____

Home Phone: _____ Daytime Phone: _____

The staff of Earth Camp Austin takes every precaution to make its program as safe as possible. Please fill out the following information as additional protection for your child.

Does your child wear glasses or contacts? _____

List any condition that could restrict activities: _____

_____

List any allergies (including foods, insect bites/stings): _____

Doctor's Name: _____ Phone: _____

In case of emergency, contact: _____

PERMISSION/ RELEASE OF LIABILITY

I understand that participation in Earth Camp Austin involves certain inherent risks and potential hazards which can occur with any outdoor activity and which I have considered and knowingly assume. I believe my child, _____, to be capable of safely participating in Earth Camp Austin. In consideration of my child's participation in Earth Camp Austin, I the undersigned hereby release the City, its employees and agents, from any action, claim or demand on my child's behalf for personal injury or property loss: (1) arising from or due to any negligent act or omission of the City while participating in Earth Camp Austin or while traveling to or from Earth Camp Austin activities, or (2) arising from the recording and use of the child's likeness/voice/image, if permitted. I hereby give permission for any emergency medical treatment, operation, or anesthesia which might become necessary. I agree to be responsible for the expense of medical treatment or service.

____Check here if you DO NOT give permission for recordings or pictures of my child made during participation in Earth Camp Austin to be used in whole or after editing by the City in connection with Earth Camp or similar City programs, including without limitation use in advertisements, promotions, publicity, and marketing.

Signature: _____ Date: _____

Parent/guardian of _____, a minor

Ciudad de Austin

Fundada por el Congreso, República de Texas, 1839
P.O. Box 1088, Austin Texas 78767

Earth Camp

Formulario de participación de estudiantes

EARTH CAMP - Formulario de participación de estudiantes

Nombre de la Escuela: _____Maestro(a):_____

Nombre del Participante: _____ Edad: _____

Dirección: _____ Código Postal: _____

Padre de familia o tutor: _____

Teléfono (casa): _____ Teléfono (día): _____

El personal de *Earth Camp Austin* toma todas las precauciones necesarias para que el programa sea lo más seguro posible. Sírvase dar la siguiente información como protección adicional para su hijo.

¿Usa su hijo anteojos o lentes de contacto? _____

Anote cualquier condición médica que pudiera limitar sus actividades: _____

Anote cualquier alergia a (alimentos o picaduras de insectos): _____

Nombre de su médico: _____ Teléfono: _____

En caso de emergencia, comunicarse con: _____

LIBERACIÓN DE RESPONSABILIDAD

Entiendo que la participación en *Earth Camp Austin* implica riesgos y peligros que pueden ocurrir en cualquier actividad al aire libre. He considerado los mismos y asumo la responsabilidad. Considero que mi hijo/a, _____, tiene la capacidad para participar en forma segura en *Earth Camp Austin*. En consideración a la participación de mi hijo/a en *Earth Camp Austin*, yo, el/la signatario/a, por medio del presente documento libero a la Ciudad, sus empleados y agentes, de toda acción, reclamo o demanda legal en representación de mi hijo/a, por cualquier daño a su persona, o a los artículos de su propiedad, ocasionado: (1) por cualquier acto u omisión negligente de la Ciudad durante su participación en *Earth Camp Austin*, o al viajar de ida y vuelta a las actividades de *Earth Camp Austin*, o (2) debido a la grabación de voz, y el uso de la fotografía de mi hijo/a, (de haber otorgado el permiso). Por medio del presente documento, doy mi autorización para que mi hijo/a reciba cualquier tratamiento médico, cirugía o anestesia que sea necesario en caso de emergencia. De la misma forma manifiesto que acepto la responsabilidad de pagar los gastos del servicio, o tratamiento médico.

_____ Por favor marque en la línea si usted NO AUTORIZA las grabaciones, o fotografías de su hijo durante su participación en Earth Camp Austin para que sean usadas en su forma original o parcial después de ser editadas por la Ciudad en conexión con *Earth Camp* Austin, o programas similares de la Ciudad, incluyendo pero sin limitación en anuncios publicitarios, promociones y comercialización.

Firma _____ Fecha: _____

Padre o tutor de: _____, Menor de edad.

City of Austin
Founded by Congress, Republic of Texas, 1839
Watershed Protection Department
P.O. Box 1088, Austin, Texas 78767

ADULT Participation Form

EARTH CAMP AUSTIN

Participant: _____ Age: _____

Address: _____ Zip Code: _____

Home Phone: _____ Work Phone: _____

The staff of Earth Camp Austin takes every precaution to make its program as safe as possible. Please fill out the following information as additional protection for you.

Do you wear glasses or contacts? _____

List any condition that could restrict activities: _____

_____

List any allergies (including foods, insect bites/stings): _____

_____

Doctor's Name: _____ Phone: _____

In case of emergency, contact: _____

RELEASE OF LIABILITY

I understand that participation in Earth Camp Austin involves certain inherent risks and potential hazards which can occur with any outdoor activity and which I have considered and I knowingly assume. In consideration of my being allowed to participate in Earth Camp, I the undersigned hereby release the City, its employees and agents, from any action, claim or demand on my behalf for personal injury or property loss: (1) arising from or due to any negligent act or omission of the City while participating in Earth Camp Austin or while traveling to or from Earth Camp Austin activities, or (2) arising from the recording and use of my likeness/voice/image, if permitted. I hereby give permission for any emergency medical treatment, operation, or anesthesia which might become necessary. I agree to be responsible for the expense of medical treatment or service.

_____Check here if you DO NOT give permission for recordings or pictures of you made during participation in Earth Camp Austin to be used in whole or after editing by the City in connection with Earth Camp or similar City programs, including without limitation use in advertisements, promotions, publicity, and marketing.

Signature: _____ Date: _____

Ciudad de Austin

Fundada por el Congreso, República de Texas, 1839
P.O. Box 1088, Austin Texas 78767

EARTH CAMP
Formulario de participación de adultos

Nombre del Participante:_____ Edad: _____

Dirección: _____ Código Postal: _____

Teléfono (casa): _____ Teléfono (trabajo): _____

El personal de *Earth Camp Austin* toma todas las precauciones necesarias para que el programa sea lo más seguro posible. Sírvase dar la siguiente información como protección adicional para usted.

¿Usa anteojos o lentes de contacto? _____

Anote cualquier condición médica que limite sus actividades: _____
_____

Anote cualquier alergia a (alimentos, picaduras de insectos): _____

Nombre de su médico: _____ Teléfono: _____

En caso de emergencia comunicarse con:_____

LIBERACIÓN DE RESPONSABILIDAD

Entiendo que la participación en *Earth Camp Austin* implica riesgos y peligros que pueden ocurrir en cualquier actividad al aire libre. He considerado los mismos y asumo la responsabilidad. En consideración a que se me permita participar en *Earth Camp Austin,* yo, el/la signatario/a, por medio del presente documento libero a la Ciudad, sus empleados y agentes, de toda acción, reclamo o demanda, por cualquier daño personal o a mis propiedades, ocasionado: (1) por cualquier acto u omisión negligente de la Ciudad durante su participación en *Earth Camp Austin*, o al viajar de ida y vuelta a las actividades de *Earth Camp Austin*, o (2) debido a la grabación de mi voz, y el uso de mi fotografía, (de haber otorgado el permiso). Por medio del presente documento, doy mi autorización para recibir cualquier tratamiento médico, cirugía o anestesia que sea necesario en caso de emergencia. De la misma forma manifiesto que acepto la responsabilidad de pagar los gastos del servicio, o tratamiento médico.

_____ Por favor marque en la línea si usted NO AUTORIZA las grabaciones, o fotografías de su persona durante su participación en Earth Camp Austin para que sean usadas en su forma original o parcial después de ser editadas por la Ciudad en conexión con *Earth Camp* Austin, o programas similares de la Ciudad, incluyendo pero sin limitación en anuncios publicitarios, promociones y comercialización.

Firma: _____ Fecha: _____

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

Earth Camp

Name _____ Date _____

School _____ Teacher _____

1. Where does your drinking water come from?

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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 _____

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 ...

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   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 un área o cuenca de drenaje. ¿Cuál es el nombre de la cuenca más cercana a tu escuela? _____

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

5. Para que la cualidad del agua sea buena, ¿por qué es importante aprender sobre la cuenca y la zona de recarga 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. ¿Crees que el aceite que se tira en la entrada de tu casa puede 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

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 five 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 many lessons can be integrated into language arts or social studies.

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). When teaching as a concentrated unit, allow approximately one week to complete the curriculum. Please cover as much as possible before attending Earth Camp.

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	Lesson 4	Lesson 5	Lesson 6
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 investigations 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 ...beakers...timing devices	◆				◆	◆
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 2**	**Lesson 3**	**Lesson 4**	**Lesson 5**	**Lesson 6**
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	◆	◆			◆	

Earth Camp Classroom Curriculum

SOCIAL STUDIES (cont'd)	Lesson 1	Lesson 2	Lesson 3	Lesson 4	Lesson 5	Lesson 6
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**	**Lesson 4**	**Lesson 5**	**Lesson 6**
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	◆	◆	◆		◆	◆

Earth Camp Classroom Curriculum

LANGUAGE ARTS (cont'd)	Lesson 1	Lesson 2	Lesson 3	Lesson 4	Lesson 5	Lesson 6
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	Lesson 4	Lesson 5	Lesson 6
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 3**	**Lesson 4**	**Lesson 5**	**Lesson 6**
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 3**	**Lesson 4**	**Lesson 5**	**Lesson 6**
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

(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.

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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?

Watershed Protection

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

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
- BACKGROUND
- LESSON PLANS
- WORKSHEETS

CONCEPT

Watershed

OBJECTIVE

Students will use maps to fit watershed pieces together in a puzzle and explain:

1. how all land is a watershed;
2. how all bodies of water have a watershed;
3. why all but two creeks in Austin flow to the Colorado River/Lady Bird Lake, and;
4. the location of their school's watershed.

TIME

One 45 minute time period.

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.

TEACHER MATERIALS

Major Basins of Texas (map)

Do You Know Your Watershed (poster)

AISD Watersheds (map)

STUDENT MATERIALS

AISD Watersheds map for each pair of students (in notebook)

In Kit: 10 watershed puzzle pieces for each group (1 extra puzzle piece is blank)

Copy: Puzzling Watersheds worksheet for each group

TEACHER PREPERATION

1. Prepare an area for students to build the class watershed puzzle.
2. Hang the Major Basins of Texas map and Do You Know Your Watershed? poster where all students can see and use them.
3. Write vocabulary on the board.
4. Organize students into five groups.

INTRODUCTION

REVIEW LESSON 1 CONCEPT - Ask students what they know about watersheds? (Answer: 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, and the creek drains in a river.)

Procedure

1. **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 river basin, we have many smaller watersheds surrounding tributaries to the major river.

2. **PROJECT THE AISD WATERSHEDS MAP -** Give each pair of students a copy of the map.

3. **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.

4. **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.

5. **INTRODUCE THE 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. Tell the class they will put together the Austin Watershed Puzzle so they can identify the locations of the different watersheds as they travel around Austin.

6. **RECHARGE ZONE -** 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.

LESSON 2
BACKGROUND
LESSON PLANS
WORKSHEETS

7. **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.

8. **DO THE ACTIVITY -** Organize students into five groups. Give each group a Puzzling Watersheds worksheet and 10 watershed puzzle pieces. Allow students time to work together with their group to answer questions.

9. **PUT THE PUZZLE TOGETHER -** When groups finish the worksheet, 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.

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

1. Which streets could you travel to get to Barton Creek from your school?

2. At a point before Barton Creek watershed, tell the students someone in the car threw trash out the window. Ask students which watershed was polluted?

3. Ask students if the trash could also pollute the Colorado River/Ladybird Lake? Explain.

LESSON 2
BACKGROUND
LESSON PLANS
WORKSHEETS

Earth Camp

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.

Earth Camp

WORKSHEET
Group Names:_____

Number	Watershed Name	N or S	Tributary	Street	Recharge

Earth Camp

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.

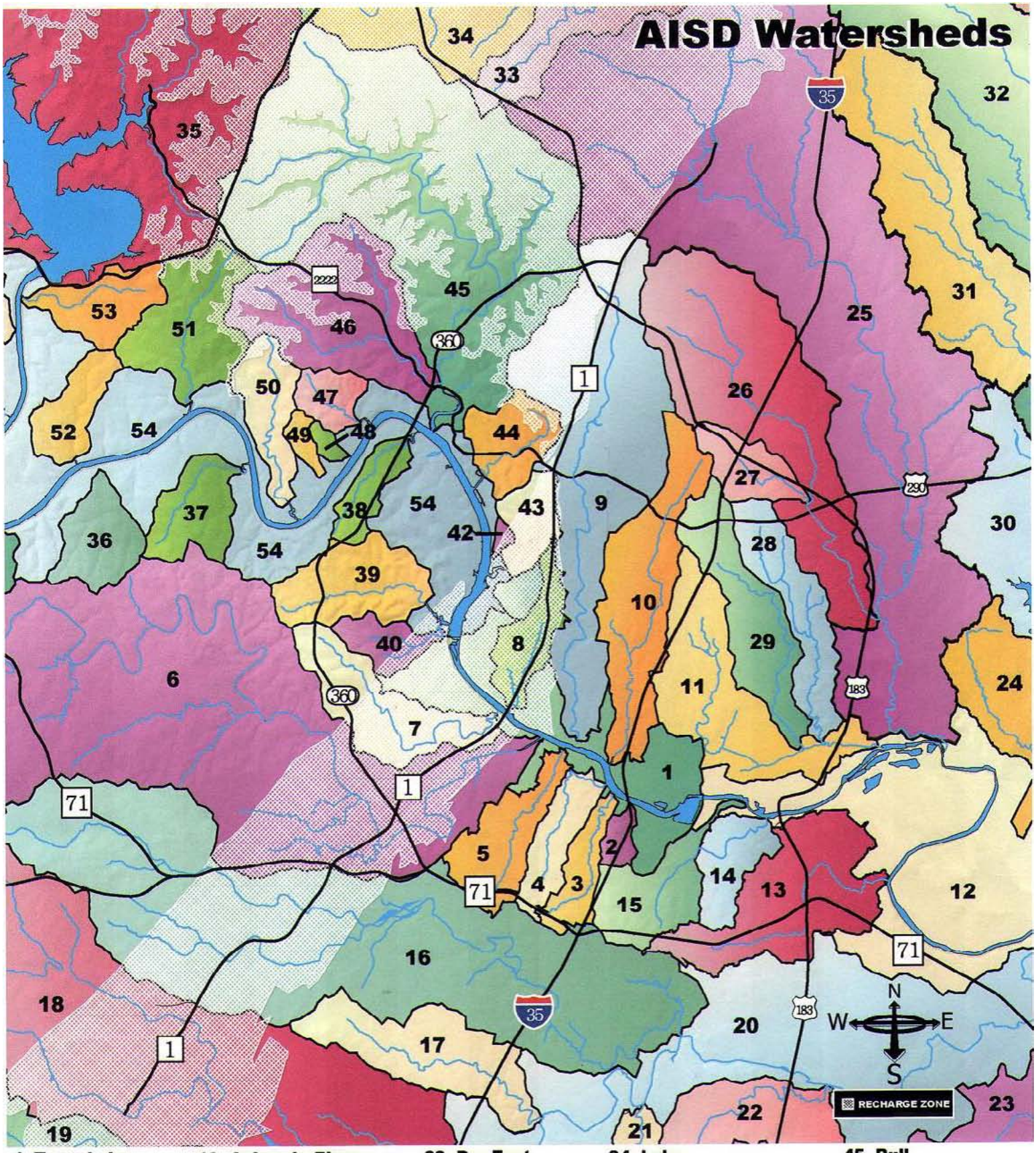
6. Coloca las piezas del rompecabezas de las cuencas junto con las de la clase para completar el Rompecabezas de las Cuencas Hidrográficas de Austin.

Earth Camp

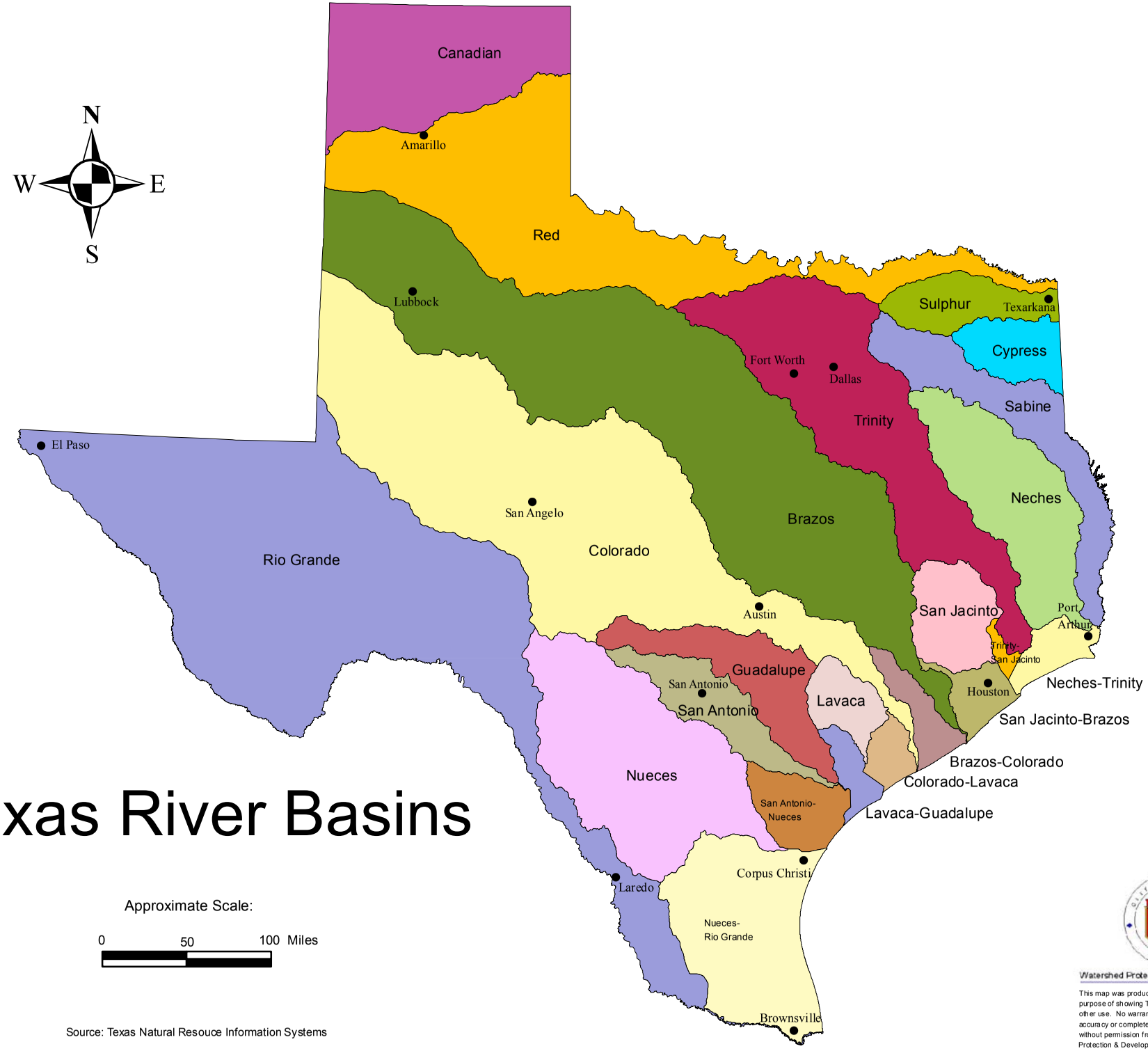
HOJA DE PRACTICA

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

Approximate Scale:

0 50 100 Miles

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.

BACKGROUND

All land is in a watershed. When water runs over the land during a rainstorm, it picks up whatever can be dissolved or carried by water and flows into the local creek, river or lake. This water is referred to as “runoff,” and can increase pollution in local creeks if land in the watershed is polluted. The land, and what is done to it and on it, greatly effects the quality of water in a water body.

One of the largest impacts of land use to the health of the creeks happens gradually with urbanization. If you look out the window, you might see lots of concrete: driveways, sidewalks, streets, curbs, parking lots, and buildings. This is what is called “impervious cover,” surfaces that do not allow water to soak through them. Land in its natural state allows rainfall to run off slowly over the native plants or absorb into the earth where the water is filtered by the plants and soil. In an urbanized area, rainwater is more likely to fall on impervious cover where it does not have the benefit of a vegetative filter. The water runs quickly into gutters and stormdrains and directly into the local creek. This sudden rush of stormwater runoff destroys the natural functioning of the creek and its ecosystem and increases the likelihood that urban pollutants will enter the water, such as motor oil, household cleaners, trash or excess garden chemicals.

Citizens can take small measures at home to reduce the amount of pollution each one contributes to the local creek. Putting trash in its place will keep litter from clogging the creek or harming animals. Instead of dumping dirty water used for cleaning in the street, read the label of the cleaner to check if it is safe to dispose of the product down the drain. After the waste is poured down the drain, the wastewater goes to a wastewater treatment plant for cleaning before reentering the river. Another solution is to use less toxic or non-toxic cleaners. Other things done at home that can end up polluting the water are: fertilizing too much, applying fertilizer right before a rain, using pesticides and herbicides incorrectly, automobile fluid leaks, washing the car, cleaning paint brushes, improperly disposing of household hazardous waste, or using any other harmful substance that falls on the ground and has the potential to run off during a rainstorm. The Clean Creek Challenge, included in this lesson, will encourage students and their families to learn and use solutions to these common pollution problems.

If you or your class has a pollution complaint in your neighborhood, call the City of Austin Environmental Hotline at 512-974-2550. The City will check it out or inform the appropriate agency so corrective action can be taken. Everyone can make a difference!

LESSON 3
BACKGROUND
LESSON PLANS

CONCEPT

Watershed Land Use and Water Pollution

OBJECTIVE

Students will:

1. identify the headwaters and mouth of a river on a map;
2. identify types of land use;
3. associate land use with possible water pollution; and
4. identity sources and solutions to pollution from activities at home.

TIME

One 45 minute time period.

Extension activities take additional time periods.

VOCABULARY

Headwaters - the beginning of a creek, stream, or river

Mouth - point where a creek, stream, or river enters the next body of water

Pollution - the contamination of soil, water, or the atmosphere by the discharge of harmful substances

Impervious cover - surfaces that do not allow water to soak through them. Paved roads and parking lots, roofs, and buildings are examples of impervious cover.

TEACHER MATERIALS

Blunn Creek Watershed (topography map)

Land Uses in Blunn Creek Watershed (map)

STUDENT MATERIALS

Land Uses in Blunn Creek Watershed map for each pair of students (in notebook)

Clean Creek Challenge for each student

TEACHER PREPERATION

1. Copy Clean Creek Challenge for each of student.

INTRODUCTION

REVIEW WATERSHED BOUNDARY - Project the Blunn Creek Watershed topography map. Ask students what landforms divide one watershed from another? (ridges, hilltops, high points) Ask students what the tops of the hills looked like in the "Water Watersheds" lesson model? (complete circles or ovals) Explain to students the complete circles, ovals, or other shapes that do not have more layers inside are the high points on the map. The yellow area is the entire Blunn Creek watershed. Call on individual students to point out the high points on the Blunn Creek watershed topography map. Explain to students the high point in the middle of the watershed is an ancient volcano that now forms a hilltop. St. Edward's University sits on top of this high point, but it does not divide the watershed because it does not have a continuous high ridge line. The other high points are connected by ridges, so they are the boundary of the Blunn Creek watershed.

PROCEDURE

1. **DEFINE AND LOCATE HEADWATERS AND MOUTH -** Project the Blunn Creek Land Use map, and give every pair of students a copy. Define headwaters. Ask students to locate the headwaters of Blunn Creek. (Blunn Creek begins at Ben White Boulevard.) Ask students to locate the place where Blunn Creek drains into the Colorado River at Lady Bird Lake. This is the mouth of Blunn Creek. (The mouth of Blunn Creek is located at the northern tip of the watershed.) Explain to students everything on the land surrounding Blunn Creek, from the headwaters to the mouth, effects the creek and the Colorado River.

2. **LOCATE BLUNN CREEK PRESERVE -** Tell students Blunn Creek used to be surrounded by grassland prairies and live oak forests. Today, you can still see the native landscape at Blunn Creek Preserve. Point out the green area that defines the preserve on the Blunn Creek Land Use map.

3. **IDENTIFY TYPES OF LAND USE -** Tell students the reason a part of Blunn Creek watershed is preserved is because the rest of the watershed has been changed into our city. Ask students to use the map legend to identify the land uses that are part of the Blunn Creek Watershed. Ask students why all land uses are not shown on this map. (Blunn Creek Watershed is small and does not include every kind of land use. Some kinds of land use, like mining, would not occur in very many city watersheds.)

4. **HOW THINGS ON THE LAND GET INTO THE CREEK -** Explain to students that when it rains, whatever is on the land in a watershed can be carried off by water and flow into the nearest creek. Some things, like pesticides or fertilizers, are not necessarily visible because they are liquids that cannot be seen or smelled. Other things that can wash into the creek from the land are excesses of dirt, yard waste, or trash which cause the creek to fill up or clog. Ask students to decide the benefit and potential pollution from each kind of land use. (Accept any reasonable answers.) Write answers in a table on the board as follows:

LAND USE	BENEFIT	POTENTIAL POLLUTION
Houses	shelter	household chemicals, gas, oil, trash, etc.
Stores	goods & services	trash from bags, wrappers, parking lot oil etc.

5. CHOICES THAT CAN HELP PREVENT WATER POLLUTION - Ask students to use the Blunn Creek Land Use map to decide what kind of land use takes up the most area. (homes) Tell students that the choices we make around our home can make a big difference to the health of our neighborhood creek. Give each student a copy of the Clean Creek Challenge. Ask students to read "We all live in a watershed!" Discuss the pollutants that occur at home. Explain how to become a Clean Creek Class.

6. GROUP ACTIVITY - Students use the Table of Contents to locate, read and choose an action they will do at home to earn points for the class.

INTEGRATED ACTIVITY: VIDEO "SLIME STOPPERS" (materials' box) -

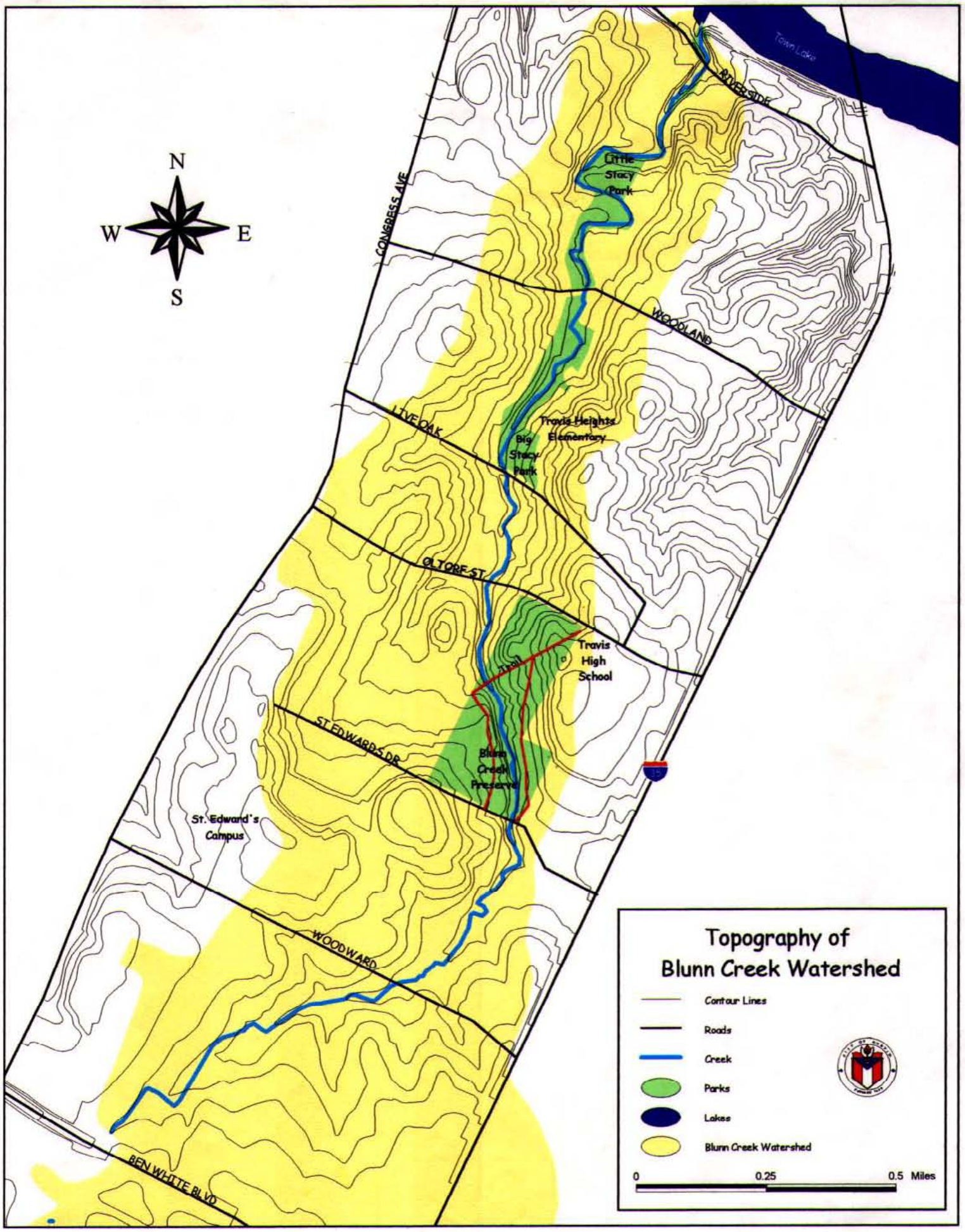
Prepare students for viewing the video about pollution at home by introducing the following vocabulary: EPA - Environmental Protection Agency; a government agency responsible for protecting the environment throughout the United States; impervious cover - surfaces that do not allow water to soak through them. Paved roads and parking lots, roofs, and buildings are examples of impervious cover.

EXTENSION: MAP THE LAND USE IN YOUR SCHOOL'S WATERSHED -

Get a map of your watershed. Locate the headwaters and mouth. Plan a walking field trip to walk the local creek. Start at the point nearest your school and walk upstream and downstream identifying types of land use around the creek. Identify the most common land use near the school. Research the type of pollution associated with the land use and ways to prevent it.

EVALUATION

Points earned towards becoming a Clean Creek Class.


Topography of
Blunn Creek Watershed
Contour Lines
Roads
Creek
Parks
Lakes
Blunn Creek Watershed
0
0.25
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N
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Town Lake
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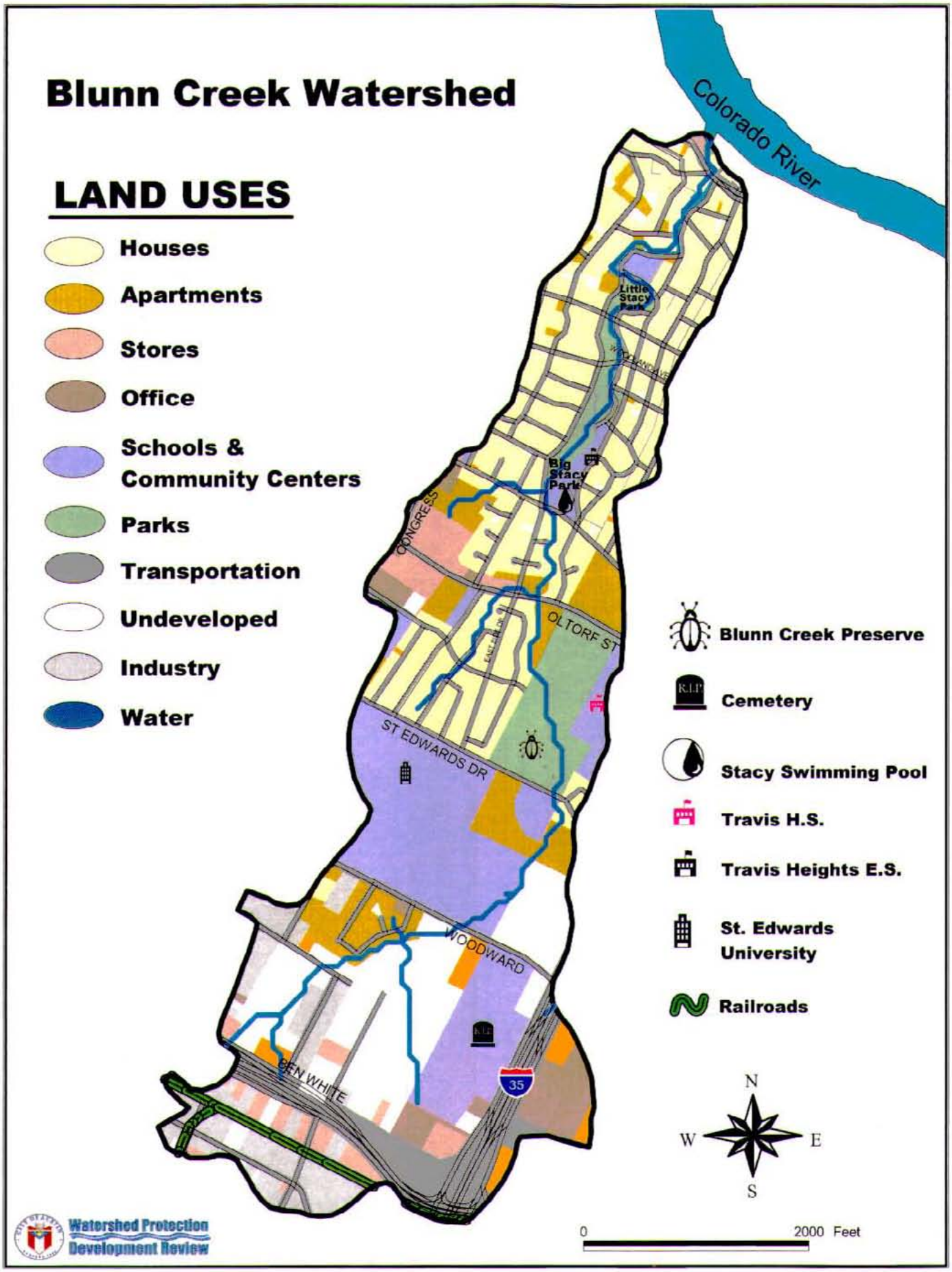
CONGRESS AVE
WOODLAND
LIVE OAK
OLTORF ST
ST EDWARDS DR
WOODWARD
BEN WHITE BLVD
Little Stacy Park
Big Stacy Park
Travis Heights Elementary
Travis High School
Trail
Blunn Creek Preserve
St. Edward's Campus


Blunn Creek Watershed
LAND USES
Houses
Apartments
Stores
Office
Schools & Community Centers
Parks
Transportation
Undeveloped
Industry
Water
Colorado River
Little Stacy Park
Big Stacy Park
CONGRESS
OLTORF ST
ST EDWARDS DR
WOODWARD
BEN WHITE
35
Blunn Creek Preserve
Cemetery
Stacy Swimming Pool
Travis H.S.
Travis Heights E.S.
St. Edwards University
Railroads
N
W
E
S
0
2000 Feet
Watershed Protection
Development Review

green neighbor

www.cityofaustin.org/watershed/greenneighbor

City of Austin
WATERSHED PROTECTION

974-2550

What should you do? Become A.....

clean creek class

Object of the Game

Practice pollution solutions to help protect water quality in Austin's creeks, lakes and aquifer.

Rules of the Game

1. Individual Goal: Read through all the sections of the booklet.
   PICK AT LEAST ONE SOLUTION FOR A POLLUTION AT YOUR HOME.
   Do the solution at home with a parent. Have your parent sign the points page and return it to your teacher.
2. Class Goal: Earn 50 points and complete one service project (call 391-0617)
   - Creek Cleanup
   - Stormdrain Marking
   - Plant a Native Landscape

Collect Your Prize!

Keep track of your progress on the Clean Creek Class gameboard that will be displayed in your classroom. When your class has reached 50 points and completed a service project, your teacher will send us the gameboard and you will recieve a Clean Creek Banner to display in your classroom!

Glossary

Aquifer- an underground layer of earth, gravel or rock that holds water

Environment – the combination of soil, water, air, plants and animals

Fertilizer – food for plants

Organic – made from plants or animals

Pesticide – chemical that kills unwanted insects or plants

Polluted – contaminated, unclean or dirty

Predator – an animal that lives by eating other animals

Runoff – water that washes over the land into a creek, river or lake

Watershed – the area of land that drains water into a particular creek, river or lake

Litter

Litter is trash left on the ground. Rainwater washes all the litter from the watershed into a creek. As a result, the creeks become ugly, stinky and polluted. Litter can add hazardous chemicals such as oil from oil containers into the water or decrease oxygen in the water as it decomposes. It can also look like food, causing animals to eat harmful substances.

Solution	Take Credit!
Throw your non-recyclable trash in the trash can.	1
Recycle papers, cans and bottles.	1
Use reusable containers for your food.	1
If your trash blows away, pick it up and put it in a trash can with a lid.	1
If you are eating fast food, make sure you throw all the trash in the trash can.	1
Don't be a litter bug.	1
Pick up litter in your neighborhood.	1
Total Credits (add up all the points you earned)	

Parent Signature _____

Table of Contents

Introduction 1

Pollution Diagram 2

Yard Care Chemicals 3

Pet Poop 4

Car Care Chemicals 5

Home Chemicals 6

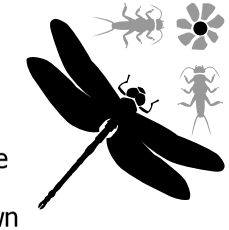
Litter 7

Glossary 8

We all live in a watershed!

You live in a home or apartment in Austin, Texas. You also live in a watershed! Living in a watershed means that any water that falls on the ground outside your home will eventually wash down hill into your neighborhood creek, lake or aquifer.

Home Chemicals



Many things we use at home like detergents, glue, paint and batteries have dangerous chemicals in them. They cannot be safely thrown in the trash because they could leak into the groundwater under the landfills. They should never be thrown in the street where they could wash into the stormdrain and nearest creek. Hazardous chemicals kill aquatic life!

Solution	Take Credit!
With an adult, take your family's hazardous waste to the Home Chemical Collection Facility located at 2514 Business Center Dr. (www.cityofaustin.org) Phone: 974-4343 Date you went: _____ Waste you brought: _____	3
Buy products that say NON-TOXIC on the label. Name of non-toxic product you bought. _____ _____ Attach the receipt.	3
Use rechargeable batteries. Where are you using rechargeable batteries? Ipod _____ camera _____ game _____ other _____	2
Wash the floor for your family. Pour the bucket of waste-water down a drain inside your house. Drains in your house flow to a wastewater treatment plant for cleaning. Date: _____	1
Use natural or less toxic cleaners. For example: • Mop the floor with Borax. _____ • Clean the windows with vinegar. _____ • Mix one part cooking oil to one part lemon juice and use to polish the furniture _____	1 1 1

Total Credits *(add up all the points you earned)*

Parent Signature _____

Car Care Chemicals

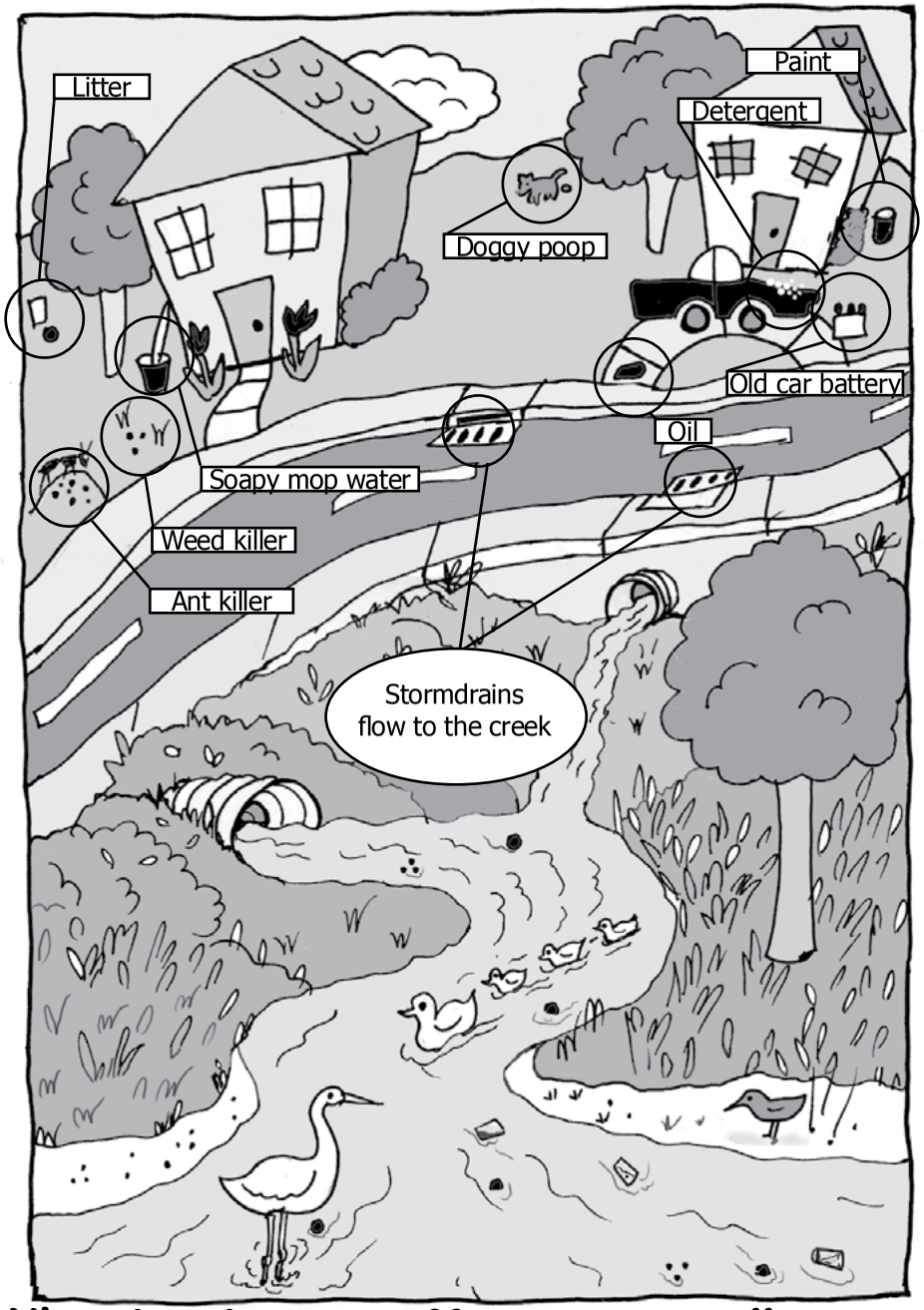
Rainfall that runs off parking lots, driveways and streets picks up spilled oil and takes it into a stormdrain. If you wash your car in the driveway, the soapy water runs off into the street and stormdrain. From there, the water flows directly into the nearest creek.

Solution	Take Credit!
Call 1-800-CLEANUP to find your nearest used oil collector. Name: _____ Tell your parents about the nearest used oil collector.	1
Do you have spilled oil on your driveway at home? **Yes** **No** If yes, tell your parents to help you use cat litter or sawdust to absorb the oil. Sweep up the oil soaked litter, seal it in a bag and throw away. Date you cleaned the oil. _____	2
Does your parents car leak oil? Tell your parents to fix the oil leak. Date oil leak fixed. _____	3
Wash your family's car and divert the soapy water to the lawn where the water and soap are absorbed by the grass. Date I washed the car: _____	3
Go with your family to wash the car at a car wash where the water is recycled or sent to the waste treatment plant. Date _____ Car Wash Name _____	2

Total Credits (add up all the points you earned)

WOW! One drop of oil can contaminate twenty-five gallons of water, making it unfit for wildlife or humans to drink!

Parent Signature _____



When it rains, runoff can carry pollutants that are on the ground into your creek!

Yard Care Chemicals

All plants need food, but over-fertilizing or fertilizing before a rain can cause fertilizer to run-off into our creeks and river, causing algae blooms and killing fish. Many people also regularly spray their lawn with pesticides to get rid of animals or plants they don't want in their yard. These chemicals can run off into your local creek, causing harm to aquatic life. They can harm you and your pets too.

Solution	Take Credit!
Visit a plant nursery or home improvement center in Austin and find the Grow Green display. Pick a fact sheet that will help your family. Name of the nursery _____ Name of the fact sheet _____	2
Native plants do not need yard chemicals or excessive watering. Use the website to pick a native plant you want in your garden. Plant name_____ www.growgreen.org/pg_pdfs	1
Identify an insect that is good for your lawn or garden using the website http://www.growgreen.org/beneficial Insect name _____	1
Pull weeds from your lawn. Be sure to get the roots. Date you weeded: _____ Number of weeds you pulled: _____	3
Does your family fertilize the lawn? If not, you can take credit!	2
If your family does fertilize, ask them to: (1) use organic fertilizer or compost (2) never fertilize before a rain and (3) only use half the amount recommended on the bag, half as often.	2

Total Credits (add up all the points you earned)

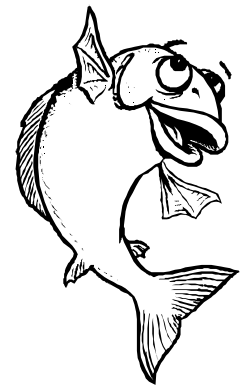
Parent Signature _____

Pet Poop

During rainstorms, harmful germs (bacteria and viruses) from animal waste can wash into Austin creeks and the Colorado River. If you are swimming and get some of the water in your mouth, the germs from the pet waste can make you sick. Pet waste also increases algae growth in the creek, which can be harmful to aquatic life.

Solution	Take Credit!
Name of your dog. _____ Scooped the poop, and flushed it in the toilet. Date _____	1
Picked up the poop with a baggy, and tossed it in the trash. Date _____	1
Found a Scoop the Poop box in a City Park and picked up after walking my dog. Name of Park _____ Date _____	2

Total Credits (add up all the points you earned)



WOW!

Approximately 30,000 dogs live in the Town Lake watershed. – that means an estimated 1,327 lbs. of dog waste goes into the watershed everyday, or nearly 500,000 lbs. per year!

An average-sized dog dropping produces 3 billion fecal coliform bacteria. Yuck!

Parent Signature _____

green neighbor

www.cityofaustin.org/watershed/greenneighbor

City of Austin
WATERSHED PROTECTION

974-2550

¿Qué deben hacer? Convertirse en una...

Objetivo del juego

Practicar soluciones de contaminación para ayudar a proteger la calidad del agua en los arroyos, los lagos y el acuífero de Austin.

Reglas del juego

1. Objetivo individual: Lee todas las secciones de este manual. ESCOGE POR LO MENOS UNA SOLUCIÓN PARA UNA CONTAMINACIÓN EN TU HOGAR. Haz la solución en casa con un adulto. Pide a tu mamá o papá que firme la página de puntos y devuélvela a tu maestro(a).
2. Objetivo de la clase: Ganar 50 puntos y completar uno de los proyectos de servicio (llamar al 391-0617)
   - Limpiar el arroyo
   - Marcar alcantarilla de desagüe
   - Plantar un paisaje nativo

¡Recibe tu premio!

Anota tu progreso en el tablero de la Clase Arroyo Limpio que se exhibirá en tu salón. Cuando tu clase haya alcanzado 50 puntos y terminado el proyecto de servicio, tu maestro(a) nos enviará el tablero y ¡recibirás una pancarta de Clean Creek para exhibirla en tu clase!

Glosario

Acuífero- capa subterránea de gravilla o roca que contiene acumulaciones de agua

Ambiente – el medio ambiente es la combinación de tierra, agua, aire, plantas y animales

Contaminado – infectado, no limpio, sucio

Cuenca – área de terreno que vierte sus aguas en un arroyo, río o lago en particular

Depredador – animal que subsiste cazando a otros animales

Desagüe – agua que corre sobre la tierra hacia un arroyo, río o lago

Fertilizante – alimento para plantas

Orgánico – hecho de plantas o animales

Pesticida – químico que mata hierbas malas, insectos o animales

Basura

La basura son desperdicios tirados en el suelo. La lluvia arrastra toda la basura de la cuenca hasta el arroyo. Como resultado, los arroyos se ponen feos, apestosos y contaminados. La basura puede añadir al agua químicos peligrosos como aceite de recipientes o disminuir el oxígeno del agua al irse pudriendo. También puede parecer comida, haciendo que los animales coman sustancias peligrosas.

Solución	¡Tus puntos!
Echa la basura no reciclable en el bote de la basura.	1
Recicla papeles, latas y botellas.	1
Usa recipientes reciclables para guardar tu comida.	1
Si tu basura se vuela, recógela y échala en un bote de basura con tapa.	1
Si compras comida rápida, asegúrate de echar toda la basura en el bote de basura.	1
Pon la basura en su lugar, no la tires en lugares públicos.	1
Recoge basura en tu vecindario.	1
Total de créditos (suma todos tus puntos)	

Firma de papá/mamá _____

Tabla de contenido

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Basura 7

Glosario 8

¡Todos vivimos en una cuenca!

Tú vives en una casa o apartamento en Austin, Texas. ¡También vives en una cuenca! El vivir en una cuenca significa que el agua que cae al suelo fuera de tu casa eventualmente llegará al arroyo, lago o acuífero de tu vecindad.

Químicos para el hogar

Muchas cosas que usamos en la casa, como detergentes, pegamento, pintura y baterías contienen químicos peligrosos. No es seguro tirarlos a la basura porque los químicos podrían derramarse y llegar hasta el agua subterránea de los vertederos. Tampoco deben tirarse en las calles, pues se irían por las alcantarillas y llegarían hasta el arroyo más cercano. ¡Los químicos dañinos matan la vida acuática!

Solución	¡Tus puntos!
Con un adulto, lleva los residuos peligrosos de tu familia a Home Chemical Collection Facility, ubicado en 2514 Business Center Dr. (www.cityofaustin.org) Teléfono: 974-4343 Fecha en que fuiste: _____ Basura que llevaste: _____	3
Compra productos que dicen NON-TOXIC en la etiqueta. Producto no-tóxico que compraste: _____ _____ Adjunta el recibo.	3
Usa pilas recargables. ¿Dónde estás usando pilas recargables? Ipod _____ cámara _____ juego _____ otro _____	2
Lava el piso con tu familia. Echa el agua sucia en un resumidero dentro de tu casa. Las tuberías de desagüe de tu casa van hasta una planta de tratamiento de agua. Fecha: _____	1
Usa limpiadores naturales o menos tóxicos. Por ejemplo: • Trapea el piso con Borax. _____ • Limpia las ventanas con vinagre. _____ • Mezcla una parte de aceite de cocina y otra de jugo de limón para limpiar los muebles. _____	1 1 1

Total de créditos (suma todos tus puntos)

Firma de mamá/papá _____

Químicos para los autos

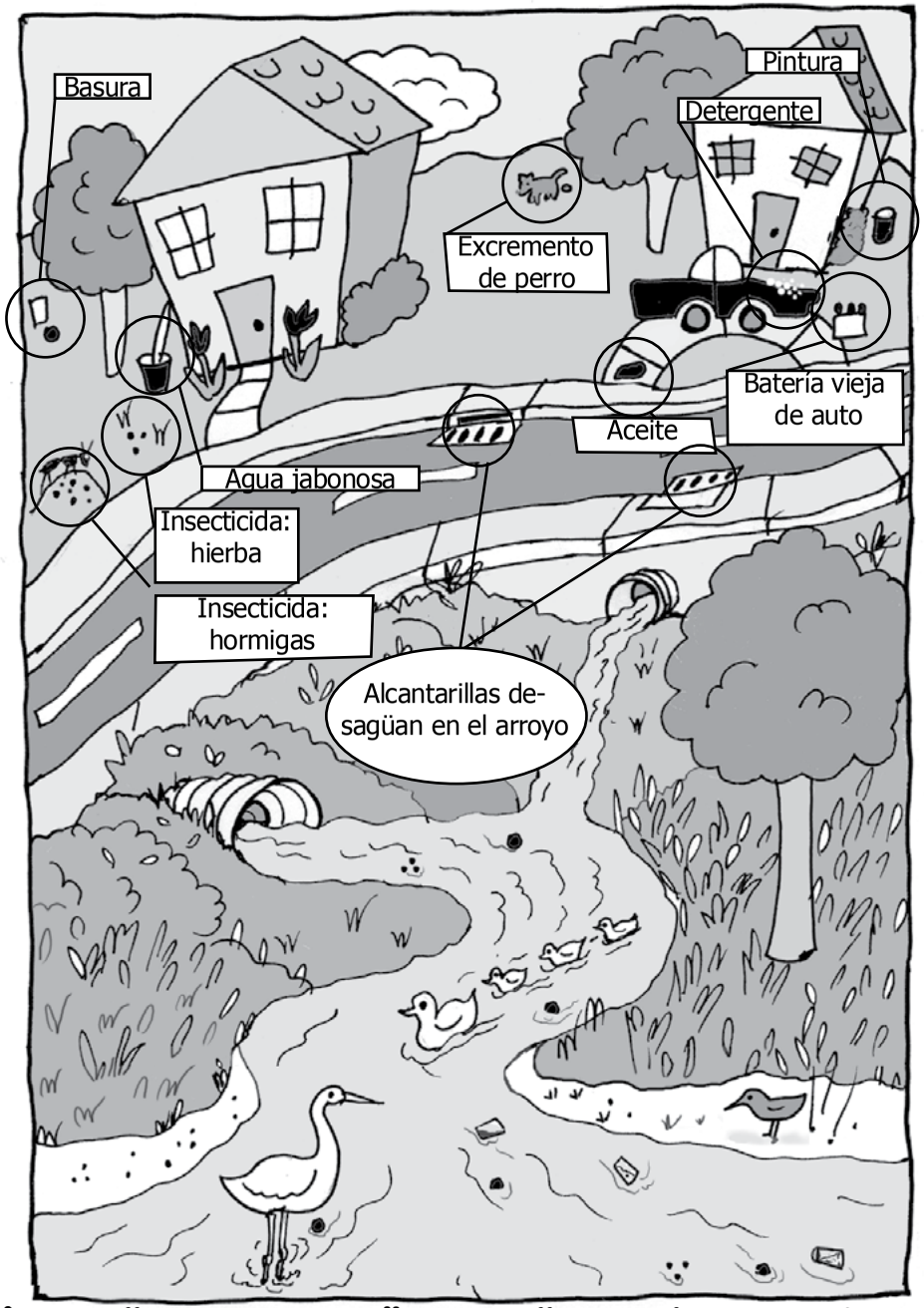
La lluvia que se escurre de estacionamientos, callejones y calles arrastra el aceite derramado hasta las alcantarillas. Si lavas tu carro en la entrada de tu casa, el agua jabonosa corre por la calle hasta la alcantarilla y luego hasta el arroyo más cercano.

Solución	¡Tus puntos!
Llama a 1-800-CLEANUP para localizar el centro de reciclaje de aceite más cercano. Nombre: _____ Dile a tus padres sobre este centro de reciclaje.	1
¿Hay aceite tirado en la entrada de tu casa? **Sí** **No** ¿Sí? Pide a tus padres que te ayuden a usar arena para gatos o aserrín para absorber el aceite. Barre la arena empapada de aceite, échala en una bolsa, ciérrala y tírala en la basura. Fecha en que limpiaste el aceite. _____	2
¿El carro de tus padres gotea aceite? Dile a tus padres que arreglen la gotera de aceite. Fecha en que se arregló la gotera. _____	3
Lava el carro de tu familia y desvía el agua jabonosa hacia el césped para ser absorbida. Fecha en que lavaste el carro. _____	3
Lleva con tu familia el carro a un túnel de lavado donde el agua es reciclada o enviada a la planta de tratamiento. Fecha _____ Nombre del lavado _____	2

Total de créditos (suma todos tus puntos)

¡Increíble! ¡Una gota de aceite puede contaminar 25 galones de agua, haciéndola dañina para los animales y humanos!

Firma de papá/mamá _____



¡Cuando llueve, un desagüe puede llevarse los contaminantes que están sobre la tierra y depositarlos en tu arroyo!

Químicos para el jardín

Todas las plantas necesitan alimento, pero demasiado fertilizante o fertilizar antes de una lluvia puede causar que el fertilizante sea arrastrado por el agua hasta nuestros arroyos y ríos, causando floraciones de alga y matando a nuestros peces. Muchas personas regularmente rocían su césped con pesticidas para deshacerse de animales o plantas que no quieren en su jardín. Estos químicos pueden llegar a tu arroyo local, causando daño a la vida acuática. También pueden perjudicarte a ti y a tus mascotas.

Solución	¡Tus puntos!
Visita un vivero o un centro de mejoras para el hogar en Austin, y encuentra una exhibición de Crecimiento verde. Escoge una hoja informativa que ayudará a tu familia. Nombre del vivero _____ Título de la hoja informativa _____	2
Plantas nativas no necesitan químicos de jardín o demasiada irrigación. Usa el sitio web para escoger una planta nativa que quieras tener en tu jardín. Nombre de la planta_____ www.growgreen.org/pg_pdfs	1
Identifica un insecto que beneficie tu césped o jardín, visita el sitio web http://www.growgreen.org/beneficial Nombre del insecto _____	1
Arranca las malas hierbas de tu césped. Asegúrate de arrancar las raíces. Anota la fecha en que desyerbaste: _____ Número de hierbas que arrancaste: _____	3
¿Tu familia fertiliza el césped? De no ser así, ¡tú puedes recibir el crédito!	2
Si tu familia fertiliza el césped, pídeles que: (1) usen abono o fertilizante orgánico (2) nunca fertilizar antes de una lluvia y (3) only use half the amount recommended on the bag, half as often.	2

Total de créditos (suma todos tus puntos)

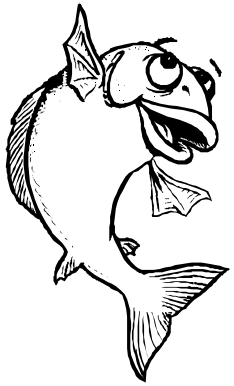
Firma de papá/mamá _____

Excremento de mascotas

Durante las tormentas de lluvias, gérmenes dañinos (bacteria y viruses) del excremento de animales pueden ser arrastrados hasta los arroyos de Austin y el Río Colorado. Si tomas agua del arroyo o río mientras estás nadando, los gérmenes del excremento de las mascotas podrían causarte enfermedades. El excremento de animales también aumenta el crecimiento de algas en los arroyos, lo cual puede dañar la vida acuática.

Solución	¡Tus puntos!
Nombre de tu perro(a). _____ Recogí el excremento y lo bajé por el inodoro. Fecha _____	1
Recogí el excremento en una bolsa y la tiré en la basura. Fecha _____	1
Encontré una caja "Scoop the Poop" en un parque de la ciudad y recogí el excremento de mi perro. Nombre del parque _____ Fecha_____	2

Total de créditos (suma todos tus puntos)



¡Increíble!

Aproximadamente 30,000 perros viven en la cuenca de Town Lake. Lo cual significa que aproximadamente 1,327 lbs. de excremento de perro son llevadas diariamente hasta la cuenca, es decir, ¡casi 500,000 lbs. por año!

El excremento de un perro de tamaño normal produce 3 billones de bacterias fecales de coliform. ¡Puaj!

Firma de papá/mamá _____

BACKGROUND

(Adapted from Macro Mania Instruction Manual, LaMotte Co.)

One way to determine the quality of water in a creek is to run chemical tests on the water for characteristics that are important to water quality. These tests are done with kits that have test tubes and reagents or electronic meters. Typical chemical characteristics tested are dissolved oxygen, turbidity, pH, nitrogen, and phosphorous. Chemical water tests give a snapshot of the health of the water at that moment in time. They cannot detect chemicals that could have previously washed through a waterway or were absorbed by aquatic vegetation.

Another way to measure water quality is to use the animals that live in the creek as water quality indicators. Some aquatic animals are very sensitive to their surroundings. If the water quality changes, the animals must either move to another location where the water quality suits them or they will die. Some animals can only live in excellent water quality, others do well in good quality water and some can even survive in polluted water.

Benthic macroinvertebrates (macros for short) are a category of stream animal that live on the bottom of a creek (benthic). Although very small, they are large enough to be seen without a microscope (macro) and do not have a backbone (invertebrate). Because specific macros have different sensitivities to pollution, are abundant and stay in one place in the creek, we can collect macros from a stream and determine the quality of the water. The healthiest and most stable environment has a variety of macros from every range of sensitivity.

Measuring water quality using the macroinvertebrate test gives a better representation of the health of the water flowing through a creek over time. Pollutants that wash downstream might not be detected by a chemical test, but would impact the creek macroinvertebrates. Some of the macros are insects that live in the creek as an aquatic nymph or larvae during the immature stage of their lives. For example, the dragonfly nymph lives two years in the water before metamorphosing into an adult. Because dragonfly nymphs are somewhat sensitive to pollution, they will not be found in a creek that has had a pollution spill in the recent past or has urban pollution that flushed through during a rainstorm.

CONCEPT

Benthic macroinvertebrate communities give a snapshot of stream health.

OBJECTIVE

The students will:

1. learn the names and water quality requirements of aquatic macroinvertebrates;
2. work as a team to conduct a simulated biological assessment of water quality;
3. be able to interpret the results of the biological assessment by evaluating the land use at the collection site.

TIME

45 minutes

VOCABULARY

Macroinvertebrate - a type of stream animal that is big enough to be seen without a microscope (macro) and does not have a backbone (invertebrate).

Benthic - animals that live on the bottom of the stream

TEACHER MATERIALS

In Kit: Macro Mania game which includes:

- 6 decks of cards (2 green decks, 2 yellow decks, 2 blue decks)
- 6 sorting sheets
- 6 site maps

PREPERATION

Copy Stream Water Quality Worksheet for each student.

INTRODUCTION

REVIEW LESSON 3, Land + Water = Water Quality.

Procedure

1. **INTRODUCE WATER QUALITY TESTING -** Tell students we know that land use affects water quality, but we often want to measure how much the water quality has been affected. One way to assess water quality is to look at the organisms that live in the stream. Some aquatic organisms are very sensitive to pollution and only live in excellent quality water. Other aquatic organisms do well in good quality water and some can even survive in poor quality water. Excellent creeks have all varieties of macros. When the variety declines, so does the water quality.

2. **DEFINE BENTHIC MACROINVERTEBRATE -** "Benthic" means animals that live on the bottom of a stream. "Macro" means that they can be seen without a microscope and "invertebrate" means they do not have a backbone. Benthic macroinvertebrates are often called "macros" for short. The macros live on or under stones, sticks, and leaves in the stream or burrow into sand and silt on the stream bottom. Macros are useful for determining water quality because they are abundant, there are many varieties, and they stay in one place in the stream for much of their lives.

3. **EXPLAIN LIFE CYCLES -** Some macros are insects that only live in the water in their nymph or larval stage (for example dragonfly nymphs). When they grow into adults, they fly from the stream and live on land. Other macros are not insects (like snails, crayfish and aquatic worms) and live in the water their entire life.

4. **CATEGORIZING POLLUTION SENSITIVITY -** The macros that are used to indicate water quality are separated into three Pollution Sensitivity groups called Group 1, Group 2, Group 3.

   - **Group 1:** Macros that are very sensitive to pollution. They can only survive in water of excellent quality.
   - **Group 2:** Macros that are somewhat sensitive to pollution. They are not quite as sensitive as the macros in Group 1. They can survive in water of high quality and water that is not quite as healthy.
   - **Group 3:** Macros that are tolerant of poor water quality. They can survive in water of high quality, water that is not quite as healthy, and polluted water.

   We can collect macros from a stream and determine the quality of water. This can be done by counting the number of different kinds of macros from each Group that are found in a sample from the stream. The healthiest water has macros from each Group, with the most from Group 1. A larger variety of macros means better water quality!

During the Macro Mania game, you will determine the water quality at a test site by examining a simulated sample of benthic macroinvertebrates!

LESSON 4
BACKGROUND
LESSON PLANS
WORKSHEET

5. MACRO MANIA ACTIVITY

1. Divide the students into six teams. Each team must have their own work space.

2. Hand out one deck of cards and one sorting sheet to each team. The deck of cards represents a macroinvertebrate sample from a specific site.

3. Have students lay the sorting sheet and map flat on a desk or table top where everyone on the team can see it.

4. Have each team sort their deck by placing the cards with the macro image showing on the matching space on the sorting sheet.

5. Initiate a class discussion: Ask teams:

Which Group had the most stacks of macroinvertebrates?

GROUP 1, GROUP 2, OR GROUP 3?

- If most of your macros are in Group 1 - you have excellent quality water.
- If most of your macros are in Group 2 - you have good quality water.
- If most of your macros are in Group 3 - you have poor quality water.

What water quality do you have at your site according to your macroinvertebrate indicators?

6. GIVE STUDENT GROUPS A COPY OF THE LAND USE MAP.

- • What was the land use at your site?
- • How did this land use affect the water quality?

Note: Water quality is not determined by the quantity of each individual type of macro but by the variety that are present. A sample from polluted water may have more macros than clean water but the number of different kinds of organisms will be low and from Group 3.

EVALUATION

Have students complete the Stream Water Quality Worksheet.

STREAM WATER QUALITY WORKSHEET

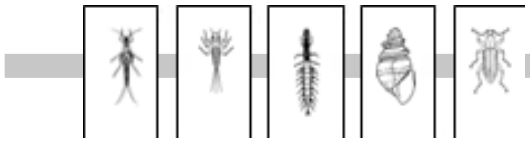
Date: _____

Team Members:_____

Site (Color of card deck): _____ Land Use: _____

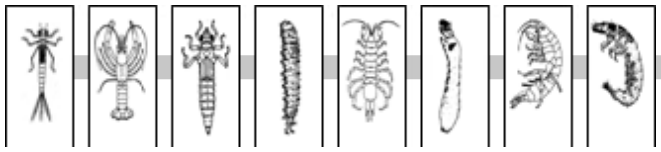
GROUP 1

Macros from Group 1 can only survive in water of high quality. If most of your macros are in Group 1 you have excellent water quality.



GROUP 2

Macros from Group 2 can survive in water of high quality and water that isn't quite as clean. If most of your macros are in Group 2 you have fair water quality



GROUP 3

Macros from Group 1 can only survive in water of high quality. If most of your macros are in Group 1 you have excellent water quality.

	Column 1		Column 2
GROUP 1		X 3 =	
GROUP 2		X 2 =	
GROUP 3		X 1 =	
		TOTAL	

Greater than 22: Excellent	17-22: Good	11-16: Fair	Less than 11: Poor

1. Fill in the information at the top of the form.
2. Put an X on the mini sorting sheet above where there are cards on your sorting sheet.
3. Count the number of boxes with Xs in each row. Write the number in Column A.
4. Multiply the numbers in Column A by the factor. Write the answers in the boxes in Column B.
5. Add together the numbers in the boxes in Column B. Write the total in the box at the bottom of Column B.
6. Circle the range that contains the number in the box. What is the water quality at your site?

BACKGROUND

Aquifers are underground rock layers that store ground-water. 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 5
BACKGROUND
LESSON PLANS
WORKSHEET

CONCEPT

Comparing the Edwards Aquifer to other aquifer formations.

OBJECTIVE

The students will:

1. build three models of three types of aquifers (sand, soil, and karstic limestone);
2. measure the rate that water flows through the three types of aquifers; and
3. measure the rate that pollution flows through the three types of aquifers .

TIME

One hour. The extension will require another class period.

VOCABULARY

Aquifer – an underground layer of earth, gravel or rock that holds water. The Edwards aquifer is underground rock that holds water.

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

TEACHER MATERIALS

In Kit: karstic limestone

Edawrds Aquifer Regional (map)

Barton Springs Edwards Aquifer Hydrologic Zones (map)

STUDENT MATERIALS - for each group of 6 students

Aquifer Research (student worksheet)

In Kit:

- 3 clear plastic bottles (cut in half and marked #1, #2, #3)
- 3 paper coffee filters
- 1 bottle of “pollution” (food coloring)
- 1 quart bag each of rocks, soil, and sand
- 100 ml beaker for measuring water

TEACHER APPRECIATION

1. Become familiar with the materials that each group will need.
2. Make copies of the Aquifer Research worksheet for each group.

INTRODUCTION

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.

Procedure

1. **WORK IN COOPERATIVE GROUPS -** Divide students into groups of six. Give each group a copy of the Aquifer Research worksheet. 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.

2. **DISTRIBUTE MATERIALS -** Pass out lab materials to each group.

3. **FORM A HYPOTHESIS -** The Recorder will read the instructions and write the hypothesis agreed upon by the group on the Aquifer Research worksheet. Students should not start the experiment until the hypothesis is finished.

4. **DO THE EXPERIMENT** - Students proceed with the instructions and conduct the experiment.

5. **RECORD THE RESULTS -** The Recorder will write the results and conclusions agreed upon by the group on the Aquifer Research worksheet.

6. **CLEAN UP -** When students have completed the experiment and recorded their results, the materials manager cleans up by washing out the plastic bottles and returning all materials except the used sand and soil to the kit.

iNTEGRATED ACTIVITY 1:

"A Journey Through the Edwards Aquifer" DVD

EVALUATION

Completed Aquifer Research worksheet .

LESSON 5
BACKGROUND
LESSON PLANS
WORKSHEET

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.

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 counts until all the water has come through the container. TIMEKEEPER should use this system to count: Mississippi One, Mississippi Two, Mississippi Three, etc. Do exactly the same experiment on #2 and #3.

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

#1_____ sec. #2_____ sec. #3_____ sec.

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. What does this mean about pollution in our aquifer?

WATER MANAGER: Add 100 ml of water to each container.

ALL SCIENTISTS: Work together to describe the differences in color? What do you think that difference means about pollution in our aquifer?

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. El encargado del tiempo debe usar el siguiente sistema para contar: Mississippi uno, Mississippi dos, Mississippi tres, etc.

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. ¿Qué nos dice esto sobre la contaminación en nuestro acuífero?

Encargado del agua: Agrega 100 ml de agua a cada recipiente.

Todos los científicos: Trabajen juntos para describir la diferencia en el color. ¿Qué nos dice esta diferencia sobre la contaminación en nuestro 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

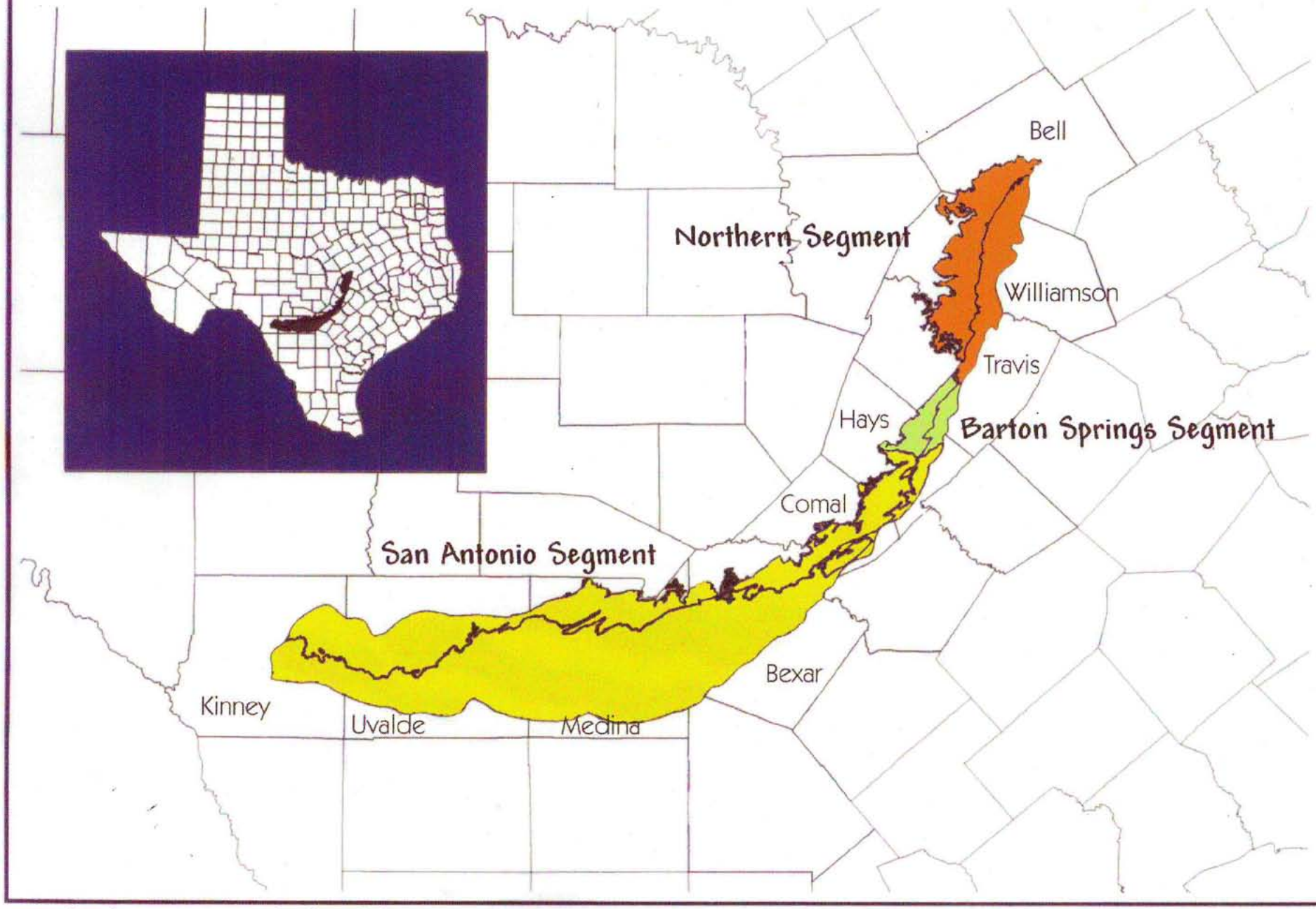
a contaminación. En nuestro experimento descubrimos que la_____ es el

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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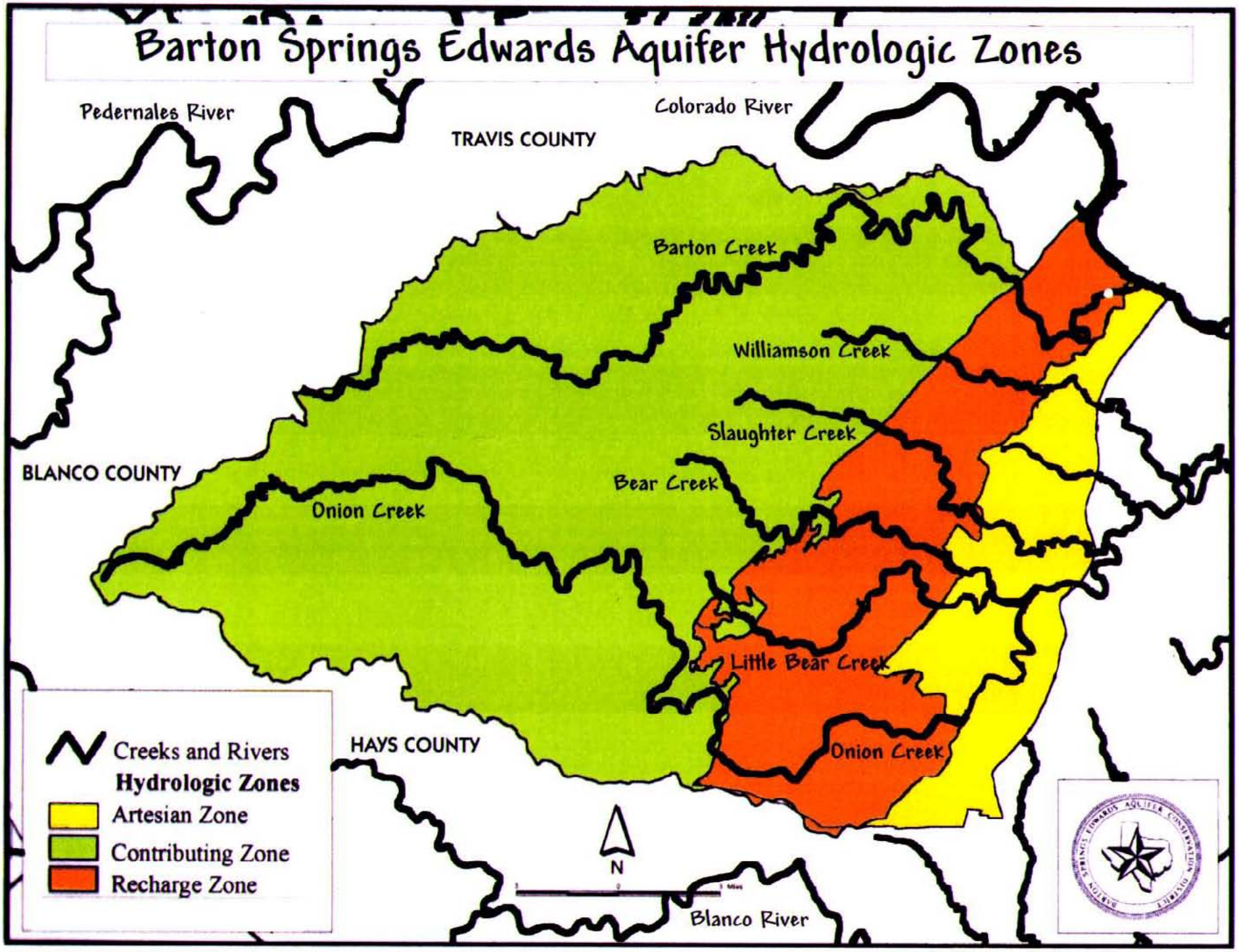

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Acorn Naturalists
Phone: 1-800-422-8886
Web: www.acornnaturlists.com
animal tracks and scat

BioQuip Products, Inc.
Phone: (310) 324-0620
Web: www.bioquip.com
forceps (soft ones for bug picking without killing)

Nasco
Phone: 1-800-558-9595
Web: www.enasco.com/science
handheld magnifiers, compass, beakers

Wards Geology
Phone: 1-800-962-2660
Web: www.wardsci.com
watershed and groundwater models

Carolina Biological Supply Co.
Phone: 1-800-334-5551
Web: www.carolina.com
gloves

LaMotte Company
Phone: 1-800-344-3100
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

REDUCING, REUSING, AND RECYCLING EDUCATION:

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/