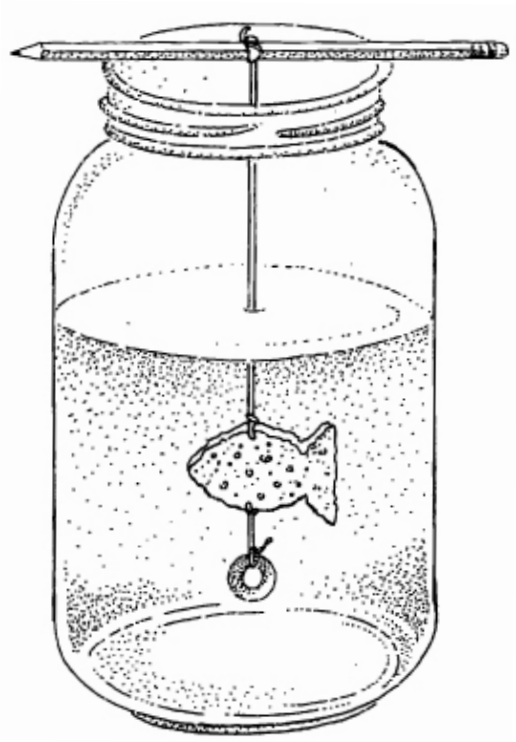
Fred the Fish

*Adapted from **Water, Stones, and Fossil Bones***
Written by Patricia Chilton-Stringham and Janet Wolanin



Time: 30 - 45 minutes

Grade level: 3rd and up

Learning Objectives: Students will be able to...
- Explain the difference between storm drains and sewer systems
- Recognize how pollution can affect local ecosystems
- Identify ways to help prevent water pollution

Contact your local water district to learn:
- *...where local storm drains release storm water runoff*
- *...if your storm water runoff is treated, and if so how?*
- *...how your recycled water is reused*

Materials:

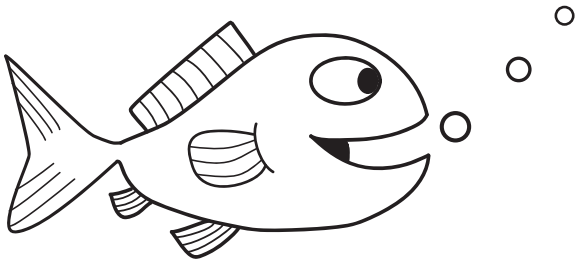
- Fred the Fish script
- Large clear plastic pitcher or container
- Water
- A plain dish sponge (no abrasive side)
- A pencil or stick
- A piece of fishing line
- Fishing weight or washer
- Sign that reads: “Oh No! Only rain should go down the storm drain.”
- A mesh strainer for cleanup

Pollution Material Options:

- A cup of soapy water (Car wash soap)
- Paper clippings (trash)
- Raisinets (dog waste)
- Maple syrup (motor oil)
- Leaves and grass (yard clippings)
- Soil (erosion)
- Nontoxic paint (exterior house paint)
- Brown sugar (fertilizer)
- Salt (road salt)
- Food coloring (leaking toxic waste)

Preparing for the lesson:

1. Print Fred the Fish script and cut into strips or create a PowerPoint by placing one set of lines on each slide.
2. Fill your large clear plastic pitcher or container about 70% full of water.
3. Using sharp scissors, cut a dish sponge into a fish shape. Use a yarn needle to thread fishing line through the center of the body. Tie a washer or fishing weight to the bottom. Tie the other end of the fishing line to a stick or pencil.
4. To suspend Fred in the water, hang the pencil across the mouth of the jar and adjust the length of the fishing line as needed. (see diagram above)
5. On an 11” x 17” piece of paper, use a thick marker to write “Oh No! Only rain should go down the storm drain.”
6. Prepare all the needed pollutants



Intro: *Storm drain/sewer discussion*

If possible, take students to a storm drain on campus, otherwise show students a picture of a storm drain. Ask students if they've ever seen a storm drain around their home before. Ask students where does the water go once it goes down the storm drain? (*depending upon where you live it may go to local creeks, rivers, or the ocean*) Ask students to guess how many people clean the water that goes down storm drains. Tell them no one cleans it *(this varies depending on where you live)*.

There is also a drain inside you classroom. Where does the water from your classroom sink go? How about dirty water in your home? It goes to a wastewater treatment plant where the water can be cleaned and then reused for things such as golf courses, parks, wetlands, etc. (*Contact your local water district to determine how recycled or reclaimed water in your area is used.)*

Activity: Have all of the materials setup on a table. Choose a student to stand next to the table and hold the "Oh No!" sign. Call one student at a time to come to the front of the room and read one script to the class. Give them a small handful of the pollutant to add to Fred's water. After the pollutant is added, have the other student hold up the sign and the entire class will say, "Oh no! Only rain should go down the storm drain." Throughout the activity ask students to communicate how Fred is feeling by: writing down a descriptive adjective, or participating in a partner share, or making facial expressions.

Wrap Up: Ask reflections questions to get your students thinking about what they just saw. Did the characters in this story have bad intentions? Did they want to hurt Fred? Did each character add a lot of pollution?

Just like you, the characters in this story thought someone cleaned the storm drains. Do you think there are other people who think that someone cleans storm drains? Could these characters have done something differently to avoid these consequences? What could they have done differently? Have students share their ideas out loud or fill out the attached worksheet.

Fred the Fish

Background Information on Storm Drain Pollution

What are storm drains and why do we have them?

When it rains onto a forest or a field, much of that water is absorbed by the ground. Some is taken up by plants, some evaporates, and some will flow over the ground and run downstream.

In a more developed setting, such as our cities and towns, rain falls onto pavement or other non-permeable surfaces, such as roofs, sidewalks, parking lots, and driveways. These surfaces do not allow the water to be absorbed into the ground. To prevent flooding, storm drains were developed to drain excess rain water, hence the name *storm drain*.

Who cleans storm water?

The water that you see flowing over impermeable surfaces like driveways, sidewalks, and streets is called stormwater runoff. Storm water runoff is directed into the nearest stream or river, making its way to the ocean. Unfortunately, the storm water runoff picks up many pollutants from both residential and commercial sources. In most cases, storm water runoff is not treated or filtered in any way. In Sonoma County, no one cleans stormwater. Anything that enters our storm drain system remains untreated and is discharged directly into our local water ways.

What is a sewer system?

A sewer system is designed to transport wastewater to a treatment facility to be cleaned. Water that has been used for things such as taking a shower, flushing the toilet, washing dishes, or doing laundry is considered wastewater. Wastewater must be treated before it can be discharged into our local waterways or reused for irrigation.

Who is affected?

Polluted water entering our waterways damages the ecosystem. When our waterways become polluted, plants, aquatic insects, birds, and other animals suffer. Ultimately, humans also suffer. Quality of water directly affects quality of life!

What are some common storm drain pollutants?

- oil, grease, and automotive fluids
- soap from car washing
- debris and litter
- fertilizer and pesticides from gardens and homes
- pet waste
- improperly maintained septic systems
- paint and cleaning chemicals
- soil from poor construction site management
- yard clippings from people who sweep them onto the street

How to prevent storm drain pollutants from entering our waterways?

1. Street litter such as styrofoam, plastic, and paper can be prevented from blowing into storm drain inlets by keeping trash bins covered and by not littering. Take care to make sure waste is recycled whenever possible.

2. Pet waste left on the ground gets carried away by storm water, contributing harmful bacteria, parasites and viruses to our water ways. It is also very acidic, changing the natural pH of water. Always carry bags with you to cleanup pet waste.

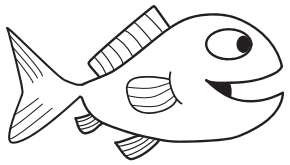
3. Vehicle fluids such as motor oil, gas, and antifreeze are very dangerous for our waterways. Maintain your vehicle to help ensure it isn't leaking fluids. If you do notice a leak, soak it up with absorbent materials such as cat litter or sawdust and dispose of it in the garbage can. If you change your motor oil at home, recycle the used oil by pouring it into a clean sealed plastic container and taking it to a certified used oil collection center.

4. Always wash used paint brushes in a container. Reuse paint solvent or take it to a hazardous-waste disposal site. Paint and solvent should not be disposed of in the sewer system and dumping it into a storm drain is illegal. Also, try using water based paints rather than oil based paints since they are less toxic and easier to dispose of.

5. Yard clippings that end up in waterways take oxygen out of the water that aquatic animals need to survive. They also create foul odors. Yard waste such as grass clippings, tree trimmings, and leaves can be composted and used for fertilizer around the yard. If you don't need them for compost, make sure to use a broom and dust pan to sweep them up and place them in your green bin.

6. Take your car to a self wash or a full service commercial car wash. Laws require commercial car washes to treat and recycle the dirty water. If this is not a feasible option, pull your car on to a permeable surface like your lawn or gravel and use a bucket for your soapy water. Dump the bucket into a household drain when finished. Always use an environmentally safe cleanser.

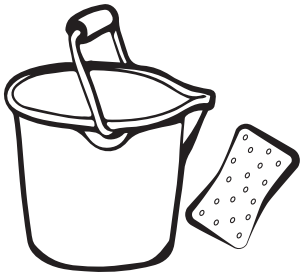
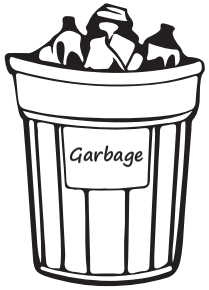
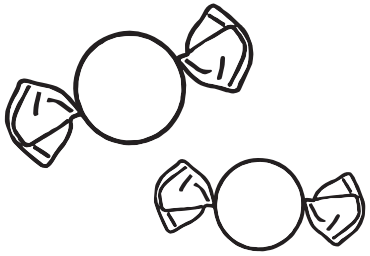
7. Use a broom and dust pan to sweep your driveway. Hosing off driveways and other pavements washes pollutants into storm drains and wastes water.

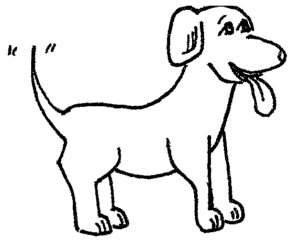
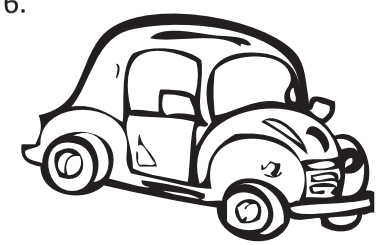
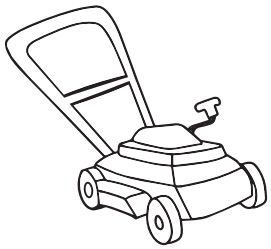


Fred the Fish

Name: _____

Write what could be done differently in each of the following situations to prevent pollution from entering the storm drain.

1.  Fred swims past a park. Some people having a picnic didn't throw their trash into the garbage can. The wind blows the litter into the storm drain.	1.
2.  Julia is washing her car. The soapy water flows down the driveway into the street and into the storm drain.	2.
3.  Scott doesn't use trash bags. He takes his garbage can outside and throws all his loose trash into the garbage bin. When the garbage truck picks up Scott's trash, it blows out of the truck and into the storm drain.	3.
4.  David and José are riding skateboards around the neighborhood. They sit down on the curb to eat candy and stick their candy wrappers down the storm drain.	4.

5. 	Maria is walking the family dog Spot. Spot needs to go to the bathroom. Maria is careful to make him go along the curb in the street so that Spot isn't messing up the neighbor's lawns. She doesn't worry because she knows the mess will go down the storm drain.	5.
6. 	Fred swims past a parking lot. He notices it is starting to rain. Some cars parked there are leaking oil. The rain washes the oil into the storm drain.	6.
7. 	Mr. Miller is mowing his lawn and trimming the bushes. He sweeps the extra grass and leaves into the street. When the rain falls, the yard clippings are washed into the storm drain.	7.
8. 	Matt is planting new plants in his yard. He uses a big pile of soil for his project. When it starts to rain, he goes inside his house. He doesn't cover the pile of dirt with a tarp. The rain washes the soil down towards the street and into the storm drain.	8.
9. 	Mary has just finished painting her house. She holds the brushes over the storm drain and sprays them with the hose to clean them off.	9.

Fred the Fish Script

Grade Level: 2nd, 3rd and 4th

Intro: Imagine a clean river as it flows through a healthy watershed. In this river lives Fred the Fish. Fred has lived here his whole life, but today he is starting a long journey downstream to the ocean.

1. Fred swims past a park. Some people having a picnic didn't throw their trash into the garbage can. The wind blows the litter into the storm drain.

2. Julia is washing her car. The soapy water flows down the driveway into the street and into the storm drain.

3. Scott doesn't use trash bags. He takes his garbage can outside and throws all his loose trash into the garbage bin. When the garbage truck picks up Scott's trash, it blows out of the truck and into the storm drain.

4. David and José are riding skateboards around the neighborhood. They sit down on the curb to eat candy and stick their candy wrappers down the storm drain.

5. Maria is walking the family dog Spot. Spot needs to go to the bathroom. Maria is careful to make him go along the curb in the street so that Spot isn't messing up the neighbor's lawns. She doesn't worry because she knows the mess will go down the storm drain.

6. Fred swims past a parking lot. He notices it is starting to rain. Some cars parked there are leaking oil. The rain washes the oil into the storm drain.

7. Mr. Miller is mowing his lawn and trimming the bushes. He sweeps the extra grass and leaves into the street. When the rain falls, the yard clippings are washed into the storm drain.

8. Matt is planting new plants in his yard. He uses a big pile of soil for his project. When it starts to rain, he goes inside his house. He doesn't cover the pile of dirt with a tarp. The rain washes the soil down towards the street and into the storm drain.

9. Mary has just finished painting her house. She holds the brushes over the storm drain and sprays them with the hose to clean them off.

Fred the Fish Script

Written by Patricia Chilton-Stringham and Janet Wolanin

Water, Stones, and Fossil Bones

Grade Level: 5th and up

Intro: Imagine a clean river as it meanders through a protected wilderness area. In this river lives Fred the Fish. HOW IS FRED? Fred has lived in this stretch of the river all his life. But now he is going on an adventure and he will travel downstream.

1. Fred swims into farm country. He passes a freshly plowed riverbank. It begins to rain and some soil erodes into the river. (Dump soil into Fred's jar.) HOW IS FRED?

2. Fred nears a suburban housing development. Some fertilizer from the farms and the lawns washed into the river awhile back. (Place brown sugar in Fred's jar.) The fertilizer made the plants in the river grow very fast and thick. Eventually the river couldn't furnish them with all the nutrients they needed, and so they died and are starting to decay. Their decomposition is using up some of Fred's oxygen. HOW IS FRED?

3. Fred swims under a highway bridge. Some cars traveling across it are leaking oil. The rain is washing the oil into the river below. (Pour pancake syrup into Fred's jar.) HOW IS FRED?

4. During a recent cold spell, ice formed on the bridge. County trucks spread salt on the road to prevent accidents. The rain is now washing salty slush into the river. (Put salt in Fred's jar.) HOW IS FRED?

5. Fred swims past the city park. Some picnickers didn't throw their trash into the garbage can. The wind is blowing it into the river. (*Sprinkle paper dots into Fred's jar.*) HOW IS FRED?

6. Several factories are located downriver from the city. Although regulations limit the amount of pollution the factories are allowed to dump into the river, the factory owners don't always abide by them. (Pour warm, soapy water into Fred's jar.) HOW IS FRED?

7. The city's wastewater treatment plant is also located along this stretch of the river. The pollution regulations aren't as strict as they should be. Also a section of the plant has broken down. (Squirt two drops of red food coloring into Fred's jar.) HOW IS FRED?

8. Finally, Fred swims past a hazardous waste dump located on the bank next to the river. Rusty barrels of toxic chemicals are leaking. The rain is washing these poisons into the river. (For each leaking barrel, squeeze one drop of green food coloring.

Fred the Fish Script

Russian River Watershed ~ Grade Level: 7th and up

1. Here we have Fred. Fred is a juvenile steelhead trout heading downstream in the Russian River towards the Pacific Ocean. He has lived in the Ukiah section of the Russian River his whole life.

2. Fred swims past a public high school in Cloverdale. During lunch, students don't throw their trash away. The wind picks up frequently and blows the loose trash into a storm drain and down into the Russian River.

3. Fred swims past a nearby neighborhood in Healdsburg. It is a weekly tradition for all the residents of Willow Court to wash their cars on the same day. The soapy water flows down their driveways and into a storm drain, and then into the Russian River.

4. Fred swims past a popular shopping center along the river in Santa Rosa. An old Chrysler is leaking oil near a parking lot storm drain. The oil flows down the storm drain and into the Russian River.

5. Fred swims past a popular dog park along the Russian River in Forestville. Dog owners let their pets leave their waste along the curbs in the parking lot throughout the year. No one worries, because the waste will disappear down the storm drain.

6. Fred swims past a private home in Guerneville that backs up to the Russian River. The homeowner is an avid gardener, leaving piles of loose soil on the back of their property for use in multiple projects. During the winter months rain washes the loose soil off the private property and into the Russian River.

7. In Duncans Mills, Fred swims past a coffee shop with a lavish patio garden. The garden uses a lot of fertilizers to keep the colorful flowers in bloom year round. After watering, the excess water runs off the patio and into the Russian River below.

8. A homeowner in Jenner has just finished painting their home along the Russian River estuary. The homeowner discovers that the most effective way to wash the paint brushes is to blast them using the hose in the front yard. The water from cleaning the brushes washes down the driveway and into a nearby storm drain, directly into the Russian River estuary.