LESSON 5

# Survey: On-Site Sketch

## Applicable TEKS

| Science Grade 4 | Science Grade 5 | Science Grade 6 |
|---|---|---|
| 4.2 B, D<br>4.3 A<br>4.4 A<br>4.7 A | 5.2 C<br>5.3 A<br>5.4 A | 6.2 C<br>6.4 A |

## Duration

Two 40-minute lessons

## Objectives

Students will sketch the survey area and surrounding lands. Students will identify different aquatic habitats.

## Prerequisites

Students should complete *Lesson 4—Water Pollution* before starting this lesson.

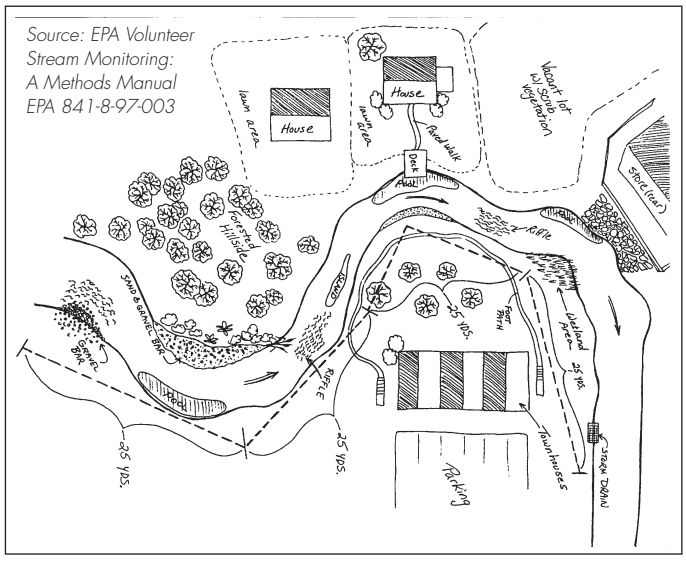
## Materials

- *Handout 5—Survey: On-Site Sketch*
- Ruler

## Procedure

1. Discuss the safety procedures. Inform them that there is to be no water contact during this lesson.
2. At the survey area, show your students the different aquatic habitats, such as—
   a. Pool: an area relatively deep and wide with slow-moving water compared to a riffle. Pool areas support fish, aquatic invertebrates, and aquatic plants.
   b. Riffle: the shallow portion characterized by relatively fast-moving, turbulent water with bottom materials composed of cobble, gravel, or bedrock. Riffle areas of streams are important habitats for many aquatic insects and small fish that require flowing water (for feeding) and high oxygen levels.
   c. Aquatic plants: generally found in sheltered areas and provide habitat for a variety of invertebrates and small fish.
3. Let your students know that these habitats (along with the depth and flow of the water) are key factors in determining the type of aquatic organisms you will find in the survey area.
4. Tell the students they are conducting a visual survey and have them all open their binders to *Handout 5—Survey: On-Site Sketch*.
5. The first part of the handout requires the students to walk around the survey area and take notes of what they see and smell. The last part is a blank page where the students will sketch the survey area and surrounding lands. Remind your students that the information they collect now will help later in future lessons when finding potential pollution sources.
6. On the blank page, students should map and describe the site, including:
   a. any noticeable pollution (use the *Student Reference Tables* for assistance)
   b. the direction the water is moving
   c. substrate characteristics (example: rocks, clay, sand, mud, etc.)
   d. bridges and other structures in the area (example: homes, fences, roads, sidewalks, etc.)
   e. surrounding land use (example: lawn areas, parking lots, exposed soil, forest, park, etc.)
   f. gravel, sand, dirt, or vegetated banks
   g. outlets for pipes, storm sewers, etc.
   h. any channelization and its substrate (example: ditches)
7. The sketch does not have to be a perfect likeness of the stream, but it should include the major habitat types, dams, bridges, location of discharge pipes, and dumps. Students should make notes on any unusual stream odors or colors.

### Stream Sketch



# Student Reference Tables

The following tables can help you determine if there is possible pollution in your stream by only using your senses. Use *Table 1—Physical Indicators of Water Pollution* to help determine the possible pollutant and then use *Table 2—General Land Uses That Might Affect Water Quality* to help determine the possible pollution source.

## Table 1—Physical Indicators of Water Pollution

| If you see the color(s) ... | The issue could be ... |
|---|---|
| Muddy tan to light brown | Suspended solids (silt and clay) due to:<br>• upstream erosion of the banks and substrate due to channelization,<br>• stormwater from logging or construction sites with inadequate erosion and sediment controls, or<br>• Stormwater from one or more areas with soil erosion, such as poorly maintained croplands and rangelands, riparian zones with removed vegetation, exposed banks, etc. |
| Pea green, bright green, yellow, brown, brown-green, brown-yellow, blue-green | An algal bloom due to high nutrient content (phosphorus, nitrogen, or both). Water color is dependent on the dominant plankton type. |
| Tea or coffee | Dissolved decaying matter originating from the organic portion of the soil. This is usually seen in woodland or swampy areas. |
| Milky white | Paint (from a construction site) or milk (from a food processing site). |
| Dark red, purple, blue or black | Fabric dyes or inks from paper or cardboard manufacturers. |
| Milky gray or black | Oxygen depletion from raw sewage or other oxygen-demanding substance; a rotten-egg or hydrogen sulfide odor might be present. |
| Clear black | Turnover of oxygen-depleted bottom waters or sulfuric acid spill. |
| Orange-red | Deposits on stream beds often associated with oil-production areas, but not always (check for petroleum odor). The color could be due to iron in the water. |
| White, crusty deposits | Common in dry or arid areas where the evaporation of water leaves behind salt deposits. These deposits are also associated with brine water discharge (from oil production areas); check to see if the stream has a petroleum odor or an oily sheen along the banks. |
| **If you smell ...** | **The odor is from ...** |
| Rotten eggs or hydrogen sulfide | Raw sewage (oxygen-demanding substance) or oxygen-poor sediment. |
| Chlorine | Treated effluent, swimming pool overflow, or industrial discharges. |
| Sharp, pungent odor | Chemicals or pesticides. |
| Musty odor | Presence of raw or partially treated sewage or livestock waste (organic-demanding substances). Musty odor could also be caused by algae. |
| **If you see on the surface ...** | **Possibly caused by ...** |
| Tan foam | Water containing organic materials with high flow or wave action. This harmless foam can be in small patches to very large clumps. |
| White foam (thin or billowy) | Soap in treated effluent, possibly around a wastewater outfall. |
| Yellow, brown, black film | Pine, cedar, and oak pollens that form a film on the surface of ponds, backwater areas, or slow-moving water of streams. |
| Rainbow film | Oil or other fuel type. Sheens are common after rains when oil and gas residue wash off streets. Other sources include spills, pipelines, and oil and gas-production areas. |

## Table 2 — General Land Uses That Might Affect Water Quality

| Land Use Type | Potential Effects |
|---|---|
| Woodland | Erosion from logging, road construction, or clear cutting may cause muddy waters. |
| Agricultural Land (croplands, pastures, feedlots, etc.) | Fertilizers or manure draining into a stream may increase the nutrient content and cause excessive algal and aquatic plant growth. Sedimentation may occur from soil erosion. Streams may also receive pesticides and herbicides in the runoff. |
| Cities and Towns | Depending on the activities occurring in the city or town, urban runoff might carry a variety of contaminants such as oil, pesticides, metals, and chemicals. |
| Industry | Industries have numerous types of chemicals and products that could cause color changes to the water, excessive algal growth, odors, absence of aquatic life, fish kills, elevated organic matter levels, and sewage fungus. |
| Wastewater-Treatment Plants | Effects may include excessive algal growth, white foam, sludge deposits (fluffy dark brown or gray solids), absence of fish and insects (or the abundance of tolerant forms), variable dissolved-oxygen levels, chlorine odor (and possible bleached vegetation near the outfall), sewage fungus, and elevated levels of *E. coli*. |
| Construction | Runoff from construction sites can cause water to become muddy and turbid. |
| Residential | Runoff from residential areas may contain fertilizers (nutrients), oil drained from cars (toxic substances), raw sewage from septic systems that overflow or leak (oxygen-demanding substances), detergents used to wash cars (toxic substances), and even litter (cans, bottles, paper, etc.). |