



# Watershed Education Guide for “Fishing in the City”

Watershed education in the classroom creates young stewards of natural resources. For this reason, it is key for schools to participate in opportunities offered through the S.F. Bay Area Fishing in the City. A grade-level specific course of study has been compiled for use with grades 3-6 that is easy for teachers to access and will engage their students. *Each suggested program correlates directly to California’s 1998 science standards [Physical Science (PS), Earth Science (ES), Life Science (LS), or Investigation (Inv)].*

## Grade 4

A. **Reading a streambed** for evidence of local geologic history.

1. **Seek to identify** common rock types (i.e. chert, sandstone - sedimentary).
2. Has weathering produced sediments such as silt, sand or gravel? [ES 5c] Find a place where students can **observe a profile** of soil layers.
3. Water is the chief agent of landscape change; relate cause-effect relationship of earth’s gravity pulling water downhill, the sediments in water wearing down the bedrock. Notice meanders or turning / curving shape of stream banks. [Inv6b,6c] Have students **measure stream flow rate** in inches per 10 seconds (may be converted to miles per hour) using ping pong ball, meter stick and second hand.
4. Erosion and deposition creates land forms; stream banks may be undercut on outer side of stream curve and sediments deposited on the inner side.

B. Investigate how energy is transferred among living things in an aquatic system.

1. **Study the inhabitants** of a pond / stream ecosystem (focus on adding in California native plants and animals wherever possible). [LS 2a] Energy enters through algae (phytoplankton) and other plants with chlorophyll.
2. **Find insects in-stream** at your study site and use an insect viewer box or magnifying lens to identify them. What do the species you found indicate about the water quality? Is there evidence the site is used by other animals (tracks, scat)? [LS 2c,2d]
3. Create food webs with arrows to **show energy transfer**; producer-consumer / predator-prey, scavenger (crayfish), decomposers (fungi, microbes, some insects). [Inv 6a] What can be observed with dead - decaying plant or animal material? What inferred?

- C. Students identify the **living and non-living parts** of their aquatic study area. *[LS 3a,3c]*
1. **Make a list** for each category and add elements to each one. Ask students to explore how the items in one category may be dependent on one another (i.e. dependence of animals on plants for food and shelter). What about items on opposite lists?
  2. **Discuss** an insect-plant mutualism with the feeding / pollination team effort. Lichen is also a good example of a “two in one” symbiotic relationship between algae and fungi.
  3. Predict temperature values then **use thermometers** to measure the temperatures of water and air over differing times / dates. Is there a cause-effect relationship? *[Inv 6c,6e]* **Construct a graph** of the data to help students interpret a comparison of the values.
  4. How do living things in a riparian habitat impact their environment causing changes which may be beneficial or detrimental?
    - a. **Consider how** a beaver dam on a stream could physically alter the environment. Salmon will die in the water after they spawn. Their carcasses contain many nutrients from life in the ocean that are released in the fresh water habitat. *[LS 3e]*
    - b. Urban development may disturb soils near a stream site. What might occur as a result? This is a nice opportunity to discuss or **role play** relevant local issues. Encourage personal responses from students.
- D. Have students **create a map** of the area showing scale with a compass rose for orientation (can be nicely related to earth’s magnetic field): *[PS 1b]*
1. Allow students an opportunity to get familiar with the length of their pace. *[Inv 6b]*
  2. They can **pace off distances** in the field, recording the number of paces for length and width of study area as well as distances between interesting land forms, prominent trees, etc.
  3. Back in the classroom the field data may be transferred (drawn) onto large grid paper or butcher paper using **approximate measure of scale**. This can be adapted as a team activity.
    - a. Use differing textures to show areas of exposed gravel and sandy banks in contrast to leafy soil (loam); locate ferns and other stream side plants.
    - b. Trees may be placed and identified by type with overhead view of crown spread (transparent to features below).
    - c. Mark in any existing trails, testing stations and other relevant site features. Students adding their own title to the maps enhance their ownership of the project.

For more information, please contact California Dept. Fish and Game  
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