



Watershed Education Guide with “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 3

A. **Look at water** in the natural environment: creek, pond, lake, ocean or bay.

1. Water is matter which can absorb heat energy and **change form** (i.e. evaporation, melting) [*PS 1e, 1f*]. Rain clouds and melting glaciers supply water for fresh water creeks and rivers.
2. Water can be mixed with other substances. Salt water, like the ocean, has **different properties** than fresh water (i.e. lower freezing temperature).
3. Tiny air bubbles, too small to see, are also found dissolved (mixed) in water. Fish and other aquatic animals must have this air to breathe and survive.
4. Emphasize the value of keeping water clean (no trash, soap, soda drinks, etc.).

B. **Energy can be observed** in a natural, aquatic setting such as a local creek or pond.

1. Because water has mass and is heavy it will flow downhill (**kinetic energy**).
2. Students can predict what will happen when they **toss a pebble in the water**. [*PS 1d*]
 - a. Compare opinions to their observations of ripples; waves carry energy [*Inv 5e*] from one place to another.
3. Light from the sun (source) travels to your natural setting and may be blocked. **Observe the canopy** of stream side trees creating shadows. [*PS 2a, 2b*]
 - a. Some fish depend on cooler temperatures caused by shade in order to survive.
4. **Observe the surface** of the water. Light rays reflect off the surface as off of a mirror.

C. Have students **make a perceptual map** of their aquatic setting (do not worry about accuracy of scale for this activity).

1. They should draw relative locations of **key points of interest** as they remember them.
2. This might include a boundary of the water, special rocks or trees, animals for which they found evidence (call of a bird, animal tracks, etc.), and landmarks made by people.

D. Students can **categorize living things** in the aquatic habitat by **similarities and differences** of physical features and behaviors that are special adaptations for growth and reproduction. [*LS 3a*]

1. For birds, compare: beaks for getting food, feathers for warmth, flight, camouflage, behavioral displays, adult color change, foot shape or leg length, nesting, and egg-laying (egret, hawk, duck).
2. In fish, compare: mouths for different types of getting food, body shapes & colors, fins for locomotion under water, gills, scales, egg-laying, and migration (catfish, sunfish, salmon).

3. Look at the adaptation of Tule reed or cattail: leaves capture the sun's energy as fuel, roots are submerged, hollow stems carry air to the roots, and seeds scatter by wind.
- E. Environmental changes can result in aquatic wildlife moving away, dying off or even extinction where basic **survival needs** are not being met [*LS 3d*].
1. Environmental changes can be caused by: flooding or drying of a water resource; change in air (oxygen) or salt content of the water; pollution; loss of heat as stream canopy is removed; sand eroding into creek covering gravel spawning beds; roots and fallen logs cleared leaving no hiding places; or movement barriers (dams).
 2. People can **restore habitat** to benefit the survival of aquatic life by: insuring sufficient flow of water; reducing pollutants that could wash into water; planting stream side trees and making silt fences for stopping soil erosion; building fish ladders and removing barriers to fish migration.
 3. The life cycle of the threatened salmon population is a good example of problems resulting from environmental change and solutions being applied with habitat restoration.

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