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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 6

A. **River and stream courses are dynamic**; recurring patterns continually shape topography: *[ES 2a]* Erosion depends upon the actions of water and ice combined with the downward pull of earth's gravity. Weathering of rock produces sediments which may be transported by the current and act as tiny cutting blades (abrasion) against the rock of the streambed, slowly wearing away the bedrock. The removed or **eroded sediments** are transferred from one place to another, and eventually **deposition** occurs as the particles are deposited farther below in the watershed creating a new landform. Can your students spot signs of erosion and deposition at your selected creek site? Have students observe or **draw the soil profile** they may find on exposed banks of your stream study site. Layers of different sized particles result from a history of deposition by water moving at different speeds. [Gravel falls out from a flow early because it is heavy. Tiny silt particles will not settle out until the water is moving slowly or is completely still.] *[Inv 7g]* What do the patterns tell about past events? Tie in a discussion of a 100 year flood event. Identify low-lying benches or terraces and other evidence (i.e. presence of riparian forest) of the extent of a **flood plain**. You may find an example of a levee, or raised area paralleling the waterway, designed to keep water from escaping above the stream banks. *[ES 2c]* Sandbags and rock lined banks (rip wrap) have been used to control moving waters. Are they always successful? Could your stream channel change course in 500 years time? **Consider causes and make predictions.**

B. **Use specific examples** to highlight key California watersheds: The western Sierra Nevada Mountains capture water which drain via a number of rivers into the Sacramento River and San Joaquin River and ultimately to the San Francisco Bay Delta and San Francisco Bay; the eastern slopes of the Sierras experience a rain shadow effect. Elkhorn Slough, which drains to Monterey Bay, shows continued erosion deep within the bay creating a submarine canyon. *[ES 2b]*

C. **Have your students learn to read and use topographic maps**: A **contour line** represents a series of connected points which are all of equal elevation above sea level. Utilize activities in which students can compare a simple cross sectional drawing of a hill with a topographic model of the same hill. Challenge them to correctly match the contour line drawing with its descriptors. Try a Great Flood activity to **make your own contour lines** of equal elevation. Within small rectangular tubs, students fashion clay mountains. They fill the tub with 2 cm water incrementally, recording a level water line by marking the clay with a toothpick as they progress. When done, tape a clear plastic overhead sheet level across the top of the tub. From this angle the finished set of etched marks are traced on to the plastic sheet. Project results on screen for group viewing. Have students explain which lines represent higher elevations and how they know this. Students respond to **making maps or building models of the local watershed**. *[Inv 7f]* Obtain USGS topographic maps of your area. Identify the ridge tops surrounding the valley basin in which your school is located by marking X's on the high points. Then draw a line connecting the marks so that you have outlined the boundaries separating your watershed from neighboring watersheds. [It may be valuable to redraw your defined watershed, selecting lines at wider intervals - i.e.

sea level, 200 ft., 400 ft., etc. - and simplifying the hard curves of the contour lines for easier reading.] A map “adapted” in this way lends itself for use with students adding place names and adding coloration - i.e. green for sea level to 200 ft., yellow for 200 to 400 ft., orange for 400 - 600 ft., and so forth. Indicate areas of unique habitat such as salt marsh or riparian habitat. Other land uses affecting watersheds such as roads, housing, farms, commercial centers, open space, etc. can be shown on the local maps and provide opportunity for vibrant discussion of impacts. A great project extension is to **make a three dimensional model of the watershed**.

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