

Mapping Your Watershed

Interpreting maps of the San Francisco Bay



Overview

In this activity, students will become familiar with the geography of California as it relates to San Francisco Bay's watershed by examining various types of maps. Students will travel around the classroom in small groups, visiting different map "stations" and working together to answer questions about each map.

Estimated Time

1 hour

Objectives

Students will be able to:

- read a variety of maps and present the information they gather from the maps
- describe the geography of California and San Francisco Bay

Materials

- Copies of map questions and worksheet
- A 12-15 inch length of string
- Masking tape
- Some or all of the following maps:

Bay Area Road Map

AAA or Grocery Store

Satellite and/or Physical maps

Bay Model (415) 332-3871

<http://www.spn.usace.army.mil/bmvc/>

Past and Present Habitat Maps

San Francisco Estuary Institute (510) 231-9539 or

<http://www.sfei.org/ecoatlas/Habitat>

California Water Map

Water Education Foundation (916) 444-6240 or

<http://www.water-ed.org/store/default.asp?parentid=2>

Nautical Charts

San Francisco Bay Southern Part: #18651,



San Pablo Bay: #18654,

Entrance to San Francisco Bay: # 18649,

Suisun Bay: #18656,

West Marine

<http://www.westmarine.com>

Topographical Map of your area

US Geological Survey,

http://topomaps.usgs.gov/ordering_maps.html

A map of your local area, such as:

East Bay Creeks Map

Oakland Museum (510) 238-3884 or

<http://www.museumca.org/shop/store.html>

Santa Clara Valley Watershed Poster

Save The Bay (510) 452-9261 or savebay@savesfbay.org

Wild in the City! Past and Present Map of San

Francisco, Marin Headlands Visitor Center (415) 331-1540

California's Science Content Standards

Grade 6

Standard Set 2.a: water running downhill is the dominant process in shaping the landscape, including California's landscape.

Standard Set 7.f: read topographic map and a geologic map for evidence provided on the maps, and construct and interpret a simple scale map.

Grades 9-12

Earth Sciences Standard Set 9.c: the importance of water to society, the origins of California's fresh water, and the relationship between supply and need.

Investigation and Experimentation Standard h: read and interpret topographic and geologic maps.

Teacher Procedure

1. Place maps on desks or tables around the classroom. Tape the appropriate list of questions next to each map. Number each map station to facilitate movement between maps.
2. Divide the class into equal groups according to the number of map stations you have.
3. Instruct each group to stand by a station.
4. Explain that each group will have a few minutes at each station. Tell them to follow the instructions they find at the station, and to write down the answers to the questions. Students should stay at their station until you give everyone the signal to rotate. Tell the students the order in which they will be moving from map to map.
5. Begin the activity, and continue until every group has visited every map.

Follow up

Have each group present one of the maps and discuss their findings. How do their answers

compare to those of the rest of the class?

Extension

For older or more advanced students, you may want to use this alternative set-up: instead of placing questions next to each map, give each student or group of students a list of questions to answer, taken randomly from the map questions. Part of the challenge is that students must *find* the map that best answers each question.

Map Questions

Creek & Watershed Map of Oakland and Berkeley

1. Locate your school on this map. Which creek is closest to your school?
 2. With your finger, trace the path of that creek as it flows to the Bay. Does it go underground at any point?
 3. Use the string and the key on the left side of the map to determine the approximate length of the creek. How long (in miles) is the creek? How many miles are underground? What percentage of the creek is underground?
 4. Name three landmarks, buildings, parks, or roads that are built on top of fill land.
 5. Name two artificial bodies of water.
 6. What kind of water would you expect to find in Lake Merritt (fresh, salty, or brackish)?
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Creek and Watershed Map of Hayward and San Leandro

1. Locate your school on this map. Which creek is closest to your school?
 2. With your finger, trace the path of that creek as it flows to the Bay. Does it go underground at any point?
 3. Use the string and the key on the left side of the map to determine the approximate length of the creek. How long (in miles) is the creek? How many miles are underground? What percentage of the creek is underground?
 4. Name three landmarks, buildings, parks, or roads that are built on top of fill land.
 5. Name two artificial bodies of water.
 6. How is Lake Chabot connected to San Francisco Bay? What kind of water would you expect to find in Lake Chabot (fresh, salty, or brackish)?
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Creek and Watershed Map of Fremont & Vicinity

1. Locate your school on this map. Which creek is closest to your school?
 2. With your finger, trace the path of that creek as it flows to the Bay. Does it go underground at any point?
 3. Locate the areas on the map that are labeled “tidal or fresh water marsh and ponds, circa 1850.” What are those areas used for today?
 4. Name three creeks that flow into a flood control channel.
 5. Locate the artificial bodies of water near points of interest 8, 9 and 11. What were those bodies of water originally used for? What will they be used for now and in the future?
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Topographical Map

1. Find a creek on this map. Use the string and the scale on the map to determine the exact length of the creek.
 2. What do the contour lines on the map represent? Can you find a flat area and a steep area? Can you find the top of a hill and a valley?
 3. What is the watershed for the creek you chose? A watershed is the area of land that sheds water to the creek. The watershed for a creek is defined by the ridge lines (highest points) which separate it from another creek's watershed.
 4. Can you find any roads on the map? How are these different from and similar to the creeks?
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Entrance to San Francisco Bay Nautical Chart

1. Maps can be made to highlight different things. For example, some maps highlight landforms while others highlight roads and highways. What do you think this map highlights?
 2. What do the small black numbers on this map represent?
 3. Locate the Golden Gate Bridge, Angel Island, and Alcatraz.
 4. Notice where it says "Westbound San Francisco Bay Traffic Lane" and "Eastbound San Francisco Bay Traffic Lane." What type of traffic do you think this is referring to?
 5. What do you think is the average depth of the Bay? What is the deepest point?
 6. What happens at 122° 35' longitude, 37° 45' latitude?
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San Francisco Bay Southern Part, Suisun Bay, and San Pablo Bay Nautical Charts

1. Maps can be made to highlight different things. For example, some maps highlight landforms while others highlight roads and highways. What do you think this map highlights?
 2. What do the small black numbers on this map represent?
 3. What is the average depth of this part of San Francisco Bay?
 4. What do you think the white area in the water represents?
 5. Locate three different sloughs. Using what you observe on the map, create a definition for the word "slough."
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California Satellite Image or Physical Map

1. Locate San Francisco Bay.
 2. The watershed of San Francisco Bay includes all the land that water flows over and through on its way to the Bay. It includes about 40% of the state of California. Discuss with your group what exact area you think is included in the watershed of San Francisco Bay. Why did you choose that area?
 3. If a watershed is compared to a bathtub, what part of the bathtub is the Bay?
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Past and Present Bay Area Eco Atlas

1. List three changes that have occurred in the San Francisco Bay area. Do you think these changes came about naturally, or did they involve humans?
 2. Which habitats existed around the Bay in the past but no longer exist today?
 3. Which habitats exist now that did not exist in the past?
 4. What affect do you think the changes in habitats has had on wildlife in the Bay area?
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The San Francisco Bay Area Satellite Image

1. Point to the place where fresh water is coming into the Bay from the Central Valley. Point to where salt water is coming into the Bay. What kind of water would you expect to find in the Bay?
 2. What color surrounds most of San Francisco Bay? What does that color represent on this map?
 3. What are some things that rainwater and creek water might pick up on their way to the Bay?
 4. What do you think the bright green, yellow, and orange areas represent? (If you don't know, try to use another map to figure it out.)
 5. When you are on the Golden Gate Bridge, you can see the ocean on one side of the bridge and the Bay on the other. Locate the Golden Gate Bridge on this map.
 6. Find the approximate location of your school. What landmarks on this map helped you find it?
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California Water Map

1. Name four rivers that are flowing from the Sierra Nevada Mountains towards the San Francisco Bay.
2. What are the names of two rivers that flow from the Central Valley into the Delta and then into San Francisco Bay? Hint: one flows from the north and one flows from the south.
3. Do you think Lake Tahoe is part of the San Francisco Bay watershed? Why or why not?
4. From what river does the Hetch Hetchy aqueduct divert water? To where does the Hetch Hetchy Aqueduct carry water?
5. How does water get from the Delta to Los Angeles?
6. From where does San Diego import most of its water? Do you think it is necessary for San Diego to import water? Why or why not?

San Francisco: Wild in the City!

1. Which areas of San Francisco were under water before 1750?
2. What areas of present day San Francisco used to be Ohlone villages or seasonal camps?
3. What was the landscape of Golden Gate Park before 1750?
4. Locate your home, school or any familiar place on the 1990's map. How do you think that area looked before 1750?
5. What has happened to most of San Francisco's creeks?

Santa Clara Valley Watershed Poster

1. How many creeks enter the Bay south of the Dumbarton Bridge?
 2. Trace the flow of Guadalupe Creek and River. How many freeways does it pass under?
 3. What might the water in South Bay creeks be carrying to the Bay?
 4. Locate your home, school or any familiar place on the map. Which creek would the water from that place flow?
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Bay Area Road Map

1. Locate your school on this map. Using roads and highways, find the shortest route to the Bay.
2. Using the map scale, determine how many miles you would need to travel along roads from your school to the Bay. How many miles would you need to travel “as the crow flies”?
3. Locate San Francisco International Airport and Oakland International Airport. How do you think people were able to build these airports so close to the Bay?
4. The green areas on this map represent parks, wildlife refuges, and preserves. Locate a park, refuge, or preserve that you have visited.

Another California, Bay, or Local Map?