

Selecting and Documenting Your Hydrosphere Study Site

Site Selection

Ideally, the Hydrosphere Study Site is located within a 15 km x 15 km area, called the GLOBE Study Site, with your school located near the center. Within this area, select a specific site where the measurements of the hydrosphere Investigation (water temperature, transparency, pH, dissolved oxygen, alkalinity, electrical conductivity or salinity, nitrate, or freshwater macroinvertebrates) can be taken. You may also choose a water body of special interest to you within your GLOBE Study Site. The water bodies that scientists are most interested in are (in order of preference):

1. Stream or river
2. Lake, reservoir, bay, or ocean
3. Pond
4. An irrigation ditch or other water body used because one of the above is not accessible or available within your GLOBE Study Site.

You should collect all water samples from the same place at the Hydrosphere Study Site each time. This is called the *Sampling Site*.

If the site is a moving body of water, like a stream or a river (*lotic*), locate your *Sampling*

Site at a riffle area (a place where the water is turbulent and moving but not too fast) as opposed to still water or rapids. If the site is a still body of water, like a lake or reservoir (*lentic*), find a *Sampling Site* near the outlet area or along the middle of the water body, but avoid taking samples near an inlet. A bridge or a pier are good choices.

If your brackish or salt water body is affected by tides, you will need to know the times of high and low tide at a location as close as possible to your *Hydrosphere Study Site*.

Freshwater macroinvertebrate sampling is done at locations near your water quality *Sampling Site*. Since different creatures live in different habitats, sampling sites will depend on the habitat type or types represented near your site. The protocols will direct you in selecting and sampling different habitats.

If others are doing research at your *Hydrosphere Study Site*, contact them before your students take measurements to avoid your students potentially interfering with other research. Your students may be able to contribute to ongoing research by taking measurements.

Welcome

Introduction

Protocols

Learning Activities

Appendix



Documenting Your Hydrosphere Study Site



Information about your GLOBE Hydrosphere Study Site is essential for students and scientists to interpret the water data of your school. Students need to keep current and accurate Science Logs, report unusual findings, and attempt to understand the data they are collecting both spatially and temporally. This means understanding what is in their entire watershed and how their area changes over time. Students will find seasonal patterns and they may also find longer-term changes or trends.



You will be asked to provide information on your site in three ways: through written comments, photographs, and a field map.

Written Comments



Students are asked to provide specific information when they define their site, by filling out the [Site Definition Sheet](#).

In addition to supplying this information, you must also carefully observe and report other things that may affect the water at your site. For example, you may observe migratory waterfowl in the pond, a large storm may have caused trees to fall into the stream or a new bridge is being built slightly up the stream from where you are sampling. You may be collecting other GLOBE data such as precipitation, soil pH, or land cover that might affect the water. Teachers can support these efforts by helping students find other resources to use such as maps, reports from other monitoring groups or government agencies, local experts, and other people who may have special insight into the history of the community.



As requested on the *Site Definition Sheet*, please provide the manufacturer and model name for the test kits. If you change the type of kit, please update the site definition information.



All observations should be documented in Science Logs. They should also be reported in the *Site Definition Sheet*, under *Comments*, and reported to GLOBE.

Photographs

Once each year, take photographs of your *Hydrosphere Study Site* to share with other schools as requested or other schools along the same waterway. Take four photographs, one in each cardinal direction (north, south, east, and west) while standing where you normally stand to collect your water sample.

Field Map

Sketch a field map of your *Hydrosphere Study Site* each year following the guidelines in the [Mapping Your Hydrosphere Study Site Field Guide](#). The field map will help you become familiar with your site and identify micro habitats as well as surrounding land cover that may affect the water. This map can also be shared with other students that you are collaborating with.

Teacher Support

Each time you establish a new *Study Site*, no matter which protocols are collected, your students should fill out a new *Site Definition Sheet*, take photographs of the site, and make a map following the [Documenting Your Hydrosphere Study Site](#) and [Mapping Your Hydrosphere Study Site](#) field guides. After the initial site description, you can update your site definition information, as well as take new pictures and create a new map. Ideally, this could be done at the beginning of the school year. If you are using a new group of students to take Hydrosphere measurements, use this opportunity to introduce them to your existing *Hydrosphere Study Site*. If you are using the same group of students, use this opportunity to explore and document any changes that may have occurred since the previous year. Maintaining your site definition information, photographs and site maps of your *Hydrosphere Study Site* once a year is essential for the interpretation of your Hydrosphere data by your students, other GLOBE students, and scientists alike.

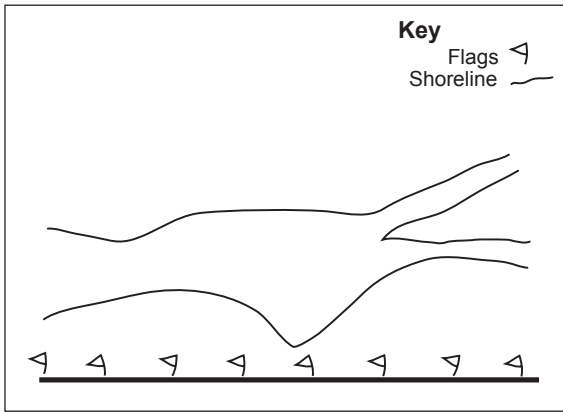
When you create the map of your *Hydrosphere Study Site* select a stretch of at least 50 meters along the bank that contains the site where you collect your Hydrosphere measurements as well a variety of habitats. The *Mapping Your Hydrosphere Study Site Field Guide* asks students to walk along the 50-m stretch they are mapping. Students should do this only if it is safe for them to do so. If your site is a river or stream, the likely habitats you may find are,

- run areas - where water flows freely and there is no turbulence;
- pool areas - where water is standing or still; finest sediments will deposit here;
- riffle areas - where there are rocky obstructions in the river bed resulting in turbulence; rocks deposit here;
- gravel bars – deposits of gravel within the stream, above the normal level of the water; and
- sand bars - deposits of sand within stream, above the normal level of the water.

If your study site is a lake, pond, reservoir, bay, ocean or other, likely habitats you will find are,

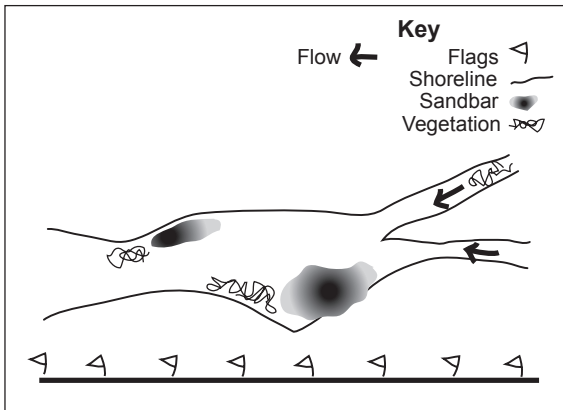
- vegetated banks: areas where vegetation grows into or hangs into the water;
- logs or snags: areas where partly or wholly submerged logs, branches, or other vegetation form habitat areas;
- aquatic vegetation: areas where submerged plants grow; and
- gravel, sand or silt: areas with no plants or debris.

The following is an illustrated example of creating a field map of a Hydrosphere Study Site.



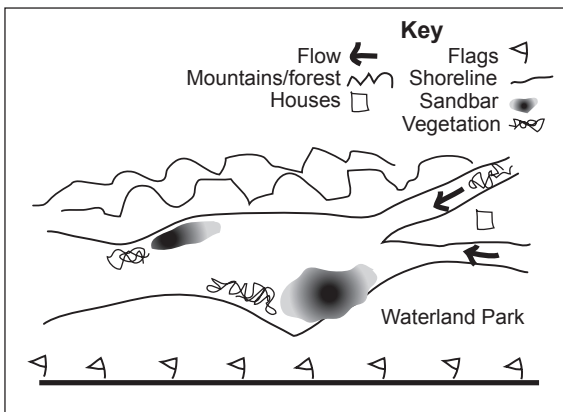
Begin by laying out a transect and marking it every 3 meters with flags. Each square on your paper will represent the area between two flags.

Draw the bank or coastline by measuring from the transect to the shore. If the far shore is too far away to fit on your map, indicate this with an arrow and the approximate distance.

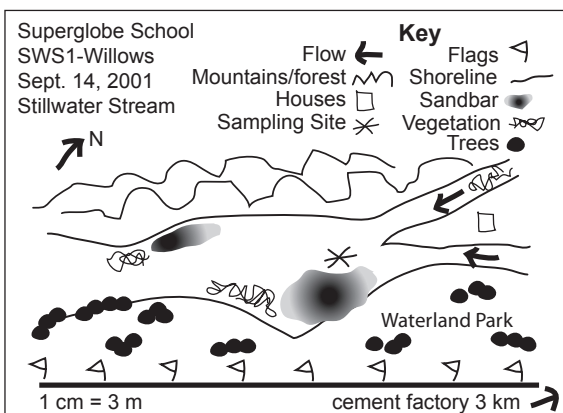


Add features to your water site. Show areas of different habitats, snags, dams or bridges, sand bars, etc. Use a different symbol in the Key to represent each feature.

Indicate the direction of water flow or inlet and outlets if known.



Add features from the surrounding area such as residential areas, trees, forests or grasslands, agricultural or recreational areas, parking lots, etc.



Add other features along the water site that might help identify your site or interpret your data such as cliffs, big trees, docks, limestone outcrops, clay deposits, etc.

Important features not shown on the map, such as industry or dams upstream, can be indicated with an arrow and approximate distance.

Add your school and site name, name of the water body, scale, north arrow, and date.

Documenting Your Hydrosphere Study Site

Field Guide

Task

Describe and locate your Hydrosphere Study Site.

What You Need

- [Site Definition Sheet](#)
- [GPS Protocol Field Guide](#)
- Pencil or pen
- Compass
- GPS Receiver
- Camera
- GLOBE Science Log

In the Field

1. Fill in the information on the top of your *Site Definition Sheet*.
2. Locate your Hydrosphere Study Site following the *GPS Protocol Field Guide*.
3. Record the name of the water body you are sampling, using the name commonly used in maps. If your water body does not have a common name, then provide the name of the water body your water site comes from or flows into or both. For example, Unnamed Stream, Tributary to Green River; Unnamed Stream, Outlet from Whiterock Lake; Unnamed Stream, Outlet from Bear Lake, Tributary to Black Creek.
4. Record whether the water is salt water or fresh water.
5. If your water site is moving water, record whether it is a stream, river, or other and its approximate width in meters.
6. If your water site is standing water, record whether it is a pond, lake, reservoir, bay, ditch, ocean or other and whether it is smaller than, larger than, or about equal to a 50 m x 100 m area. If known, indicate the approximate area (km²) and depth (meters).
7. Record whether your sample location is an outlet, bank, bridge, boat, inlet or pier.
8. Record whether you can see the bottom.
9. Record the material from which the bank or channel is made.
10. Record the type of bedrock, if known.
11. Record the manufacturer and model number for each chemical test kit you are using, if any.

12. Record in the *Comments* section any information that may be important for understanding the water at your site. Some possible observations might be:
 - a. Any upstream discharge into your body of water
 - b. Whether the flow (streams) or water level (lakes) is regulated or is natural (for example, flow is regulated downstream of dams).
 - c. Types of plants and animals observed
 - d. Amount of vegetation in the stream
 - e. Human uses of the water: fishing, swimming, boating, drinking water, irrigation, etc.
 - f. Other information about why this specific site was selected.
13. Standing where you will be collecting your water sample, take four photographs of your sampling area, one in each cardinal direction (N, S, E, W). Use a compass to determine the direction.
14. If you've taken photographs of your site label each photo with your school's name, the name of the study site name, and cardinal direction. Keep an electronic copy to provide to any collaborating schools or for student research.

Mapping Your Hydrosphere Study Site

Field Guide

Task

Make a scaled field map of your Hydrosphere Site.

Materials

- [Hydrosphere Site Mapping Sheet](#)
(1 cm grid paper)
- Measuring tape (50 m)
- Compass
- Flags (18)
- Pencil/eraser

In the Field

1. Select a section of the bank at least 50 meters long as your study area, if possible. You may consider the entire water body as your study area if it is small enough. The area should contain the sampling site where you collect your water measurements as well as a variety of habitats.
2. Use the measuring tape to measure a straight transect, at least 50 meters long, parallel to the shoreline, and within 10 meters of the bank. The transect will be varying distances from the water if the bank is not straight.
3. Place flags at the two ends and at every 3 meters along the transect.
4. Start drawing your map using the flags to help keep it to scale.

Note: Using the *Mapping Field Sheet* or graph paper with 1 cm squares, each square should represent 3 meters. Put the scale on your graph.

5. Mark the transect and flag positions on the map.
6. Draw the waterline or bank by measuring from each flag directly to the water, placing a small dot on the map to show the waterline, then connect the dots with a dotted line to indicate the bank.
7. Put in the opposite bank or indicate the approximate distance to the opposite bank if known.
8. Use an arrow to indicate the direction of water flow or the inlet and outlet of your water body.
9. Create a key with symbols for special features found at your site. Use these symbols to indicate where special features are located on the map. Suggested features to include:
 - Within the sampling area: riffle areas, pools, vegetated areas, logs, rocky areas, gravel bars, sand bars, bridges, docks, jetties, dams, etc.

- Around the sampling area: land cover (or MUC codes), geological features such as cliffs or rocky outcrops, man-made features such as houses, parks, parking lots, factories, roads, dumps or debris, etc.
10. Show the location of your Hydrosphere Sampling Site.
 11. Include the following information on the map:
 - Name of site
 - Name of water body
 - North arrow
 - Date
 - Scale (e.g., 1 cm = 3 m)
 - Key to all symbols used on the map
 12. Scan your map to have an electronic version to share with other schools and have a hard copy for your students to use as a reference or to include in their student research.

Frequently Asked Questions

1. Is it acceptable to use a man-made site, e.g. a pond built near the school?

Although natural sites are first in the order of preference, man-made sites may be used. Many lakes and ponds are man-made

2. My coastline curves. Is this an appropriate site?

You will seldom find a perfectly straight coastline. Try to pick as straight a stretch of coast as possible or an area of coast representative of the water body.

3. There are agricultural fields to the north of my site. How should I indicate them?

In the *Comments* section, note anything within your watershed that you think might affect the water. On the field map, note direction and approximate distance to major land cover features of the surrounding area.

4. My beach has both rocky and sandy shores. Should I choose a mix or try to find a site with just one type of habitat?

Try and find a site with just one type of habitat. The sampling procedures for different types of coast are different.

5. We live fairly near to a river, but my class

can't go that far for sampling every week. Should we choose a less preferable, but closer site?



Try to sample water bodies that are significant to your area, even if you have to use a less frequent sampling strategy. Sites closer to the school, that can be sampled weekly, can also be chosen as a second sampling site. This often makes for interesting comparisons between the sites.

6. Can I choose a site that is sometimes dry? Water sites may sometimes dry up, be frozen, or become flooded so that data cannot be collected. If one of these situations occurs, check 'dry', 'frozen' or 'flooded' on the data entry page for each week that you cannot collect a water sample. This will indicate to researchers that the site is still being monitored even though water data cannot be collected.

7. Can I have more than one site on a river or lake?

Multiple sites along a watershed are desirable. Significant differences might be found at sites with different depths, near different land cover, or in tributaries of a larger river or body of water.