

Chapter 3 Graphics and Other Visual Tools

- When to use graphics
- Maps
- Charts
- What makes a good graphic?
- Scale considerations
- Tailor graphics to audience and venue
- Photographs
- Slides and overheads

A story about your watershed, while compelling, must compete for attention with the likes of *USA Today*, MTV, and the World Wide Web. Graphics are one way to draw attention to the words and numbers that tell your story.

This section offers some basic tips on graphic presentations, discusses different uses of visual materials for particular audiences and data types, and provides relative cost information.

When to use graphics

Graphics should be used as often as possible. In addition to their value as attention getters, graphics help people *see* what's going on. The simplest way to present data may be to display rows of raw numbers, perhaps with a narrative description thrown in for good measure. This is simpler for the author, but not for the audience. Graphics enable the audience to quickly catch trends that occur and grasp the significance of any unusual values. In most cases, figures and summaries will reveal these better than a forest of specific values. Charts reveal trends and relationships, photographs and maps record natural appearances, and diagrams (e.g. hydrologic cycle or food web) explain natural processes. Graphics have their place in all the presentation methods discussed in this manual, from reports to videos.



There are several commonly used graphic techniques to choose from: maps, charts, photos, tables, graphs, and drawings. All convey information, but some are better than others in certain situations. What kinds of graphics match the story you are trying to tell? Some attributes of the different graphic types are described in the following pages.

Maps

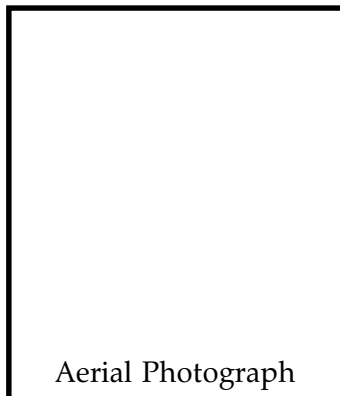
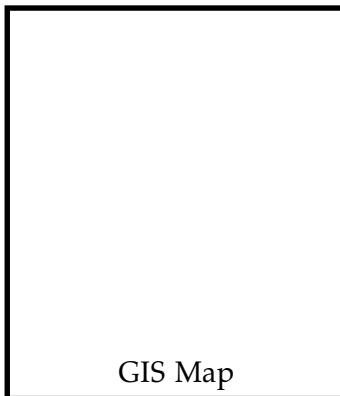
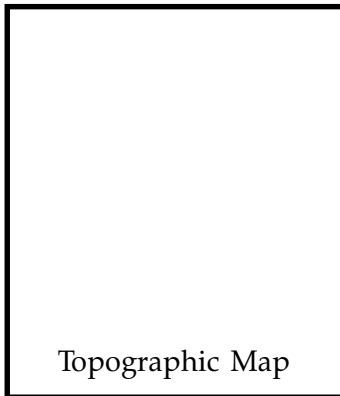
Every presentation should include a map. Maps help bring sampling results into people's lives by linking the location of sampling sites or of pollution problems to their homes, businesses and recreation spots. Those in your audience who are not familiar with your study will be grateful for a quick orientation.

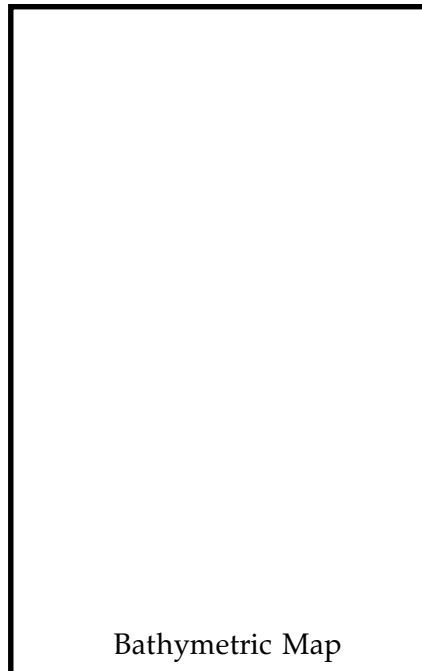
Different maps for different folks

There's a map for every audience and every occasion.

Commonly used maps are described below:

- Topographic maps show the natural lay of the land: features such as forests, buildings, roads, rivers, and gravel pits, as well as the topography (the elevation of the land) depicted by brown concentric lines. They contain a lot of detail, but the largest scale (greatest detail) is 1:24,000 (1" on the map represents 2000 feet or 600 meters) so they are not well suited for inclusion in reports or in slides (unless enlarged with a copier). They are very helpful in a large exhibit, or tacked to the wall during a presentation. *Topo!* software, discussed on page 3-7, allows increased flexibility in using topographic maps.
- Geographic Information System (GIS) maps are computer-generated. They can show any combination of features such as land use, hydrology, roads, protected land, even demographics. Because these are digital maps, they are easily manipulated; colors, symbols, scales and combinations of data layers can be changed at will.
- Aerial photographs can be used as maps, when the features you want to show are not visible on other maps. For example, wetlands, or new housing developments are easy to spot on large aerial photos.
- Highway or Street Atlas maps, such as those published by the Official Arrow company, show roads in much more detail than topos. They can show the precise location of a sampling site or pollution source to an audience who is more familiar with roads than with natural landmarks. These maps have an added advantage of (usually) not being very "busy"; there's often room to add additional information, such as an inset photo, data graph, or drawn in feature (e.g. canoe launch, pollution plume, etc.).
- Bathymetric maps show the relief on the bottom of lakes. They are useful to find—and show—the deepest or shallowest parts of a lake or pond, and can be used as base maps to display plant survey results.
- Hand-drawn maps require at least a third grade art education and production tools ranging from Microsoft Paint to Crayolas, but provide more flexibility in content and scale.





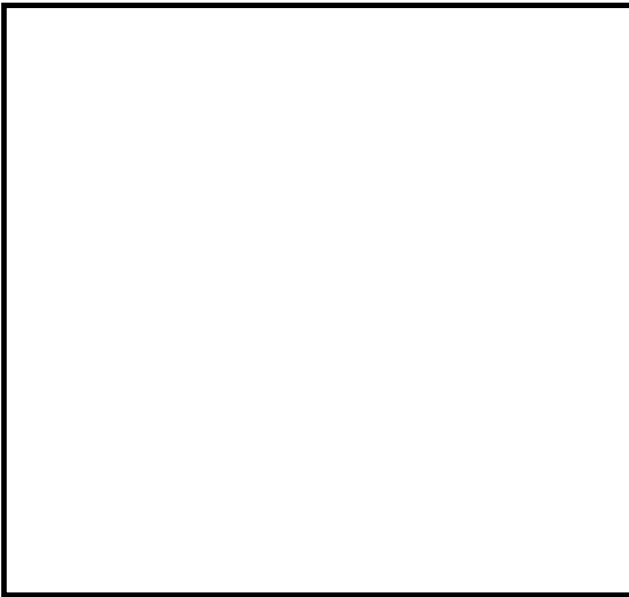
A map tells your story

The information, education, and persuasion value of your maps can be enhanced by the strategic addition of various features to a base map:

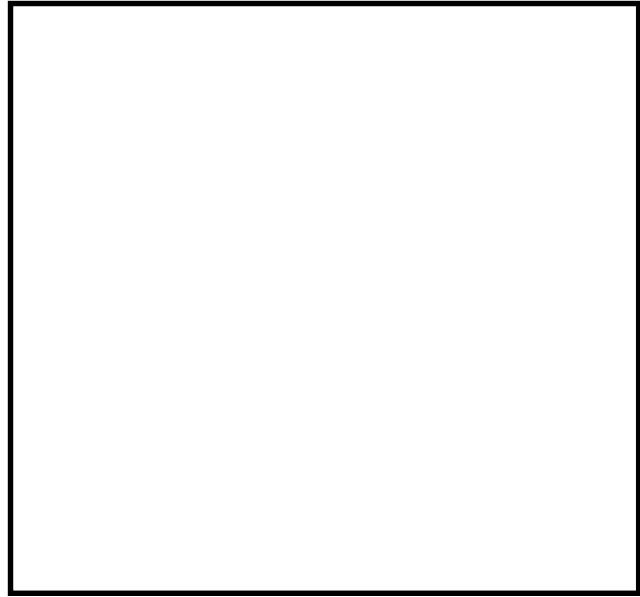
- For a local audience such as a watershed association, the map should include familiar landmarks such as schools, churches, and streets.
- Contour lines are necessary when erosion and sedimentation are a concern, but may make a map look cluttered.
- Overlays help reduce clutter when several map features, such as topography, hydrology, land use, and sampling site locations are desired. Each feature can be shown on a separate overlay, or map layer. Overlays work well with transparencies; with other media, solid copies of each map can be displayed near each other.
- Data can be represented on a map. For example, distinctive color codes can accentuate differences in type and severity of pollution found in different stream reaches, or can highlight lake areas infested with excessive or exotic plant growth. Symbols can be sketched for different plants on a large scale base map of a lake or river. Another way to highlight significant findings on a map is to use differently colored or sized symbols: larger or garishly colored means more pollution. See Example 3-4 for other “value-added” map techniques.

Graphics tips:

- When formatting charts and graphs, remember that 8% of the US population is color blind: when color-coding results, don't use both red and green on the same graphic. Or use shapes or symbols in addition to color.
- Whether you use color, shading, or patterns, be sure that an easy-to-understand data key is included or that data is clearly labeled.
- If a printed report contains color graphics, check that the colors are still distinguishable when the report is photocopied in black and white.
- Keep type styles to a minimum. Sans serif fonts such as “Arial” work best for numbers and data, serif fonts such as “Garamond” are better for larger text boxes.
- When comparing data, be consistent—don't mix pie charts with bar graphs.



Map for a local audience



Map for an "outsider" audience

Example 3-1: the same map labeled differently for a local and an outsider audience.

Example 3-2:
This map shows the location of emergent vegetation: single "E"s show single patches, while shaded areas show dense patches. This is for reports where cost mandates the use of black and white. For an exhibit or a live presentation, the addition of color would make the map more appealing.

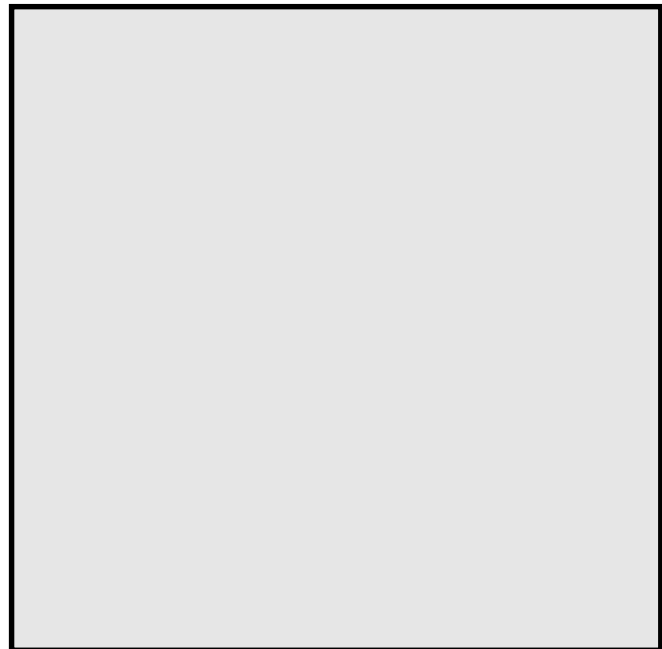


Tip
For general audiences, don't use code names in figures, use English: South Cove, Behind Stop&Shop are much more meaningful than USS001, USS002.

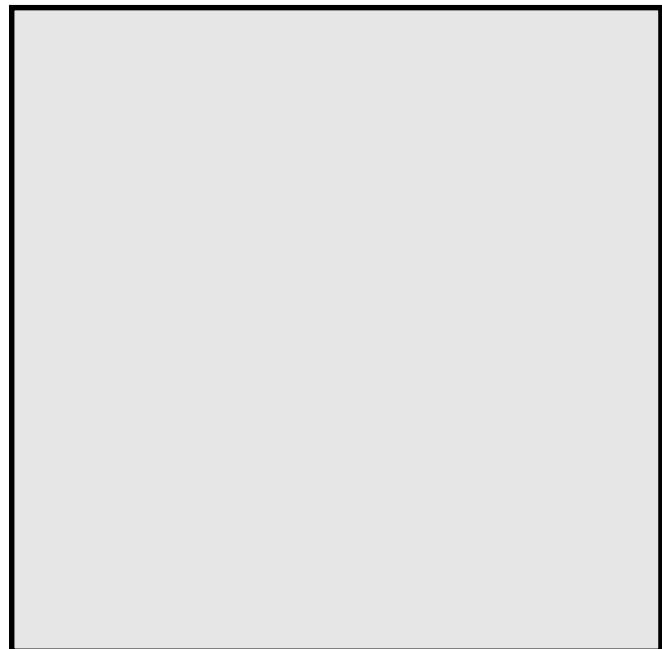
Some examples of map uses:

Maps are useful in newspaper articles, as shown in Example 3-3, which shows bacteria at various sites, with the site number framed differently depending on whether swimming standards were violated.

	good
	fair
	poor



Example 3-3: Map used in newspaper. (From River Watch Network)



Example 3-4: Hand-drawn map with universal symbols.

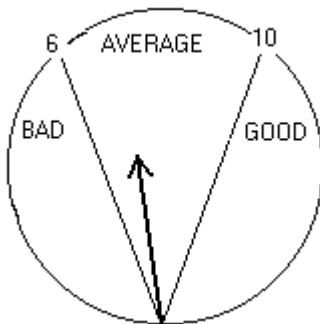


Example 3-4 shows the same results, but even more graphically, using universally recognized symbols to convey the information. The map was hand-drawn, yet it is neat and clear. Other alternatives might include a “fuel gauge” at each site, with the bad range on the “empty” side, medium in the middle, and good range on the “full” side, with the results for that site represented by an arrow pointing to one of the three ranges, or a traffic light with either the top “danger,” middle “caution,” or bottom “OK” light on at each site.

Maps are also good “ice-breaker” props in a meeting or on a poster used at a festival: have a map of local watersheds superimposed on a road or street map, and have people identify their “watershed address.” Or have them trace the flow of water from the watershed boundary to their homes, then downstream. Or have them put colored dots on the map to represent areas they consider valuable (e.g. fishing or swimming holes) or threatened by pollution.

Clip art

Symbols such as these from Microsoft Word or Publisher collections, (except the fuel gauge which was drawn in Paint) can be used to illustrate data results in maps for lay audiences:



Data can also make a big impact when shown on consecutive maps in an oral presentation. For example, GIS maps were developed for the Charles River to show the water quality in dry, moderate, and wet weather conditions. River segments were color-coded to show whether they met Standards. There were three maps: on the Dry Weather map, most of the segments were blue (meets swimmable/fishable criteria); on the Moderate Weather map, the segments were mostly purple (meets swimmable/fishable criteria sporadically); and on the Wet Weather map, 99% of the river was colored red (violates swimmable/fishable criteria). See a similar example in Chapter 8: 8-11.

Where to Obtain Maps

Topographic maps are available at bookstores and outdoor shops for about \$5. A new product, called *Topo!*, contains topo maps on computer. With *Topo!*, you can view maps in different scales, draw on them, obtain additional topographic information (like stream mileage or a contour profile) and print them out. *Topo!* is commercially available and can be purchased from the Earth Science Information Office listed next page.

Without Geographic Information System (GIS) capabilities, getting a fancy computerized map printed can be expensive. For Massachusetts maps, try MassGIS in Boston at (617) 727-5227. Most towns or cities that have a planning department also have GIS mapping capability and can provide maps for a fee (around \$75).

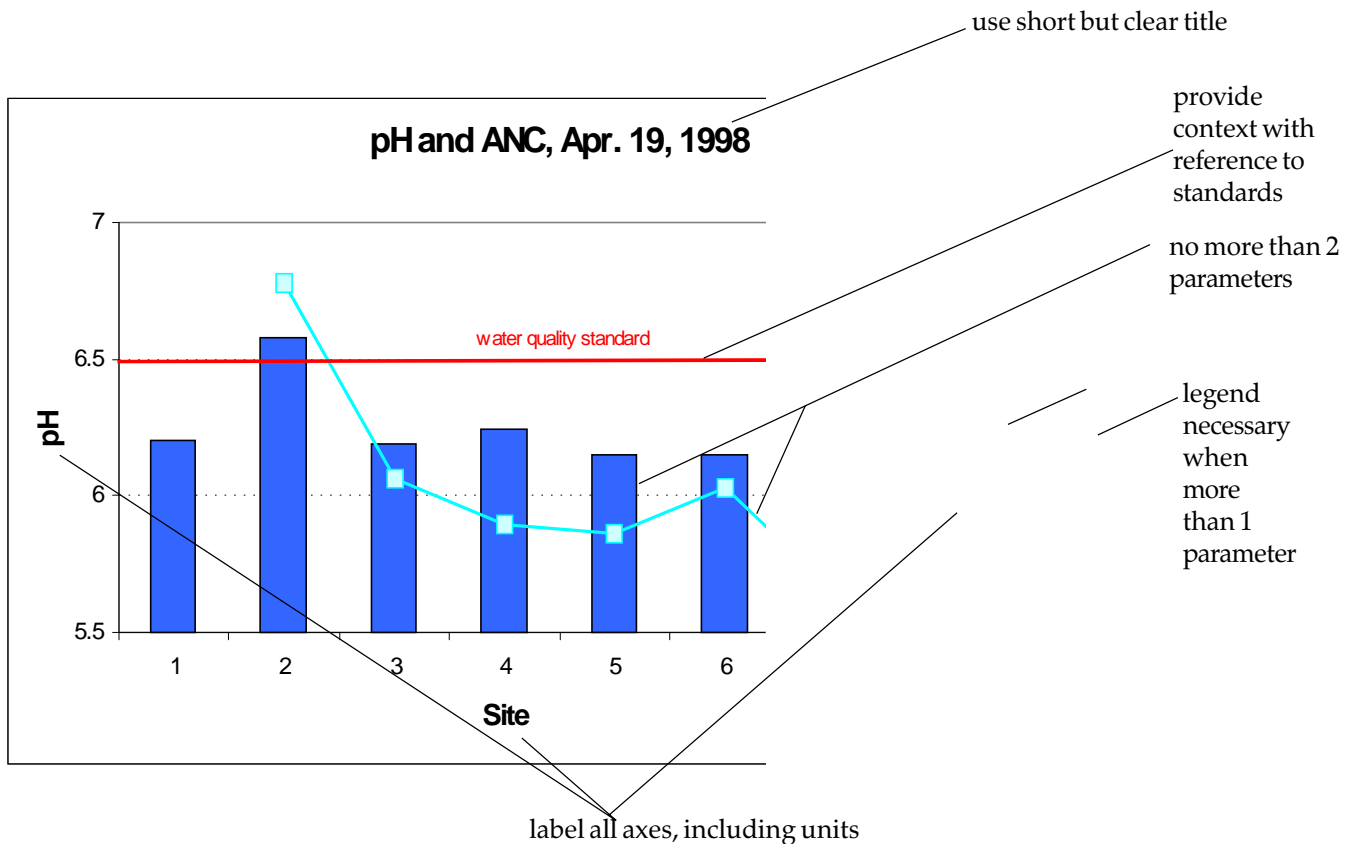
To obtain detailed maps or aerial photographs that include soil and wetland features, contact the Earth Science Information Office at UMass at (413)545-0359 or visit www.umass.edu/tei/esio.

Bathymetric maps for almost all lakes and ponds in Massachusetts can be found in publications from the UMass Water Resources Research Center: Inventory of the Ponds, Lakes, and Reservoirs of Massachusetts (1972, by County).

Charts

Charts are an effective way to summarize *and* show values in a clear, succinct visual format. Charts allow the eye to capture large amounts of information and see trends clearly. They are used in almost any kind of presentation, but again, different charts work better for different kinds of information. Fortunately, with computers, changing from one type to another is relatively easy.

For basic instructions on making graphs with computer software, see MassWWP's Data Management Manual.



Example 3-5: Basic rules for legible graphs.

Simple two-axis line graphs, bar graphs, and pie charts are all effective ways to illustrate your results.

Line graphs

This type of chart is good to show trends, for example pH over time, or water level over time. Other uses for line graphs include charting a parameter from upstream to downstream.

Bar Graphs

This type of chart is good to compare or contrast discrete values at different times or different locations—as opposed to implying a continuous trend. Bars, also called histograms, are more suitable than line graphs when showing only a few data points.

Example 3-7 uses inverted histograms to compare Secchi disk levels at several lakes. To get this downward effect, enter depth values as negative numbers in the data table.
