

Choosing Parameters to Support Your Questions

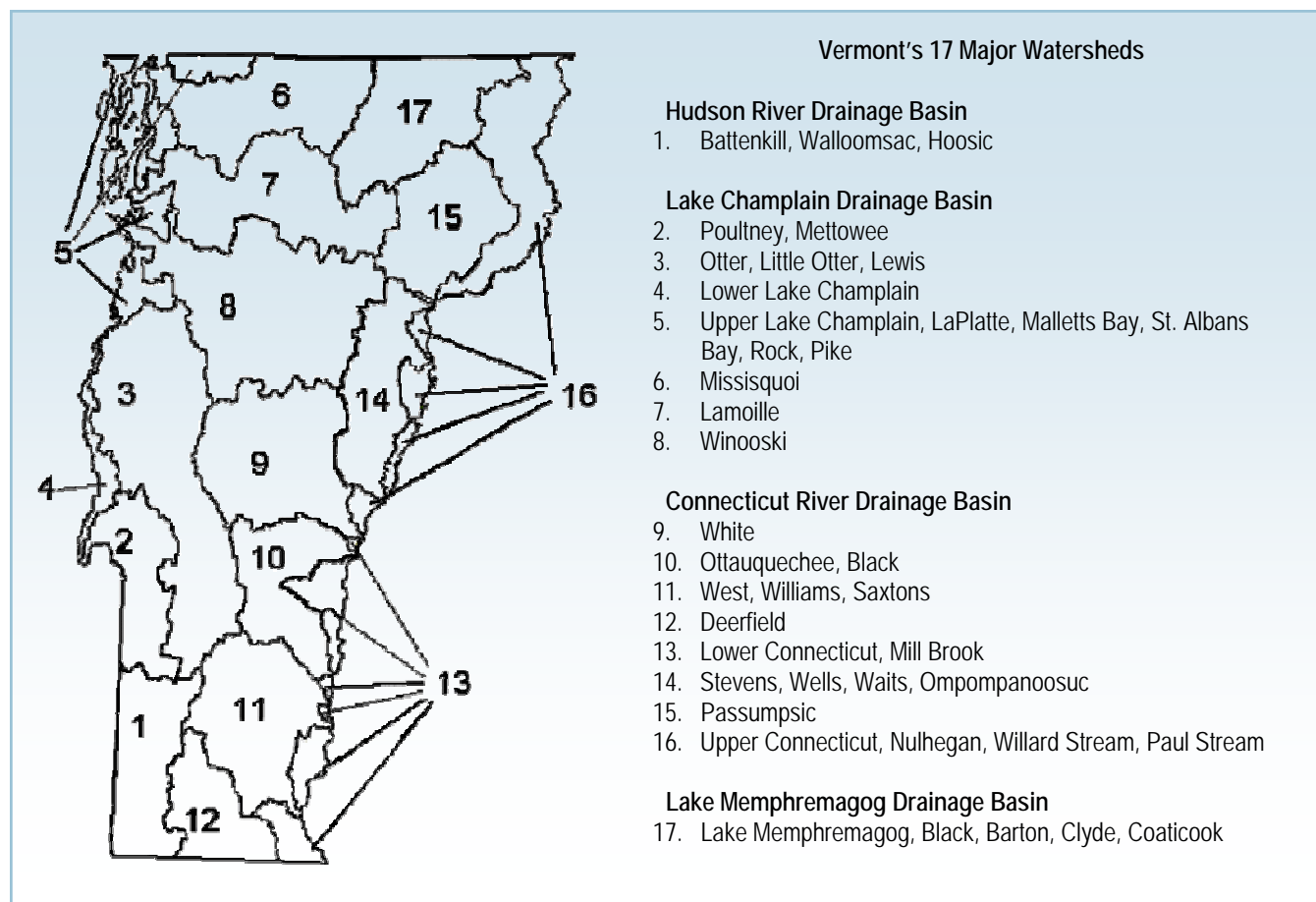
This section will show you how to:

- ◆ Find information to research your chosen waterbody and watershed.
- ◆ Select parameters to monitor that will answer your initial question.

Now you will begin to design the specifics of your monitoring plan by choosing the parameters you will monitor. Selecting parameters is a critical step in monitoring program design because you will need to choose ones that are appropriate for answering your “why” question and purpose (“what” you do with the monitoring results).

Learn what is already known about the waterbody and watershed

A volunteer monitor’s starting point is not from a particular lake or stream, but from that waterbody’s watershed. Collect as much background information about the watershed as possible, depending on your particular purpose and intended data use. Some purposes will require a great deal of detail, while others will require little detail. You may want to include information such as geology and soils information, land uses, watershed boundaries and drainage patterns, known water quality and aquatic biota, locations of point source discharges such as wastewater treatment plants, rainfall records, stream flows and lake levels.





Finding information on the watershed

There are many resources available for watershed research including maps, hydrologic information, information on fish and aquatic plants, lake, wetland, river and stream data and past and current monitoring efforts and studies.

You will be able to obtain a lot of this information by contacting your local municipality, Natural Resource Conservation Districts, Regional Planning Commissions, lake and watershed associations, the Vermont Department of Fish and Wildlife, and the Vermont Water Quality Division. Your data user may also be a good source of information and may guide you to additional resources.

After you have collected and reviewed available background information, you may want to revisit your monitoring purpose and the original questions you wanted to answer. Ask yourself if the background information answered your question(s), or changed the question(s) you want to answer.

General maps

U.S. National Atlas Online
www.nationalatlas.gov

USGS National Map
www.nationalmap.usgs.gov

TopoZone
www.topozone.com

U.S. Maps Using Census Data
<http://tiger.census.gov/cgi-bin/mapsurfer>

Vermont Center for Geographic Information
www.vcgi.org

Biophysical Regions of Vermont
<http://vmc.snr.uvm.edu/BullBd/bprpage.htm>

Vermont watershed information and maps

Detailed Maps of Vermont's 17 Major Basins
www.vtwaterquality.org/html/wq_education.htm

Lake Champlain Basin Atlas
www.lcbp.org/ATLAS/HTML/intro.htm

VTDEC Basin Planning/Assessment Information
www.vtwaterquality.org/planning/html/pl_basins.htm

U.S. EPA Watershed Maps and Information
www.epa.gov/surf

U.S. EPA EnviroMapper for Water
www.epa.gov/waters/enviromapper/index.html

Geology information and maps

Vermont Environmental Geology Maps
www.anr.state.vt.us/dec/geo/envseriesinx.htm

Bedrock and Geological Cross-section Maps
www.anr.state.vt.us/dec/geo/mapsonlineinx.htm



Vermont soils information & maps

Vermont Natural Resources Conservation Service

www.vt.nrcs.usda.gov/Soils

Wetland Soils Information

www.anr.state.vt.us/dec/waterq/wetlands/htm/wl_id-hydricsoil.htm

Fish, wildlife and exotic/invasive plant information & maps

Vermont Sport Fish Information

www.vtfishandwildlife.com/fish_sportfish.cfm

Vermont Wildlife Management Area Maps

www.vtfishandwildlife.com/wma_maps.cfm

Vermont Wildlife Management Unit (Regional) Maps

www.vtfishandwildlife.com/wmu_maps.cfm

VTDEC Aquatic Nuisance Species Information

www.vtwaterquality.org/lakes/htm/ans/lp_ans-index.htm

Wetlands information & maps

VTDEC Wetlands Section

www.vtwaterquality.org/wetlands.htm

Lake Champlain Basin Wetlands Map

www.lcbsp.org/ATLAS/PDFmaps/nat_wetland.pdf

River and stream information

VTDEC River Management Section

www.vtwaterquality.org/rivers.htm

VTDEC Biomonitoring and Aquatic Studies Section (BASS)

www.vtwaterquality.org/bass.htm

USGS Vermont Gauge (Flow) Stations

<http://vt.water.usgs.gov>



River Network

www.rivernetwork.org

Vermont River Conservancy

www.vermontriverconservancy.org

Lake and pond information & maps

VTDEC Lakes and Ponds Section

www.vtwaterquality.org/lakes.htm

Lake Water Quality Summary Reports

www.anr.state.vt.us/dec/waterq/cfm/lakerep/lakerep_select.cfm

Vermont Lake Maps/Depth Charts

www.vtwaterquality.org/lakes/htm/lp_depthcharts.htm

Lake Champlain Depth Chart

www.lcbsp.org/ATLAS/PDFmaps/nat_depth.pdf

Information on past and current monitoring efforts and studies

U.S. EPA National Directory of Environmental Monitoring Programs

www.epa.gov/owow/monitoring/dir.html

Vermont Lay Monitoring Program

www.vtwaterquality.org/lakes/htm/lp_imp.htm

Aquatic Nuisance Species Watchers Program

www.vtwaterquality.org/lakes/htm/ans/lp_ans-index.htm

VTDEC Biomonitoring and Aquatic Studies
www.vtwaterquality.org/bass.htm

Lake Champlain Basin Program Monitoring
www.lcbp.org/monitsum.htm

Vermont watershed & lake associations
www.vtwaterquality.org/lakes/docs/lp_watershedprograms.pdf

Lake Champlain Committee
www.lakechamplaincommittee.org

Bonnyvale Environmental Education Center
www.beec.org

Eco Info: Air, Water, Land, & Energy Monitoring in Burlington and Lake Champlain
www.burlingtonecoinfo.net

Vermont Monitoring Cooperative
<http://vmc.snr.uvm.edu>

UVM Watershed Alliance
www.uvm.edu/~watershd

Local Conservation Commissions
www.uvm.edu/~envprog/epic/nbavcc.html

New England Regional Monitoring Collaborative
www.umass.edu/tei/mwwp/nermc

Lake Champlain Maritime Museum
www.lcmm.org

Vermont Public Interest Research Group
www.vpirg.org

Selecting appropriate parameters

Your monitoring program may collect information on the physical, chemical or biological condition of the waterbody. It is not essential to monitor all three conditions, but looking at them together will provide the most insight into water quality as they are interrelated and information on one condition can help explain the results of monitoring another.

Selecting what parameters you will monitor is directly related to “why” you are monitoring. For example, if you are monitoring a stream to determine the effects of a nearby sewage treatment plant on water quality, your parameters might include dissolved oxygen, turbidity, *E. coli*, pH, temperature and changes in the macroinvertebrate community, as these can indicate sewage pollution. Use Tables 3-1 and 3-2 as guidance for selecting parameters that will support your “why” question.

Table 3-1: Land Uses Contributing to Pollution and Associated Parameters for Volunteers to Consider Monitoring

Land Use (Source)	Associated Parameters to Monitor
Urban runoff	Turbidity, nutrients (phosphorus, nitrogen), temperature, conductivity, dissolved oxygen, biological survey (fish, plants, macroinvertebrates), pH, flow, optical brighteners, <i>E. coli</i> , streambank stability, geomorphic assessment
Construction/Development	Turbidity, temperature, dissolved oxygen, total suspended solids, biological survey, nutrients, pH, geomorphic assessment
Forestry	Turbidity, temperature, total suspended solids, nutrients, biological survey, pH, geomorphic assessment
Septic system/Sewage treatment plant	<i>E. coli</i> , nutrients, dissolved oxygen, conductivity, temperature, turbidity, pH, biological survey, optical brighteners
Farming/Agriculture	Turbidity, nutrients, temperature, total suspended solids, biological survey, <i>E. coli</i> , streambank stability, geomorphic assessment
Municipal and Industrial discharges	Temperature, conductivity, total suspended solids, pH, biological survey
Shoreline alteration	Turbidity, temperature, total suspended solids, biological survey, nutrients, riparian habitat assessment, geomorphic assessment, streambank or lakeshore stability