

2.4.1 Water Use

Water Withdrawals

Some potential water withdrawals include public water suppliers, industries, mines, power plants and agriculture, among others. You can view these water withdrawal locations and specifics regarding their permits on the Kentucky Watershed Viewer . You can obtain additional information about water withdrawal permitting by contacting KDOW's Water Quantity Management Section at 502-564-3410 or at the website .

The water withdrawal program has information on all withdrawals of water greater than 10,000 gallons per day from any surface, spring or groundwater source, with the exception of:

- Water required for domestic purposes
- Agricultural withdrawals, including irrigation
- Steam-powered electrical generating plants regulated by the Kentucky Public Service Commission
- Withdrawals used for injection underground as part of operations for the production of oil and gas

Members of your team or other locals may know more about water withdrawals, particularly agricultural usage, which can be surprisingly voluminous, especially during droughts.

GIS coverage of water withdrawal sites is in kygeonet . 319-Funded projects must provide a map showing water withdrawal sites.

Public Water Supply

Source Water Protection and Wellhead Protection Programs, described in 5.1.2, require the delineation of a protection area which is all or part of the watershed or groundwater recharge area for the source and seek to minimize the risks of pollutants entering into those protection areas.

Information about Source Water Protection and public drinking water systems is available through the Kentucky Infrastructure Authority (KIA) Water Resource Information System (WRIS) . To obtain specific information about Source Water Protection in your area you can contact the Water Management Planner for your Area Development District (ADD) . You can also contact KDOW's Water Quantity Management Section .

KDOW administers the Wellhead Protection Program, which is designed to assist communities that rely on groundwater as their drinking water source. To obtain additional information about this program contact KDOW's Water Quantity Management Section .

GIS coverages of water lines and Source Water and Wellhead Protection areas are in kygeonet . 319-Funded projects must provide maps showing public water lines and Source Water and Wellhead Protection Areas.

Do you wonder what some of these programs are and what the terms mean? Go back to Watershed Basics and find out.

Discharges

Municipal, industrial and other wastewater facilities discharges and wastewater networks

Municipal, industrial, and other wastewater facilities directly discharging from a point source (end of pipe) to surface waters are required to obtain a KPDES permit from KDOW. (KPDES stands for Kentucky Pollutant Discharge Elimination System.) The point of discharge is called an outfall. You can locate KPDES permits in your watershed using KDOW's Watershed Viewer . Once you find the basic facility information, you can get more information from EPA's Surf Your Watershed website .

More information about KPDES can be found on the Kentucky Division of Water website .

Information that is useful at this stage of planning includes:

- Location of discharge, both major discharges and discharges of local concern
- Size of treatment facility
- Whether or not the facility is operating at or above treatment capacity, the volume and flow it can effectively handle.
- Whether the owner plans to expand and whether expansion plans have already been developed
- Whether the facility is in compliance with regulatory requirements of the permit

If the situation or data indicate the need for closer analysis, you will need to look for specific monitoring data. You can secure those data directly from the discharger or from KDOW . In addition, the discharger may be able to provide you other monitoring data.

If the discharge is related to pollutants of issue in your plan, it will be necessary to secure these data in order to quantify **pollutant loads**, which are described in Chapter 4.

Maps showing the boundaries of wastewater (sewer) services and some pipe network information are available at Kentucky Infrastructure Authority (KIA) Water Resource Information System (WRIS) . Your local wastewater treatment facility may also be able to provide maps of the networks of pipes carrying wastewater to their treatment facility. Pollutants sometimes emerge from leaky pipes, especially when those pipes are old.

GIS coverage of discharge sites, sewer lines and proposed sewer lines are in kygeonet . 319-Funded projects must provide maps showing permitted discharges and sewer lines.

Stormwater discharges

Although stormwater begins as runoff over surface areas, more than one hundred Kentucky municipalities are regulated by KDOW as permitted, (multiple) point source discharges. Such permits mandate programs to minimize the pollutants in the permitted stormwater system and to encourage citizens to keep pollutants out. Permits also regulate runoff from construction sites greater than one acre and from industrial facilities with outside material storage that might contribute to polluted runoff.

KDOW's website lists communities holding stormwater permits .

To locate stormwater collection systems and outfalls in your watershed, you may need to contact the municipalities and counties in which the systems are located. Some Area Development Districts, who frequently help map these outfalls, may also have this information .

All large Kentucky cities and many small ones have **Municipal Separate Storm Sewer System (MS4)** permits. A listing of Kentucky municipalities covered by MS4 and the administering authorities is provided on the KY Division of Water MS4 website .

GIS coverages of discharge sites and MS4 area boundaries are in kygeonet . In 2010, pipe networks are being added as well. 319-Funded projects' map of discharges, mentioned above, should include stormwater discharge sites.

Combined Sewer Overflows

As a part of inventorying your watershed, your planning team should find out if any of the communities in your watershed are served by **combined sewer systems**. If they are, you'll need to map the location of **combined sewer overflow (CSO)** discharge points. The best sources for this type of information are municipalities, cities and county water departments or public works divisions that manage the systems. Identifying the location of the CSOs on a map will help you to correlate water quality information and accurately determine sources of pollution. Additional information from Kentucky Division of Water is located online .

Sanitary Sewer Overflows

Sanitary sewer overflows (SSOs) are illicit, but they occur if systems become overloaded or are faulty. The best way to locate them is to ask your local wastewater system, team members or other locals.

Unsewered Areas

There are two ways to identify existing areas serviced by onsite systems. One is to contact your local health department's Environmentalist. He or she may also be able to tell you when systems were built and what types of education residents have or have not received about proper maintenance of them.

The second way to identify areas served by onsite systems is to compare areas served by sewer facilities with areas served by public drinking water. The areas receiving water but not sewer are probably populated and using onsite septic systems. You can ask the water and wastewater/sewer facility for service boundaries or go to Kentucky Infrastructure Authority (KIA) Water Resource Information System (WRIS) .

Members of your team or other locals are likely to know whether certain neighborhoods have sewer access or not.

GIS coverages of existing and planned extensions of sewer and water lines are available from kygeonet .

2.4.2 General Land Use

Examination of land use is one of the most important tools for analyzing your watershed and for setting priorities and selecting monitoring sites as your planning proceeds. Remember: what happens on the land impacts water.

Land use is one type of information that is not easy to separate by sub-watershed. However, if you make an effort to do so, it can significantly help when you begin deeper analysis.

There are several ways to examine land use: maps made from GIS data, aerial photography, and making your own observations. In addition, historic and current photos can reveal details.

No matter how much GIS data or aerial photography you have, it is important to ground-truth the information; in other words, to confirm or amend the information by looking around you. See Section 2.6.1, Windshield Surveys.

Figure 2.1 is a GIS-created map of the Hancock Creek Watershed that uses the National Land Cover Dataset to show land uses in the watershed.

Aerial imagery offers a bird's eye view of the watershed, giving life to features identified from research described above, and shows additional land features, such as vegetative cover along riparian corridors and presence of natural areas. An aerial image may serve as background to a land use map, or be used separately – in which case it is best to put identifying features on the photograph, such as those on your base map. An aerial image marked with natural areas, nature preserves, scenic rivers, historical or archaeological sites and/or other assets can increase community appreciation of the watershed. The Kentucky Watershed Viewer provides land cover and aerial photography (in the "base imagery" file), but only when zoomed into a small area . Guidance for using Google Earth aerial imagery is available from the Kentucky Watershed Leadership Academy .

Some cities and regions in Kentucky have land use databases. You can learn about these from local planning or economic development officials or from your local Area Development District (ADD) . Your partners and local university and college researchers can alert you to mapped sources for land use data.

Land ownership may be a significant factor in your planning if an agency, organization or individual manages a considerable amount of land in your watershed. This might include the US Forest Service, the US Army Corps of Engineers, a Kentucky State Park, a prison, or others. If so, they could be important partners in your planning effort. Some of this information will be in the Watershed Viewer . Some Property Valuation information is readily available:

- A directory of Property Valuation Administrators (PVAs) is available from the Kentucky Department of Revenue .
- The Kentucky PVA Association has other related Internet links .

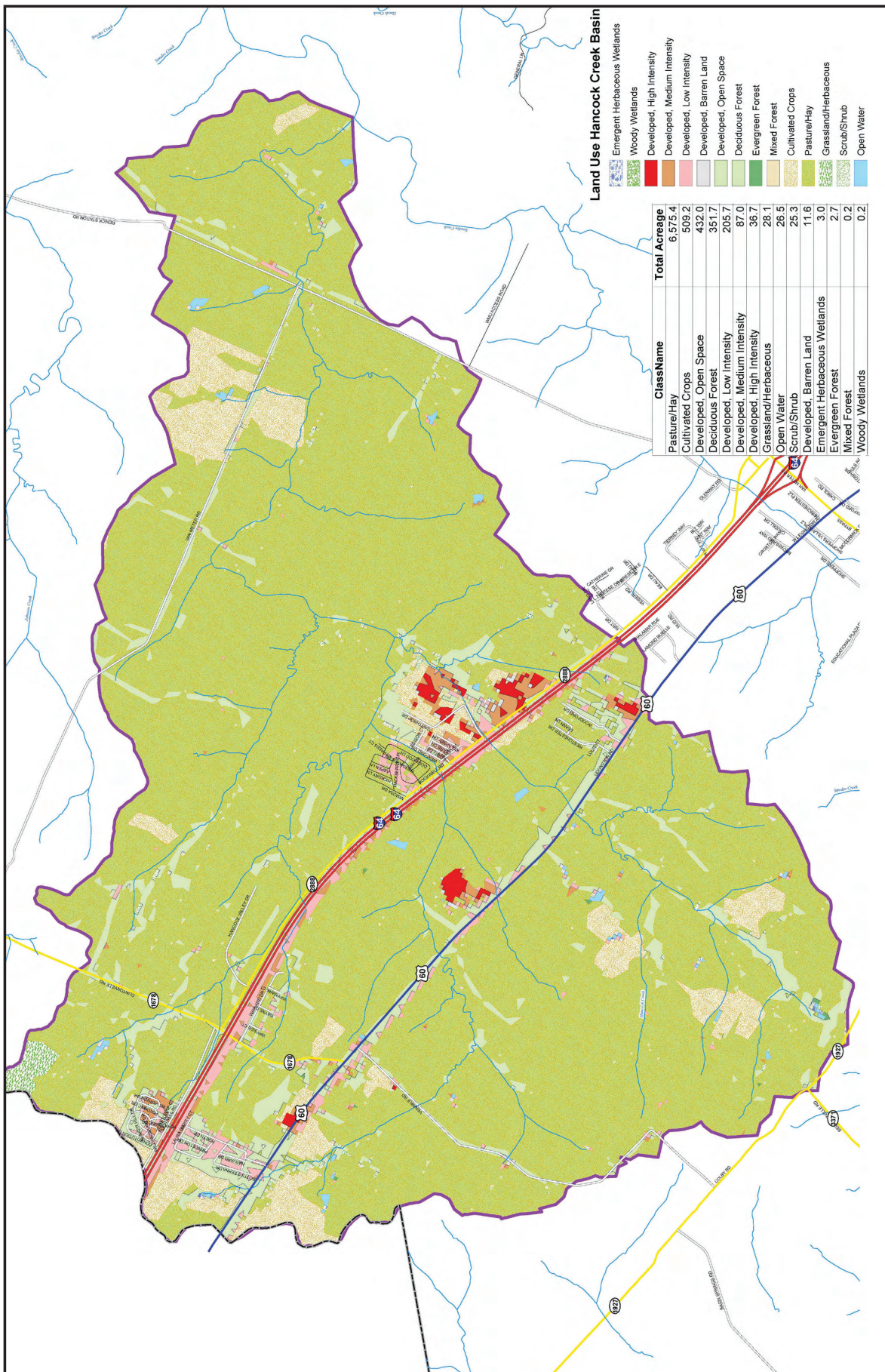


Figure 2.1 - Land Use in Hancock Creek Watershed

Historic photos, maps, and aerial views can provide information about changes in land use. Section 2.2.7 has ideas for finding these items. Members of your team or other locals may know of concerns related to land use. They may also know about historical land uses in your watershed that are not shown on current data. The latter is perhaps most relevant with respect to waste disposal areas.

GIS coverages of land use (National Land Cover Dataset) and aerial photography are in kygeonet . 319-Funded projects must provide a map showing land use.

Impervious Surfaces

Since impervious surface has been shown to effect stream degradation, it is important to determine the amount of imperviousness throughout your watershed. See Watershed Basics for more information.

Land use information can be used to predict the percentage of impervious cover. A study by the USDA in 1975 indicated that a one acre residential development may only be twenty percent impervious cover, whereas an industrial or commercial development of the same size may be up to seventy percent impervious cover.

2002 Kentucky GIS land use data identifies impervious surfaces and kygeonet also has an impervious surface coverage . 319-Funded projects must provide a map showing impervious surfaces.

2.4.3 Other Water Disturbances

Instream Construction or Disturbance (Hydromodification)

Examples of instream construction or disturbance include moving stream channels, filling in the floodplain, dams, and dredging. See also section 2.2.7, Geomorphologic Data, for sources of information.

Most projects that take place in waterbodies or wetlands, or dump or place dredged or fill material in waterbodies or wetlands, require a **404 permit** from the US Army Corps of Engineers. The Louisville District, which covers most of Kentucky, lists recently issued permits at , but if you want information on previous projects in this district, you may need to visit or telephone their office at 502-315-6686 or 502-315-6733. There may be a fee, although you can request a waiver. Louisville District permits are available by county and show only information about the permittee; they do not give the location of the activities.

Parts of southern and eastern Kentucky are covered by other Corps Districts. The Huntington District lists issued permits at . The Nashville District can be reached at 615-369-7500.

Projects that result in significant physical disturbances to wetlands or streams require **Water Quality Certification** (401 WQC) from the Kentucky Division of Water. Impacts in streams or lakes designated as Special Use Waters require an individual WQC. You can find more information regarding this program on the Kentucky Division of Water website . To determine whether a specific site required and obtained 401

Certification, contact KDOW's Water Quality Certification Section at 502-564-3410 or visit their website [www.kdow.com](#).

In the end, often the best sources of information about hydromodifications are aerial photographs, maps, and members of your team or other locals. Small, low-head dams and historical stream channeling will not be identified by databases or permit programs. In almost all of Kentucky, a straight stream is one that has been altered, so look suspiciously at any straight stretch of stream. Ask locals about low-head dams, small stream obstructions built for various purposes. GIS coverage of dams is available from kygeonet [www.kygeonet.com](#).



Low-head dam on South Elkhorn Creek

2.4.4 Land Disturbances That Can Impact Waterways

Mining and Quarries

Mining operations require KPDES permits when water will be used to wash coal, the operation will pump water from underground seams, or for any discharge of water from the mining site. If mining is active in your watershed, mining operators will be vital stakeholders for your planning team, and the Kentucky Department for Natural Resources will be important partners.

For information on surface mining locations visit the Kentucky Department for Natural Resources website [www.kdnr.com](#).

Members of your planning team or other locals may know about mining sites, including old sites and sites that have been restored as required by permitting.

Quarries are permitted through the Noncoal Review Branch in the Kentucky Division of Mine Reclamation and Enforcement. Call 502-564-2340 to find out if there is a quarry in your watershed. More information about noncoal permits is available at their website [www.kdow.com](#).

2.4.5 Hazardous Materials

Information about sites that store or contain hazardous materials and/or waste is available through a number of programs administered by the Kentucky Division of Waste Management: CERCLA (Superfund), RCRA (Resource Conservation and Recovery Act), Brownfields, Underground Storage Tanks, and landfills. Contact the Division of Waste Management and ask for the program of concern: 502-564-6716.

2.5 Finding Data and Information About Demographics and Social Issues

To provide comprehensive context to your analysis and planning for implementation, consider examining trends on the following issues:

- Population (age, size of family, composition, etc)
- Average household income
- Education levels
- Housing (ownership, rental, vacancy rates, etc.)
- Property tax values
- Unemployment rate
- Farming trends (part-time/full time, owner operated/rental, etc.)
- Limited resource landowners
- Major employers, location of facilities
- Regional economic trends

County and zip code level data are available through the US Census Bureau. Local officials and universities maintain census data to a finer grain. A major source of detailed census data available online for Kentucky is the Kentucky State Data Center at the University of Louisville .

Local libraries and historical associations may also help with information about demographics and social issues. Members of your planning team or other locals may have information about social issues.

Census data are available from kygeonet .

2.6 Making Your Own Observations

Besides doing all the detective work described above, it is extremely important for your planning team to get out into the real world and look around and to use your collective knowledge, memory – and brains.

For example, land use data are only collected every few years at best, and changes on the landscape occur continually. Checking land uses throughout the watershed is generally called a Windshield Survey. In addition, data collection isn't always detailed, comprehensive or accurate. Data collected through statewide programs or from satellite data are not going to yield the same results as walking or canoeing along or in a stream provides.

Don't forget to take safety precautions.

2.6.1 Visual Surveys

Conduct a visual or "windshield" survey of your watershed using your watershed map and a car or a couple of bicycles. It is preferable to work in pairs, so you can see more and take detailed notes -- and also for safety, because streams have lots of slippery spots, steep slopes, etc.

It's helpful to use a form to stimulate and organize your observations. It's a good idea to do visual surveys twice, once during the growing season and once when leaves are gone and crops have been harvested. Look for changes in land use and

land use practices, including construction sites, agricultural operations, etc. Look for erosion, impervious surfaces, and information related to any of the topics listed in this chapter. Be respectful of private property, of course.

EPA's guidebook has guidance for making these observations . Forms specific to Kentucky's rural areas are available through Kentucky Waterways Alliance's website .

2.6.2 Stream Surveys

Walking segments of your stream can be very revealing, and fun, too. Always go in pairs or as a group, to make observations less subjective and for safety reasons. Respect private property. The streams in Kentucky belong to the Commonwealth of Kentucky, and if you are on a boat, you are not trespassing. However, not all landowners know that fact; plus stream banks are not public property. The Natural Resources and Conservation Service has instructions and forms for conducting a stream assessment .

The Center for Watershed Protection (cwp.org) has a comprehensive, Unified Stream Assessment manual available for a fee .



Active Options

- Acquaint your team with how information can be organized onto maps using a map-drawing exercise: From Kentucky's Watershed Viewer or another GIS mapping tool, print a map showing only the waterway and the watershed's boundary. Make enough copies for every member of the team. Distribute the copies with markers or crayons, and ask each member to mark things that are personally significant, such as cities, roads, parks, farmlands, and forests, on the map. Ask them to put a big star where they live or work. Then ask members of the team to take turns presenting their maps to the rest of the team. Discuss how individuals view the watershed's characteristics differently.
- When making contacts with other information sources, consider asking if they want to partner with the team. When they provide information but don't get involved, be sure to keep them informed of your team's progress.
- You might invite special speakers to your planning team meetings to present aspects of watershed description:

How Much To Share?

The detail provided for each of the topics in this section depends on the subject and the scope of your plan as well as your findings.

If you can, integrate information your team discovered through visual or stream surveys into the related sections.

If you were unable to find information or the category is not relevant to your plan, it is still worthwhile to explain, because otherwise people may wonder why you did not consider that particular factor in your analysis.

If you cannot connect information with a specific location, try to connect it with a sub-watershed, or note where the practice or condition is applicable to a part or to the entire watershed.

Identify sources of information whenever possible.

- Soils and topography: A staff member from the Conservation District
 - Land use and cover: A staff member from the county Planning Commission or Area Development District
 - Impairment and Protection: A staff member from the Division of Water
 - Water Quality Data: A stream scientist from your state university's streams program
- Consider using modules from the Commonwealth Water Education Project, which was created to educate citizens and students about nonpoint source pollution .
 - Members of your group can do visual assessments of key segments of your waterway using one of the formal survey instruments in Section 6.5.1 of the EPA Handbook. When they're complete, ask the members to share their results (and pictures!) with your group.
 - Plan some optional outings, ideally at locations where partners or stakeholders can be hosts. Sites might include:
 - Stream restorations
 - Innovative stormwater management practices
 - A Watershed Watch monitoring site
 - Take photos! Develop a brief slide show about what you've learned that can be used for a creek-side news event or short presentations to other local groups. However, avoid the temptation to draw premature conclusions; remember, you have lots of analysis to do first.



Write It Down

First, revisit and update the information in the first section of your plan. You are likely to have new partners and stakeholders to list as a result of your research process. Also, your team will have learned information that may refine the preliminary concerns.

Chapter 2: The *[insert the name of your watershed]* Watershed Introduction

Describe your watershed in one or two paragraphs, relating:

- The name of the waterway of concern
- The larger waterway to which it is tributary
- Its location within Kentucky (counties and communities)
- Its area in square miles

Add a paragraph or two to introduce the information you found about water resources, natural features and human influences. This is the part of the plan where you begin to tell the story of your watershed, to integrate existing information.

Water Resources

- Describe and provide map(s) of the water resources in your watershed.
- Watershed Boundary
- Hydrology
- Groundwater-Surface Water Interaction
- Flooding
- Regulatory Status of Waterways
- Water Chemistry and Biology
- Geomorphology

Natural Features

Describe and provide maps of the natural features of your watershed.

- Geology and Topography
- Soils
- Ecoregion

Riparian/Streamside Vegetation

Describe and provide maps of any riparian information you found.

Rare and Exotic/Invasive Plants and Animals

Describe and provide any information about rare and exotic/invasive plants and animals you identified in your watershed.

Human Influences and Impacts

Describe and provide maps about human activities in your watershed. As much as possible, connect these activities to specific locations or sub-watersheds. Be accurate and respectful.

- Water Use
- Land Use
- Other Water Disturbances
- Land Disturbances
- Hazardous Materials

Demographics and Social Issues

Provide any relevant information about demographics or social issues. If feasible, identify differences within sub-watersheds.

Team Observations

Describe any visual or stream survey activity of the team, partners, or volunteers. Include any observations that have not been integrated into other sections of this chapter.

Interim Conclusions

Consider including a short section that summarizes the information that appears to be most relevant.

The following information must be included in map form for all 319-funded projects:

- Watershed and sub-watershed boundaries
- Political boundaries (counties, cities)
- Roads
- Hydrology: streams, lakes, rivers
- Groundwater network: karst basins, springs, sinkholes, dye tracing results
- Floodplains
- Regulatory status: impairment, Special Use, TMDLs
- Geology
- Topography
- Soils
- Water withdrawals
- Water lines
- Source Water Protection Areas
- Wellhead Protection areas
- Permitted discharges
- Sewer lines
- Land Use
- Impervious Surfaces

Other Records

Record your team's impressions of watershed issues before, during, and after collecting information. What implications does the team see? These impressions will be helpful as you continue your discoveries. Hopefully, you will either prove the impressions are right or wrong.

Although your plan will summarize much of your research findings, be sure to keep records of your research activities:

- Who you contacted and their contact information, whether or not the contact yielded data. Keeping this information electronically will make it easier to share and update.
- Data inventories
- Calculations
- Dead-end research efforts
- Surveys, if any were conducted, with details about how they were conducted.