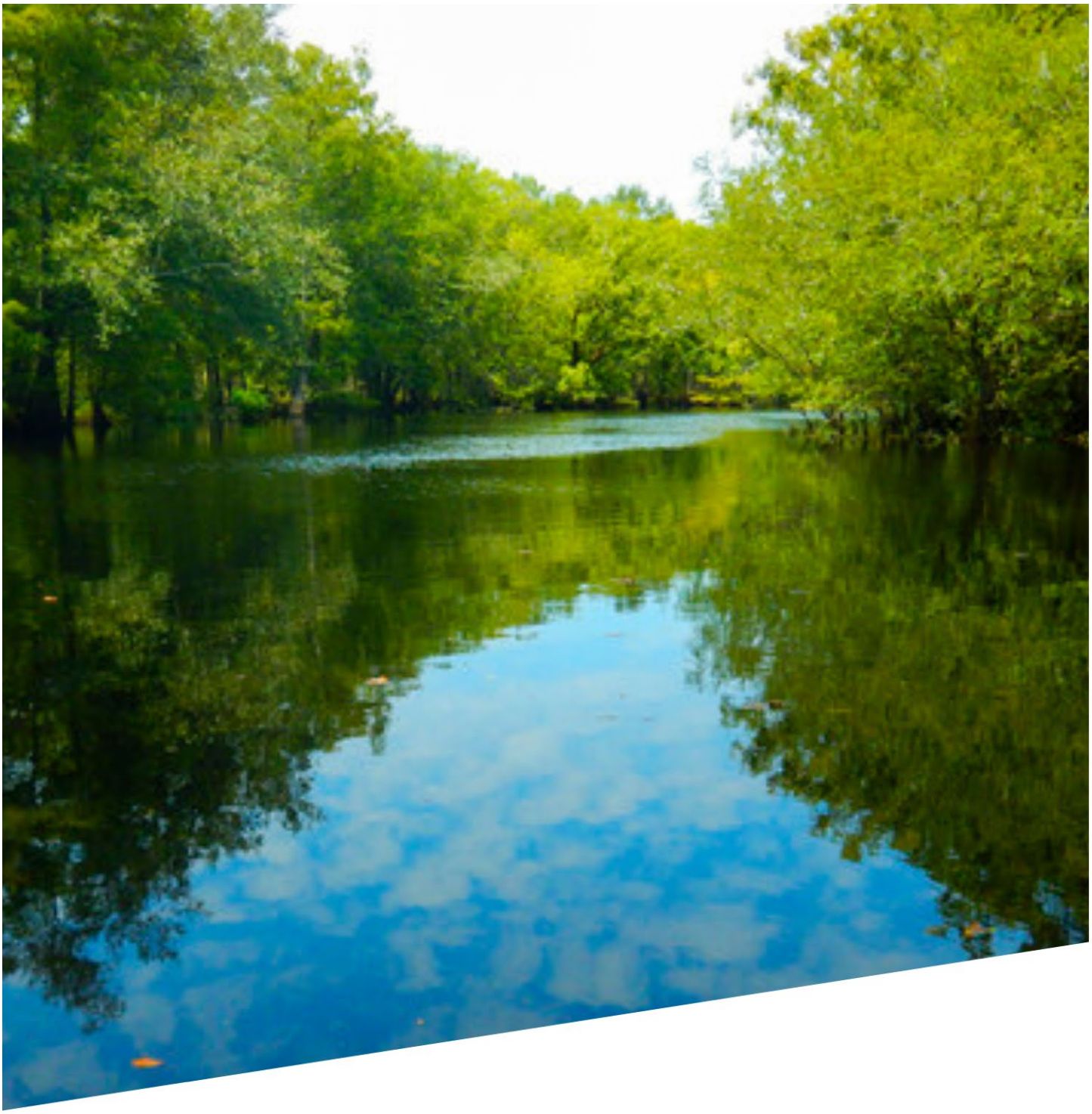


SOUTH CAROLINA SIMPLIFIED GUIDE TO DEVELOPING WATERSHED-BASED PLANS

2022

South Carolina Department of Health and Environmental Control

dhec
Healthy People. Healthy Communities.

Purpose

This guide has been created to assist developers of watershed-based plans in South Carolina. It serves as an overview of the watershed planning process, including helpful tips and links to resources. For a more in-depth discussion of specific plan elements, the US Environmental Protection Agency (EPA) has created a comprehensive handbook for watershed plan creation. In addition to reviewing this guide, organizations are encouraged to contact their Watershed Manager for help and feedback while developing watershed-based plans. All blue text are links to the named resource.

Watershed-Based Planning

Effectively improving water quality requires addressing the entire watershed holistically - including identifying all sources of water quality problems. A watershed-based plan is a roadmap for communities to systematically define and address water quality problems and areas for protection within a given watershed. Effective watershed plans typically include active participation from stakeholders, analysis and quantification of the specific causes and sources of water quality problems, identification of measurable water quality goals, and implementation of specific actions needed to solve those problems.

Specifically, EPA has outlined 9 elements that should be included in all watershed-based plans:

Abbreviated Element	Full Element Text from EPA Guidance
1. Identification of pollutant sources and their causes.	a. Identification of causes of impairment and pollutant sources or groups of similar sources that need to be controlled to achieve needed load reductions, and any other goals identified in the watershed plan. Sources that need to be controlled should be identified at the significant subcategory level along with estimates of the extent to which they are present in the watershed (e.g., X number of dairy cattle feedlots needing upgrading, including a rough estimate of the number of cattle per facility; Y acres of row crops needing improved nutrient management or sediment control; or Z linear miles of eroded streambank needing remediation).
2. Estimated load reductions from management measures identified in (c). (May also include overall pollutant reduction needed as found in a TMDL document.)	b. An estimate of the load reductions expected for the management measures described under paragraph (c) below, recognizing the natural variability and the difficulty in precisely predicting the performance of management measures over time. Estimates should be provided at the same level as in item (a) above, for instance the total load reduction expected for row crops or eroded streambanks.
3. Management measures (Best Management Practices, or BMPs) needed to eliminate or control pollutants	c. A description of the management measures that need to be implemented to achieve the load reductions estimated under paragraph (b) above, as well as to achieve other watershed goals identified in this watershed-based plan, and an identification (using a map or a description) of the critical areas in which those measures will be needed to implement this plan.

Chart continued on next page > > >

Abbreviated Element	Full Element Text from EPA Guidance
4. Identification of funding and technical assistance needs as well as potential sources. For example, watersheds with agricultural sources would most likely require the expertise of USDA Natural Resources Conservation Service staff and could potentially utilize Environmental Quality Incentive Program funds for implementation.	d. An estimate of the amounts of technical and financial assistance needed, associated costs, and/or the sources and authorities that will be relied upon to implement this plan. As sources of funding, states should consider the use of their Section 319 programs, State Revolving Funds, USDA's Environmental Quality Incentives Program and Conservation Reserve Program, and other relevant federal, state, local, and private funds that may be available to assist in implementing this plan.
5. Outreach strategy that is targeted towards members of the public that are impacted by the project and the management measures from (c).	e. An information/education component that will be used to enhance public understanding of the project, and encourage their early and continued participation in selecting, designing, and implementing the NPS management measures that will be implemented.
6. Timeline of implementation events that proceeds in a logical and efficient manner.	f. A schedule for implementing the NPS management measures identified in this plan that is reasonably expeditious.
7. List of milestones for keeping plan implementation progress on track.	g. A description of interim, measurable milestones for determining whether NPS management measures or other control actions are being implemented.
8. Criteria to determine if pollutants are being reduced and progress is being made toward attaining water quality standards. If not, the plan will need revisions.	h. A set of criteria that can be used to determine whether loading reductions are being achieved over time and substantial progress is being made towards attaining water quality standards. If not, determining criteria for whether this watershed-based plan needs to be revised or, if a NPS TMDL has been established, whether the NPS TMDL needs to be revised.
9. Monitoring strategy to determine effectiveness of plan implementation.	i. A monitoring component to evaluate the effectiveness of the implementation efforts over time, measured against the criteria established under item (h) immediately above.

The Need for Watershed-Based Plans

A watershed-based plan helps accurately identify pollutants and pollution sources so that appropriate and effective solutions can be carried out. Local knowledge and planning are needed to improve and protect the quality of water in our streams, rivers, lakes, and estuaries. While there is an increased realization in South Carolina of the importance of watershed plans in addressing local water quality issues, there are many parts of the state in need of watershed-based plans.

In addition, watersheds with approved plans are eligible for 319 nonpoint source pollution reduction funds. Although these funds are not guaranteed to communities with watershed-based plans, 319 grants can only be awarded to applications in watersheds with an approved 9-element watershed-based plan.

What Does a Watershed-Based Plan Look Like?

The sections that follow will help groups think through each of EPA's nine required plan elements. In general, most watershed-based plans:

- Are developed for one to four 12-digit Hydrologic Unit Codes (HUCs), and occasionally a 10-digit HUC

- Include a watershed overview (location, hydrology, geology, climate, land use and land cover, projected growth, population, etc.)
- Include a watershed analysis (classification, TMDLs, designated uses, water quality standards, water quality impairments, water quality data, source water intakes, discharges, etc.)
- Include maps, tables, pictures, and other visual aids
- Identify impaired and threatened waters along with best practices towards improvements
- Include a water protection component and climate change adaptations
    - See EPA's Climate Change Indicators
    - Resources and assistance in climate considerations for watershed planning are available from Carolinas Integrated Sciences and Assessments
- Are regularly evaluated and updated based on changing conditions, data, and goals

The overall goal of the completed WBP is to provide thorough plans for potential implementation of the recommendations made in the plan. While data analysis is an important aspect of watershed planning and recommendations, the majority of time, effort, and resources should *not* be spent on data analysis, but rather the interpretation of data for implementation.

Preparing a Plan: The Nine Required Elements

Identifying Pollutant Sources

A watershed plan should be based on data, which may not be practical or feasible to collect during the planning stages. In these cases, you should make the best evaluation based on the information available. Potential data sources include:

- SC 303(d) list of impaired waters
- DHEC's Watershed Atlas
- Existing Total Maximum Daily Loads
- TMDL Attainment Status
- Water Classifications and Standards
- Classified Waters
- EPA's Water Quality Data
- Local Municipal Separate Storm Sewer Systems (MS4s)
- Universities
- Watershed organizations that conduct water quality monitoring

Watershed plans should include the impairment being addressed, along with the cause or sources of the impairment, and what use or watershed function is affected by the impairment. Impairments are important because they indicate that a waterbody currently does not meet state water quality standards based on the intended use of the waterbody. South Carolina designates four uses for fresh and salt waters: aquatic life (AL), recreation (REC), fish consumption (FISH), and shellfish harvesting (SHELLFISH). Other uses that could be affected by water quality impairments include drinking water supply and wastewater treatment.

Most water quality monitoring programs use indicators to designate an impairment. For example, South

Carolina uses *E. coli* bacteria to indicate the presence of other pathogens in the water that may be harmful to swimmers. Common impairments or indicators used in South Carolina include:

- Chlorophyll a
- Bacteria (fecal coliform, *E. coli*, enterococcus)
- Dissolved oxygen
- Metals (chromium, copper, cadmium, lead, nickel, zinc)
- Nutrients (nitrogen, phosphorus)
- Macroinvertebrates
- Turbidity

To correct water quality problems, knowing the problem is not enough. It is also important to list potential sources of the impairment which can later be targeted for improvements. Potential sources may include livestock in streams, failing septic systems, land disturbance activity, increased impervious surface, over-fertilization of crops or lawns, illicit discharges, or sewer pipe overflows.

It may be useful to compile an initial list of impairments, designated uses, and sources in a table, such as in the example below.

Impairment	Potential Sources	Watershed Use
Phosphorus	Livestock in streams, excess fertilizer, failing septic systems	Aquatic life, water supply, wastewater treatment
Turbidity	Construction activities, cropland, increased impervious cover	Aquatic life, recreation, water supply
E. coli Bacteria	Pet waste, wildlife, failing septic systems, livestock in streams	Recreation, water supply, wastewater treatment

Once the impairments, causes, and sources of those impairments are known for the watershed, the plan should establish targets or goals for the watershed. These goals can be used to create milestones and criteria to measure success. Typically, the goal of a watershed-based plan is to improve an indicator so that it meets state water quality standards and/or allows for a particular use. For example, the goal may be to lower bacteria levels in a creek so that it is safe for recreational use.

Output: a description of the water quality impairments in the watershed and the causes of each impairment, as well as the overall goal or purpose of the plan based on impairments.

Management Measures

A watershed-based plan should describe the management measures needed to achieve the goals discussed in the previous section. This includes measures that are currently in place as well as additional measures that are needed. Measures can control pollutant loads to waterways by:

- Reducing the availability of pollutants (ex. fixing a failing septic system)
- Slowing the transport of the pollutant to the waterbody (ex. detention pond)
- Treating the pollutant before it reaches the waterbody (ex. riparian buffer)

Measures can be *structural,* such as building a fence to keep cattle out of a stream, or *nonstructural,* such as educating homeowners on picking up pet waste. Educational management measures can be described separately as part of a larger education and outreach program. Be sure to list *all* potential structural measures that could be implemented. In addition to determining the type of management measures needed, thorough plans will also include the identification of target areas for management practice installation. Certain areas of the watershed may be prioritized to protect valued resources, take advantage of stakeholder cooperation, or reduce costs. For example, management measures could be concentrated on property closest to the stream of interest, near monitoring stations with the most standards violations, or around heavily used recreation areas.

There are numerous resources on best management practice design. A few examples are listed below. Please contact your Watershed Manager for additional assistance in choosing management practices.

- **NRCS National Resources Conservation Service Practice Standards**
  - Contact your local NRCS office for assistance with design and installation.
- **International Stormwater BMP Database**
  - This database contains over 700 BMP studies, performance analysis results, tools for use in BMP performance studies, monitoring guidance, and other study-related publications.
- **DHEC Stormwater Best Management Practice Handbook**
  - This manual includes practices for erosion and sediment control, runoff control, and low impact development.
- **National Menu of Stormwater Best Management Practices**
  - This searchable database includes education, construction, post-construction, and pollution prevention measures.
- **Best Management Practices for Georgia Agriculture**
  - This manual provides descriptions, effectiveness, and relative coast of BMPs that are understood to protect surface water quality in Georgia.
- **Quick Reference Guide for Best Management Practices**
  - This guide provides BMP examples and their functionality in a watershed model and was developed by the Chesapeake Bay Program.
- **Agricultural BMP Handbook for Minnesota**
  - This handbook includes definitions, effectiveness based on scientific literature, and economic considerations for many BMPs.

Output: a description of the management measures needed for each source of pollution including a map of critical areas and/or potential management measure locations.

Load Reductions

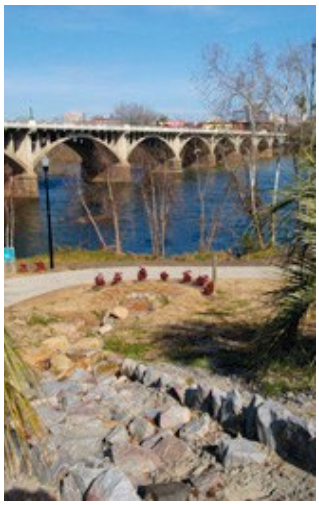
Load reductions provide a snapshot of the impact a project will have on reducing pollution in a watershed. Watershed-based plans should include the current pollutant loading in the watershed and the acceptable loading required to meet water quality standards. If a Total Maximum Daily Load calculation has been established for a pollutant in the watershed, it will include the quantifiable amount of pollution that must be reduced in a watershed to meet water quality standards.

In addition, each management measure should be accompanied by estimated pollutant load reductions expected from each measure. These reductions can then be compared to the total amount of pollution that needs to be eliminated from the watershed.

Load reductions are typically estimated by using standard literature values or by running a model. There are many studies that report the amount of pollutants that certain practices either contribute (ex. cattle, pet waste, or failing septic systems) or reduce (ex. rain gardens, wetlands, or riparian buffers). These standard numbers can then be applied to any watershed based on the number of people, livestock, or practices in that watershed.

The best estimates usually come from studies conducted locally or regionally. When possible, use data from studies that have been conducted in South Carolina, in nearby states, or in areas with similar soils and/or land-use. When using literature values, remember to cite data sources so that readers will understand the assumptions and limitations behind the data used to develop the plan.

Beyond literature values, several tools are also available to determine pollutant loadings and reductions:



- **Spreadsheet Tool for the Elimination of Pollutant Load (STEPL)**
  This modified spreadsheet tool calculates the amount of nutrients, biological oxygen demand, and sediment generation in a watershed based on land use, soils, and management practices. It also estimates load reductions for specific management practices.
- **New York State Stormwater Management Design Manual**
  The appendix presents data and methodologies for using the simple method to estimate pollutant load from a site or drainage area.
- **Revised Universal Soil Loss Equation 2 (RUSLE2)**
  This model predicts average annual erosion or soil loss based on local climate, topography, soils, and land use.

Watershed Managers have experience calculating load reductions and are available to assist organizations with their load reduction estimates.

Output: for each pollutant of interest, the amount of pollution currently in the watershed, the total amount of pollution removal in order to meet water quality standards, and the amount of pollution expected to be removed by each type of management measure.

Financial and Technical Assistance

Financial and technical assistance are critical to implementing a watershed-based plan. Cost estimates for management measures including salaries, regulatory fees, supplies, equipment, and contractual work should be established during the planning process. Knowing generally how much a plan will cost to implement makes applying for funding quicker and easier. Sources of financial assistance to implement management measures can include:

- 319 grants for nonpoint source implementation projects
- SC Clean Water State Revolving Fund
- USDA's Environmental Quality Incentives Program and Conservation Reserve Programs
- Local government stormwater fees and capital improvement funds
- Federal grants
- In-kind donations of labor, equipment, supplies or cash

It is also important to consider what kind of technical assistance will be needed to implement the watershed-based plan. For example, specific expertise may be needed for best management practice design, siting, and implementation, as well as developing monitoring or outreach programs.

Output: an estimated budget for plan implementation, a list of realistic funding sources, and a list of the type of technical assistance needed to implement the plan, along with specific people or organizations that could provide the assistance.

Education and Outreach

In the planning stages, it is important to engage community members in identifying water quality problems and solutions and to solicit partners for executing the plan. Education and outreach are also an important component of a watershed-based plan. Outreach can be viewed as a nonstructural best management practice in which the goal is to change behaviors that contribute to water quality problems. For example, a watershed-based plan may recommend educating residents and visitors about picking up pet waste so that it does not run off into nearby streams.

Effective outreach aimed at changing behavior typically follows these 5 steps:

1. **Identify the problem.** In watershed-based plans, this is usually the pollutant of concern the plan is targeting.
2. **Set goals.** This includes the overall vision or outcome of an outreach campaign.
3. **Identify undesirable behaviors contributing to the problem.** Outline what people are doing that needs to be changed.
4. **Identify appropriate behaviors to reduce contributions to the problem.** Outline what people in the watershed should be doing.
5. **Get to know your audience.** Find out who specifically is doing the undesirable behavior to teach them good practices.

This process should be repeated for each target audience, based on what behavior should be encouraged or changed. It often takes multiple outreach efforts before people will adopt a new practice. Having partners who know people in the watershed is therefore essential to establishing those relationships needed to encourage adoption of management measures. EPA's Watershed Academy page has more information and resources on education and outreach.

Output: a description of the target audiences to be educated, the goal for each audience (appropriate behaviors), and the methods that will be used to reach out to each audience.

Implementation Schedule and Milestones

Watershed-based plans should include the measurable tasks or milestones necessary to meet the goals, understanding that goals and milestones may change over time. Groups should prioritize goals and tasks and assign a time frame to each. For example, will a task take months or years to implement? The tasks should be included in the watershed plan in chronological order.

It may also be useful to include costs, monitoring needs, attainment of permits or engineered plans, additional resources required, and who will be responsible for implementing each element. While this information may be included elsewhere in the plan, it can be helpful to have a master chart of activities, as in the example table below.

Goal: Reduce bacteria levels in target stream by 50%

Objective	Milestone	Resources Required	Responsible Party	Time Frame
Work with farmers in the watershed to fence 500 cattle out of the stream	Hold a meeting with 25 local farmers to encourage them to install BMPs	Meeting location, food, speakers, staff time	County	2-3 months
	Write conservation plans for 10 farms	Staff time, travel expenses	NRCS	6-15 months
	Install 5,000 feet of livestock exclusion fencing along the stream	Labor, fencing materials	NRCS, Farmers	12-36 months

Output: a list of measurable milestones, in chronological order along with the estimated time frame for completing each.

Evaluation Criteria

All watershed plans should include a way to track plan progress and determine if plan goals are being met or if they need revision. Criteria should be established for each management measure as well as for the overall success of the watershed plan. Evaluation criteria should be measurable and quantifiable. For example, a plan might include tracking the number of management practices installed, or the percentage of samples meeting water quality standards. A plan could also include criteria that compares response rates before and after an educational campaign.

Output: an explanation of the criteria that will be used to measure successful plan implementation.

Monitoring

As water quality improvements are the ultimate goal of watershed-based plans, it is critical to outline the type of monitoring necessary to measure this goal. Watershed-based plans will include DHEC monitoring information, however plans should outline an ideal monitoring strategy which may go above and beyond DHEC monitoring. This section should reflect what type of monitoring a group believes is necessary to fully identify and measure progress towards water quality goals.

The monitoring component of a watershed-based plan may include answers to the following questions:

- What is the purpose or goal of the water quality monitoring plan?
- What type of monitoring is needed? What parameters should be monitored?
- Who is currently conducting monitoring in the watershed? What partners could provide help with monitoring in the future?
- Where are existing monitoring stations?
- Where should additional monitoring stations be established? Are the potential monitoring sites accessible? Does a group have permission to cross the property? Are there physical barriers to reaching the waterbody?
- What quality of data is needed to meet plan goals, for instance is regulatory data needed, or would screening tests be sufficient?

As with other plan elements, visuals are useful for strategically assessing monitoring needs in a watershed. Watershed plans should include a map with the key waterbodies, existing monitoring stations, and potential monitoring locations to clearly communicate the monitoring strategy.

Some resources for monitoring data in South Carolina include:

- DHEC Surface Water Monitoring Program
- USGS Water Data
- Volunteer Monitoring programs like SC Adopt-a-Stream
- Universities
- Municipalities including those with MS4 programs

In addition, for groups interested in establishing new monitoring sites, DHEC has created Regulatory Data and Quality Assurance Guidance which may be useful in thinking about the best monitoring approach.

Output: a description of the type, frequency and location of monitoring activities needed to determine plan success; a discussion of who will implement the monitoring strategy; a map with current and needed monitoring sites.

Putting It All Together

Once you have written all of the components of your watershed-based plan, you will need to decide how to organize it. There is no right or wrong way to structure a watershed plan, but looking at other completed plans may be helpful. View example watershed-based plans at DHEC's webpage.

The final version of your watershed-based plan will be submitted to DHEC Nonpoint Source Staff for review. Once a plan has been approved, it will be published on the DHEC webpage.

Watershed-based plans may be amended after their completion to include additional components or revised to cover additional HUCs. A watershed plan provides an excellent opportunity to educate community members about key water quality issues and get them involved in restoration activities. After you have completed your plan, contact your Watershed Manager to get started implementing your pollution reduction strategies.

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