



Tennessee Statewide Approach

Watershed Groups and Management Cycle

Lead Agency:

Tennessee Department of Environment and Conservation (TDEC)

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Information:

TDEC's Watershed Management Approach Web site:
www.state.tn.us/environment/wpc/watershed/

Overview

In 1996, the Tennessee Department of Environment and Conservation (TDEC) Division of Water Pollution Control reorganized its programs (monitoring and permitting activities) on a rotating watershed basis. Nationally, watersheds in the United States (U.S.) are delineated by the U. S. Geological Survey (USGS) using a nationwide system based on surface hydrologic features (see "Watershed Delineation" sidebar). Tennessee comprises fifty-five watersheds that correspond to USGS's Hydrologic Unit Code (HUC) 8-digit categorization. These watersheds serve as TDEC's geographic management units and are arranged into five groups.

Planning, monitoring, assessment, total maximum daily load (TMDL), and permitting activities are placed on a rotating five-year schedule such that the same activity occurs in each watershed within a group at the same time. TDEC uses its watershed management approach as a program inventory tool that reflects a common strategy for information collection and analysis as well as a common understanding about roles, priorities, and responsibilities of all stakeholders within a watershed group. In addition to balancing staff workload at twenty percent of the total workload per year for five years, a watershed focus helps identify the most cost-effective pollution control strategies to meet clean water goals. This case study discusses TDEC's process for implementing its statewide watershed management approach to developing NPDES permits.

Background

TDEC's Division of Water Pollution Control initiated the watershed management approach to better manage planning and resources and to streamline watershed activities. Tennessee designed its watershed approach to be programmatic and to address what it calls the "Three Es": efficiency, effectiveness, and equitability.

Watershed: Tennessee Statewide Watershed Approach

Watershed Approaches Used:

- *Planning, monitoring, assessment, TMDL development, and permitting synchronized on a five-year cycle*
- *Watershed management process documented through Water Quality Management Plans*

Stakeholders:

- *General Public*
- *Division of Water Pollution Control*
- *Watershed Management Section*
- *Permits Section*
- *Planning and Standards Section*
- *Environmental Field Offices*
- *Division of Water Supply*
- *Tennessee Department of Agriculture (TDA) Nonpoint source program*
- *Natural Resources Conservation Service (NRCS)*
- *U.S. Geological Survey*
- *Tennessee Valley Authority (TVA)*
- *U.S. Army Corp of Engineers*
- *National Park Service*
- *U.S. Forest Service*
- *U.S. Fish and Wildlife Service*
- *Local Watershed Groups*

Stakeholder Involvement Techniques:

- *Public meetings at key points of five-year watershed cycle*
- *Consulting with Tennessee Valley Authority on promoting partnerships*
- *Posting Water Quality Management Plans on Web site*

Watershed Delineation

Watershed boundaries are defined by the topographic dividing line where water flows in two different directions; however, the scale for defining a hydrologic unit varies depending on the scale of investigation. USGS assigns HUCs consisting of two to twelve digits based on six levels of classification. HUCs with more digits represent a smaller portion of the watershed.

HUC Classification			
Name	Digits	# in US	Avg size (sq mi)
Region	2	21	177,560
Subregion	4	222	16,800
Accounting unit	6	352	10,596
Cataloguing unit	8	2,262	700
Watershed	10	n/a	227
Subwatershed	12	n/a	40

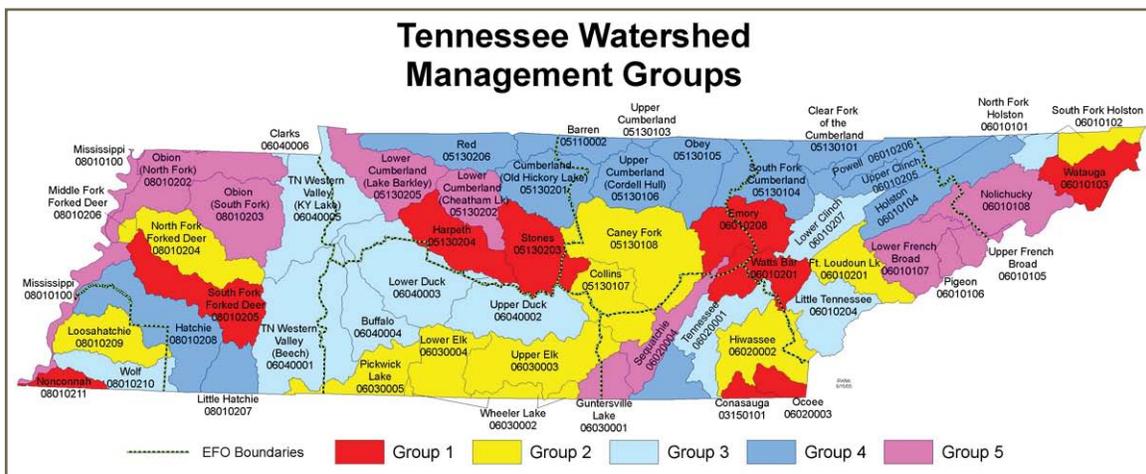
The first four levels (2- to 8-digit) have been completed and certified for the entire United States. The U.S. Department of Agriculture, Natural Resources Conservation Service is presently developing a national system that will delineate, number, and name hydrologic units on the watershed and subwatershed scales.

The development of Tennessee’s approach is not formally documented, but it was initiated by the Division of Water Pollution Control management who attended a U.S. Environmental Protection Agency (EPA) Watershed Conference in 1994. After learning about other states’ efforts in watershed-based permitting, Tennessee investigated options for implementing a watershed approach and decided to make programmatic changes to its National Pollutant Discharge Elimination System (NPDES) permit issuance process.

The Division of Water Pollution Control formed a new section, called the Watershed Management Section, and moved nonpoint source program staff to the Tennessee Department of Agriculture (TDA). The Watershed Management Section coordinates with the nonpoint source program staff at TDA, as well as the Planning and Standards Section (responsible for monitoring strategies, water quality standards, and the Clean Water Act (CWA) 303(d) list), the Permits Section (responsible for issuing permits), and the Environmental Field Offices, or EFOs, (responsible for water quality monitoring). More information about these programs is available on TDA’s Nonpoint Source Web site www.tennessee.gov/agriculture/water/nps.html, TDEC’s NPDES Permit Web site <http://tn.gov/environment/permits/npdes.shtml>, and Tennessee’s Environmental Field Offices Web site <http://tennessee.gov/environment/efo/>. TDEC also partners with other agencies like the Natural Resources Conservation Service and the Tennessee Valley Authority, watershed groups, and local universities to support watershed planning and restoration projects. Currently, the Watershed Management Section consists of eight people: four in the watershed group, who prepare watershed water quality management plans, and four in the TMDL group, who conduct modeling, waste load allocations, and prepare TMDL reports.

Initially, the Director requested that staff develop a plan for conducting business using the watershed approach. Staff designed and implemented the program as part of their regular workload. The first task for the section was to organize USGS’s HUC-8 watershed list into five Watershed Management Groups, which are depicted in Figure 1. Currently, all Water Pollution Control programs are using the watershed approach and schedule. The NPDES permits within each watershed were organized so that permits within a watershed would be issued during the same year. A September 14, 1995, memo from the Director to all NPDES permittees advised dischargers of forthcoming schedule changes to their permit terms and invited them to a meeting to discuss the new watershed approach.

Figure 1. Tennessee Watershed Management Groups



Strategy

The goals of Tennessee’s watershed approach are to integrate all aspects of watershed management into a structured, scheduled program and to be efficient, effective, and equitable in program implementation. The framework for the approach is based on the concept that many water quality problems, like the accumulation of pollutants or nonpoint source pollution, are best addressed at the watershed level.

Watershed management activities across Tennessee occur over five-year cycles. As shown in Figure 2, the cycle begins in a different year for each of the five Watershed Management Groups. Thus, the current activities for each group at any point depend on the group’s position in the five-year cycle. The six key activities that occur during the cycle are:

- ◆ **Planning.** TDEC compiles existing data and reports from appropriate federal, state, and local agencies and citizen-based organizations and uses them to describe the quality of rivers and streams and to determine monitoring priorities. Priority streams are those on the CWA 303(d) list, those previously non-assessed, and those believed to exhibit a change in water quality since they were monitored last.
- ◆ **Water Quality Monitoring.** TDEC staff collect field data for streams previously identified as priority streams. These data supplement existing data and are used for water quality assessments.
- ◆ **Assessment.** TDEC uses monitoring data to determine whether the streams support their designated uses based on stream classifications and water quality criteria. This assessment is used to develop the CWA 303(d) list and the CWA 305(b) report. Following this assessment, TDEC conducts a public meeting to inform the public of the most recent results.
- ◆ **Wasteload Allocation/TMDL.** TMDLs examine both point source and nonpoint source contributions to the watershed. TDEC uses the monitoring data not only to determine pollutant limits for NPDES point source dischargers, but also for TMDL development to ensure water quality standards are met. TDEC’s TMDL Web site www.state.tn.us/environment/wpc/tmdl/ provides more information on TMDLs

and TMDL development in Tennessee. TDA’s Nonpoint Source Web site www.tennessee.gov/agriculture/water/nps.html provides more information about the use of watershed planning and nonpoint source projects.

- ◆ **Permits.** TDEC synchronizes issuance and expiration of all point source discharge permits to follow the five-year watershed cycle. Permits are issued following completion of the five-year watershed management cycle (e.g., if planning begins in 2005, permits are drafted in 2009 and issued in 2010). Tennessee issues approximately 1,350 individual NPDES permits. All permits were organized by HUC-8 geographic areas by 2000, so that all NPDES permits in a watershed are now re-issued at approximately the same time. With all the permits in a watershed expiring in the same year, permit writers are able to better address watershed-wide issues.
- ◆ **Watershed Water Quality Management Plans.** The watershed analysis is documented through Tennessee’s Watershed Water Quality Management plans. Each plan includes six chapters that provide a generic summary of TDEC’s Watershed Approach to Water Quality, a general description of the watershed, a water quality assessment of the watershed, a point and nonpoint source characterization of the watershed, water quality partnerships in the watershed, and future plans/restoration strategies for the watershed. TDEC holds a second public meeting to discuss draft plans with local citizens, elected officials, and the regulated community. TDEC’s Watershed Management Plans Web site www.tn.gov/environment/watersheds/wsmplans/ provides links to the Watershed Management Plans for specific watersheds organized by Watershed Group.

Figure 2. Tennessee’s Watershed Management Cycle

Activities	Year							
	2003	2004	2005	2006	2007	2008	2009	2010
Planning	Group 3	Group 4	Group 5	Group 1	Group 2	Group 3	Group 4	Group 5
Water Quality Monitoring	Group 2	Group 3	Group 4	Group 5	Group 1	Group 2	Group 3	Group 4
	Group 3	Group 4	Group 5	Group 1	Group 2	Group 3	Group 4	Group 5
Assessment	Group 2	Group 3	Group 4	Group 5	Group 1	Group 2	Group 3	Group 4
Waste Load Allocation	Group 4	Group 5	Group 1	Group 2	Group 3	Group 4	Group 5	Group 1
	Group 5	Group 1	Group 2	Group 3	Group 4	Group 5	Group 1	Group 2
Draft Discharge Permits/ Management Plan	Group 4	Group 5	Group 1	Group 2	Group 3	Group 4	Group 5	Group 1
Issue Permits	Group 3	Group 4	Group 5	Group 1	Group 2	Group 3	Group 4	Group 5

All of the activities in the cycle are coordinated by the Division of Water Pollution Control and are designed to complement one another: planning helps lead to effective program implementation; monitoring and assessment support use determinations, TMDL studies, and NPDES effluent limitation development; and Watershed Water Quality Management Plans are used for basin planning. TDEC uses the sequence of activities in Tennessee’s watershed approach as a tool to analyze the watershed every five years and to document the results of that process in its published plans.

Stakeholder Involvement

The Watershed Approach represents awareness that restoring and maintaining Tennessee’s waters requires crossing traditional barriers (point vs. nonpoint sources of pollution) when designing solutions. These solutions increasingly rely on participation by both public and private sectors, where citizens, elected officials and technical personnel all have opportunity to participate. Tennessee believes that this integrated approach mirrors the complicated relationships in which people live, work, and recreate in a watershed.

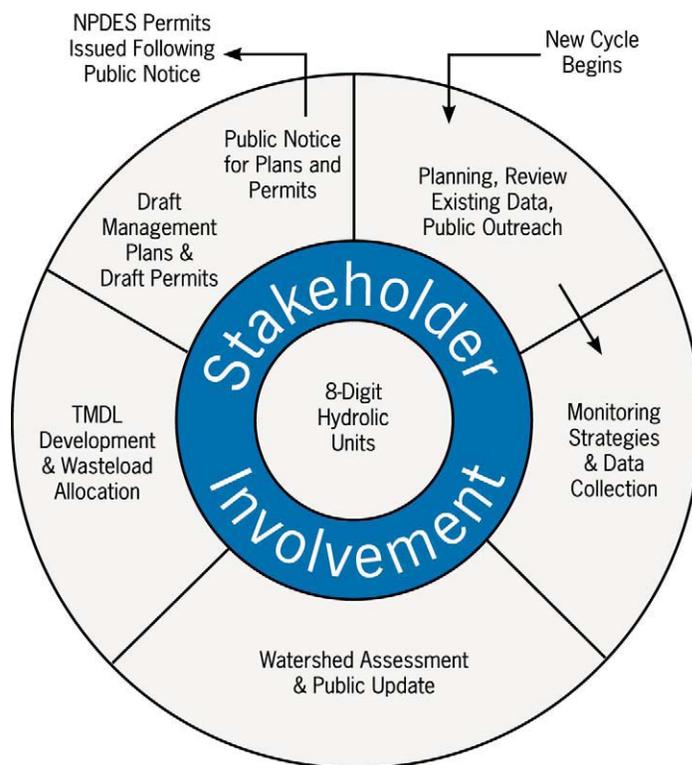
When designing its approach, TDEC looked to the Tennessee Valley Authority, which, since 1992, had been building partnerships with community residents, businesses, and government agencies to promote watershed protection through its Clean Water Initiative. In addition to consulting the Tennessee Valley Authority for its watershed knowledge during development of the program, TDEC used Tennessee Valley Authority’s River Action Teams as models for stakeholder involvement.

Tennessee welcomes participation in any phase of the watershed management cycle. Following the assessment that occurs during the second year of the cycle discussed above, a watershed-wide meeting is held (during the third year) to inform the public about the most recent water quality assessment and to invite input about water quality issues in the watershed. Another public meeting is held in the fifth year of the cycle for comment on the draft Watershed Water Quality Management Plans. The TDEC homepage and direct contact with local Environmental Field Offices provide additional opportunities for public involvement. Figure 3 illustrates the how NPDES permit development fits within the Watershed Management Cycle and illustrates Tennessee’s commitment to public participation and transparency in all NPDES activities.

Factors Considered During Development

Specific factors considered during initial development of Tennessee’s watershed groups were watershed proximity to field offices, complexity of the issues (i.e., upstream to downstream, number of permittees in each watershed), and geographic scale of watershed. The primary consideration for the Watershed Management Section staff during this

Figure 3. Phases of NPDES Permit Development on a Watershed Management Cycle



grouping process was the appropriate scale for associating watersheds with HUC geographical management units. After initially contemplating HUC-6, HUC-8, and HUC-10 classifications, they chose HUC-8 because it has available land use and agricultural census (livestock) information and is considered to be a more manageable unit than a larger area designation. TDEC was also committed to local participation, and the smaller unit of HUC-8 corresponds better to local citizen identity.

TDEC identified several potential benefits that it considered when designing its Watershed Management Cycle. These benefits included:

- ◆ **Attaining water quality goals:** The approach should increase focus on attaining and maintaining water quality goals and ecological integrity, rather than on program activities such as number of permits issued. The approach also should ensure timely development of TMDLs and promote effective control strategies.
- ◆ **Improving the basis for management decisions:** By considering both point and nonpoint source stressors, the approach should improve the scientific basis for decision making. Managers can focus their efforts on watersheds where they are most needed.

- ◆ **Enhancing program efficiency:** The approach should improve the efficiency of water management programs by facilitating integration and coordination of program activities within each watershed.
- ◆ **Improving coordination:** The approach should enable coordination between federal, state, and local agencies, including data sharing, pooling of resources, conducting assessments and managing control strategies.
- ◆ **Increasing public involvement:** The approach should provide opportunities for stakeholders to increase their awareness of water-related issues and to inform staff about their knowledge of the watershed, including scheduled public meetings during the five-year watershed management cycle, as well as meetings at stakeholders' request.
- ◆ **Providing greater consistency and responsiveness:** Developing goals and management plans for a watershed using stakeholder involvement should provide increased awareness of public perceptions, responsiveness to the public's needs, and consistency in determining management actions.

Program Effectiveness

The Watershed Management Section defines success programmatically by the improved administration and watershed characterization achieved through the Watershed Management Cycle. Long-term programmatic goals include development of watershed restoration plans. The Watershed Management Section has achieved several programmatic milestones that it considers indicators of success:

- ◆ permit reissuance is synchronized by watershed, which allows the Permitting Section to consider cumulative effects of permits and provides the additional benefit of facilitating planning for staff resources;
- ◆ 98 percent (all but one) of the watershed Water Quality Management Plans that inventory point sources, document nonpoint sources, and provide information to develop watershed restoration plans are complete;
- ◆ 80 percent of the Water Quality Management Plans are available on the TDEC Web site (www.tn.gov/environment/watersheds/wsmplans/); and
- ◆ TDEC coordinates effectively with the Tennessee Department of Agriculture nonpoint source program (administrators of the 319 program).

In addition, public awareness has increased through the development of Watershed Water Quality Management Plans, which has improved cooperation and formulated productive relationships. There is strong stakeholder support from permittees, who appreciate the goals of efficiency, effectiveness, and equitability. Permits are more efficient because there is better coordination and synchronization, more effective because monitoring data are used to develop water quality based effluent limitations, and more equitable because watershed management plans examine all permittees in the watershed. Other stakeholders are motivated to participate in the process because of the opportunity to become involved with protection of water quality in their watersheds.

Tennessee believes that its watershed approach establishes a strong foundation for water quality improvement. As the watershed approach begins to address watershed restoration through watershed restoration plans, streams should be removed from the CWA 303(d) list with greater regularity. TDEC reports these success stories to EPA and also posts them on the Tennessee Department of Agriculture (nonpoint source program) Web site www.state.tn.us/agriculture/water/success.html.

Lessons Learned & Next Steps

One lesson Tennessee learned was that it was difficult to anticipate staff resource needs when implementing a watershed approach. When beginning to implement its watershed approach, TDEC underestimated the time needed to synchronize permits and develop Water Quality Management Plans. Now that one five-year cycle has been completed (all watershed plans have been written), progress is more predictable. The new challenge is to move the plans from inventories (the Water Quality Management Plans) to active watershed restoration plans. If the approach is replicated in another state, that state should anticipate an adjustment period when reorganizing to implement a watershed management cycle.

Another lesson Tennessee learned was the importance of appropriately defining geographic scope. Tennessee grappled with its decision to use HUC-8 as the organizing unit. Each state should decide whether this geographic focus suits its needs. In the future, the Tennessee Watershed Approach will be moving from the HUC-8 watershed geographic management units toward using HUC-12 subwatersheds for watershed restoration plans. A smaller area is easier to evaluate for specific projects. TDEC also will coordinate permit reissuance at the HUC-12 level when appropriate.

Resources

Communication between Jennifer Duckworth, Tetra Tech, Inc. and David Hair, EPA OWM Permits Division on June 19, 2008.

Communication between Jennifer Duckworth, Tetra Tech, Inc., Sherry Wang, Manager Watershed Management Section, and David Duhl, TDEC Watershed Coordinator on July 3, 2008.

Electronic communication from David Duhl, TDEC Watershed Coordinator, to Jennifer Duckworth, Tetra Tech, Inc. on August 19, 2008.

Tennessee Department of Environment and Conservation Watershed Management Approach Web site
<www.state.tn.us/environment/wpc/watershed/>.

Tennessee Department of Environment and Conservation Watershed Water Quality Management Plans
<www.tn.gov/environment/watersheds/wsmplans/>.

Tennessee Department of Environment and Conservation, Division of Water Pollution Control, Planning and Standards Section, Proposed Final Year 2008 303(d) List, May, 2008.

U.S. Geological Survey and U.S. Department of Agriculture, Natural Resources Conservation Service, 2009, *Federal guidelines, requirements, and procedures for the national Watershed Boundary Dataset: U.S. Geological Survey Techniques and Methods 11-A3* <<http://pubs.usgs.gov/tm/tm11a3/>>.

U.S. Department of Agriculture, Natural Resources Conservation Service. *Watersheds, Hydrologic Units, Hydrologic Unit Codes, Watershed Approach, and Rapid Watershed Assessments Fact Sheet*. June 18, 2007.
<www.nrcs.usda.gov/programs/rwa/Watershed_HU_HUC_WatershedApproach_defined_6-18-07.pdf>.

Note: All Web references current as of December 11, 2009.