The CT DEP requires quarterly progress reports from "pass-through" §319 grant recipients, and meets periodically with project managers, through which progress is evaluated on a project-by-project basis. These reports are compiled, summarized, and submitted to EPA semi-annually. Each year the CT DEP issues an annual report summarizing program accomplishments over the previous calendar year, highlighting programmatic and environmental results.

The LISS produces an annual *CCMP Tracking and Monitoring Report*, which describes progress in implementing the CCMP action plans for: hypoxia management; toxic contamination, pathogen contamination, living marine resources, floatable debris, and public education and outreach.

The NOAA Office of Coastal Resource Management (OCRM) requires OLISP to provide semi-annual progress reports, which includes development and implementation of the CNPCP.

C. ANNUAL WORK PLAN

In cooperation with EPA, USDA/NRCS, and other partners, the CT DEP BWM prepares and submits to EPA an annual budget and work plan (for PPGs and "categorical" grants) describing the specific projects, with measures of success, that will be initiated utilizing that year's grant funds (federal and non-federal).

D. SUCCESS STORIES

Every few years, EPA's Office of Water publishes a "Section 319 Success Stories" report. CT DEP has submitted four successful projects, two for each of the "success stories" compilations published by EPA, and will continue to seek and submit success stories upon request by EPA. CT DEP also publishes numerous fact sheets and brochures describing its successful projects for general distribution, through which feedback is sought from its various partners and the public.

E. MONITORING

Connecticut's *Ambient Monitoring Strategy for Rivers and Streams: Rotating Basin Approach* utilizes a rotating basin monitoring approach to improve assessment of the state's rivers and streams. This program targets its resources at Connecticut's major river systems, and provides a good, overall indicator of water quality in the state. The upper Thames River basin is the next hydrological assessment unit to be monitored under the rotating basin plan. This work will begin with benthic invertebrate sampling, starting in October 1999, and will continue with quarterly, physical and chemical sampling at 39 sites through September 2000. Currently, the CT DEP is evaluating new approaches to monitoring that will better gauge impacts to water quality from nonpoint sources during wet weather events.

Volunteer citizen monitoring supplements the ambient monitoring program by providing more data on priority watersheds. In addition, CT DEP is developing a statewide watershed model to improve tracking and monitoring of pollutants, and benefits of nonpoint source management. The Long Island Sound monitoring strategy focuses on nutrients and dissolved oxygen, the primary water quality concern for the state's estuarine waters. Additional work and resources will be necessary to effectively measure improvements in water quality resulting from implementation of nonpoint source control programs and individual projects. These needs are continually evaluated and addressed in management program upgrades.

II. IMPROVING NONPOINT SOURCE MANAGEMENT IN CONNECTICUT

Nonpoint source management remains a challenge for the CT DEP and the numerous other agencies, organizations, and individuals working to restore and protect the quality of the state's water resources. The complicating factor is that nonpoint source pollution is largely the result of land use, and land use decisions are made primarily at the local level. While the federal and state governments are charged with meeting the goals of the federal Clean Water Act and Coastal Zone Management Act and companion state laws, namely "fishable and swimmable" waters, they do not have the ability to regulate the primary remaining sources of the pollutants that prevent attainment of these goals. One of the biggest challenges to the state NPS Program is building awareness of the connection between land use and water quality, and then providing local land use decision-makers with the tools necessary to guide development in such a way as to minimize impacts to local water resources. The national program to control nonpoint source pollution, prescribed by §319 of the Clean Water Act, relies primarily on the voluntary use of "best management practices" (BMPs) to reduce the impacts of land use on water quality. CZARA §6217 requires the state to have enforceable policies to ensure the implementation of management measures to protect coastal water quality from nonpoint source pollution.

1. TECHNICAL TRAINING AND ASSISTANCE

The CT DEP, with funding provided in part by EPA under §319, administers several training programs to encourage municipalities to require BMPs for new development, and has conducted numerous demonstration projects to test the pollutant-removal effectiveness of different BMPs. While building local capacity remains a challenge, one measure of the success of Connecticut's

NPS Program is the increased recognition of nonpoint source pollution as a serious concern among the various local boards and commissions that deal with development, as borne out by the increased emphasis placed on soil erosion and sediment control, maintaining and restoring wetland and riparian buffers, stormwater treatment systems, and other runoff controls. The CT DEP BWM and OLISP must continue to build local capacity by providing timely and consistent technical assistance to these boards and commissions, many of which are staffed by citizen volunteers. Because membership on these boards and commissions turns over on a regular basis, there is a need to provide ongoing training programs, like the inland wetland commissioners training program and NEMO, and develop new programs as new issues arise. One example is the need for a stormwater management manual and accompanying training program for both municipal officials and the development community. Some of the tools and materials necessary for such a program are currently under development, including a §319-funded project by the University of Connecticut to update and revise "intensity/frequency/ durational" curves based on recent rainfall data on which stormwater management system designs are based.

A. NONPOINT SOURCE EDUCATION FOR MUNICIPAL OFFICIALS

One such program is administered by the University of Connecticut Cooperative Extension System (UCONN/CES) with §319 funding support from CT DEP. The primary purpose of the UCONN/CES Nonpoint Education for Municipal Officials (NEMO) Program is to educate municipal land use decision makers about the connection between land use and water quality, and provide them with technical information on how to reduce the environmental impacts of new development.

B. OFFICE OF LONG ISLAND SOUND PROGRAMS

The CT DEP Office of Long Island Sound Programs (OLISP) provides assistance and training to coastal municipalities in identifying various methods to prevent nonpoint source pollution and protect coastal water quality. The OLISP has developed and disseminated a manual describing BMPs for urban runoff and marina operation and maintenance, and with model stormwater, and erosion and sediment control ordinances. The manual has been presented at several regional and municipal workshops, and more workshops are anticipated in the future. Similar outreach and training efforts will be expanded throughout the §6217 management area once Connecticut's CNPCP receives full approval and implementation is formally underway.

2. ENFORCEMENT

In addition to the need for increased technical training and assistance, there also is a need for more consistent enforcement of environmental regulations by local governments. The state, which has an oversight role in many programs, also lacks the necessary resources to be fully effective in that role. An important component of the ongoing and future training programs is getting across to municipal boards and commissions the importance of enforcing state and local laws and regulations, and giving them greater access to support from the federal and state regulatory agencies.

3. WATERSHED MANAGEMENT

The transition from the traditional, program-driven approach to water resources management to a comprehensive, multi-media "watershed approach" is yet another challenge facing the department in the coming years.

A. BUREAU OF WATER MANAGEMENT

The CT DEP took the first step in 1996 by establishing, within the Water Bureau's Planing and Standards Division, a Watershed Management and Coordination Section to oversee the department's watershed management efforts. Staff in this new unit have been assigned to one or two priority watersheds, and act as liaisons between the department's base program staff, other state and regional agencies, and local stakeholders. They also administer the state's River Restoration Grant Program, and coordinate these activities to leverage §319 grant funds and other funding sources. At the same time the Bureau of Water Management began developing a "watershed management strategy," to determine and assign roles and responsibilities among the numerous state, regional, and local entities that have a stake in a watershed approach to water resources management. The culmination of this effort should result in a watershed management framework that describes, in a clear and concise manner, the roles and responsibilities of the state, regional, and local agencies and organizations involved in water resources management. As a follow-up to that exercise, the Water Bureau is currently assessing the need for further restructuring to facilitate more effective watershed management, and is using §319 funds to hire five full-time "watershed coordinators" for the five major basins in the state.

2. OFFICE OF LONG ISLAND SOUND PROGRAMS

The Office of Long Island Sound Programs' Coastal Programs Unit has also reorganized staff liaison assignments on a coastal watershed basis. OLISP Coastal Programs Unit staff serve as the coastal management program's contacts with coastal municipal planning and zoning authorities, providing technical assistance in the review of coastal development proposals and land use planning as well as outreach and education to municipal officials on coastal management-related issues such as the connection between nonpoint source pollution and land use. The coastal municipalities contiguous to the Thames River, the Connecticut River, the Quinnipiac River, the Housatonic River, and the Western Coastal Basin have been grouped according to their watershed and assigned to individuals on the Coastal Programs Unit staff.

C. SOIL AND WATER CONSERVATION DISTRICTS

On a parallel track, the CT DEP, in cooperation with the Connecticut Association of Conservation Districts (CACD), is exploring the potential for reorganizing the eight county soil and water conservation districts on a watershed basis. CT DEP believes the existing county-based soil and water conservation district system is not organized to effectively support watershed management as county boundaries have little relationship with natural resources. In support of this effort, CT DEP submitted legislation in early 1999 that would reorganize the eight county district structure to four watershed-based districts. The CT DEP believes that this change will facilitate greater local stewardship of natural resources; improve technical assistance to municipalities and agriculture producers on matters related to soil and water conservation; aid the department's watershed management initiatives; result in more efficient administration of district operations; and help to foster financial stability throughout Connecticut's soil and water conservation district system. Reorganizing by watersheds will foster greater working relations with CT DEP regarding resource needs for:

improved erosion and sediment controls; inland wetlands and watercourses training programs; storm water management; and farm resource management panning in aquifer protection areas. The CACD is committed to adopting a new management structure, with watershed-based conservation districts, by mid-1999, and CT DEP has set aside §319 funds to assist with this transition.

D. PRIORITY-SETTING

Utilizing this watershed management framework, the CT DEP and its partners will focus their resources on a subset of selected, high priority watersheds for a three-five year period (depending on the size and complexity of issues involved in the watershed) on a rotating basis, initiating one-two new projects each year. One important factor driving this schedule is the *List of Connecticut Waterbodies Not Meeting Water Quality Standards*, which is produced biennially pursuant to §303(d) of the Clean Water Act. Section 303 also requires that, once these waterbodies are identified, plans are developed and implemented that will eliminate the impairment and allow attainment of water quality standards. One important aspect of this new approach is soliciting and encouraging the participation of local government agencies and watershed residents in the decision-making process from the beginning of the project. This will involve extensive public outreach efforts to solicit input from local stakeholders on everything from the problems they would like to see addressed to the proposed solutions. Experience has shown this to be extremely labor intensive and time consuming in the initial stages of a watershed project, but the "buy-in" by local stakeholders committed to implementing the "watershed management plan" more than makes up for it.

The NPS Program is only one component of this emerging watershed management approach being developed by the CT DEP Water Management Bureau, but because of the predominance of water quality problems associated with nonpoint source pollution, it is an extremely important one. Many early watershed management efforts were conducted under the auspices of, and funded by the CWA §319 grant program, and the department learned many useful lessons from these projects. The success of the CT DEP's watershed approach will depend heavily on the Water Bureau's ability to learn from these lessons and to remove old institutional barriers to working across media, program, and personal boundaries.

4. NATIONAL ENVIRONMENTAL PERFORMANCE PARTNERSHIP SYSTEM

Beginning with FY96, the CT DEP entered into EPA's new National Environmental Performance Partnership System (NEPPS), and for the first time received several previously separate grants under three performance partnership grants (PPGs). The Bureau of Water Management applied for federal Clean Water Act funds authorized under §§ 106, 104(b)(3), and § 319 through a single grant application and work plan, or Performance Partnership Agreement (PPA). The Air and Waste Management Bureaus also applied for and received one PPG apiece encompassing several previously categorical grants. For FY98-99, CT DEP negotiated a two year PPA with EPA, but still applies for and receives an annual, multi-media PPG covering most of the eligible grant programs. The driving force behind the NEPPS is an emphasis on measuring a state's performance in protecting the environment by real improvements in the quality of air, water, and land resources, rather than the traditional, numbers-oriented approach often referred to as "bean counting." It also allows the state greater discretion and flexibility in determining its environmental priorities and how shared resources should be targeted to address these priorities. The CT DEP, and in particular, the NPS Program, faces a real challenge in establishing these new performance measures, or environmental indicators, as changes in the environment resulting from nonpoint source management are often slow to materialize and difficult to measure even using the most rigorous monitoring methods and practices.

5. BUILDING PARTNERSHIPS

As described in the Section I, one of the strengths of the state NPS Program is its close coordination and strong working relationships with other federal, state, and local government agencies and non-government organizations. However, some of these relationships are not as strong as they could or should be. For example, CT DEP often has to

operate in a reactive mode to projects proposed by the state DOT, because there isn't a mechanism in place to coordinate during the important preliminary planning stages of these projects. Rather than being forced to react to proposals to fill wetlands or increase stormwater discharges, CT DEP and DOT should work together during the early stages of projects to promote environmentally-sound approaches to road construction and stormwater management. One strategy might be to establish a workgroup of the appropriate CT DEP and DOT staff to create a mechanism though which the use of best management practices is institutionalized in DOT's capital planning process. Information on the pollutant removal capabilities of different stormwater treatment systems, generated through the NPS Program, will be used to promote the use of the most effective systems.

The CT DEP also must continue its efforts to ensure that nonpoint source pollution from local and state roads, highways, and bridges is controlled, especially when improvements to existing infrastructure are being proposed. On-going training and education for officials in DOT and local departments of engineering and public works must be improved to expand the project design focus to include water quality impact reductions in addition to water quantity issues and to ensure the implementation of best management practices (BMPs). One of the methods currently under development to achieve improvement in this area is an alternatives analysis flow chart to aid DOT and local public works and engineering staff in project designs to improve water quality. The flow chart will compel DOT and local road design officials to consider and evaluate the various best management practices that can be accommodated based on site and other constraints (e.g., presence of sensitive resources, right-of-way limitations, incompatible soils for infiltration, etc.) and explicitly describe why more advanced treatment is not feasible in those instances where such treatment is not proposed.

III. FUTURE DIRECTIONS FOR NONPOINT SOURCE MANAGEMENT

1. INFLUENCING LOCAL LAND USE DECISIONS

Land use regulation in Connecticut and throughout New England is the responsibility of municipal governments, and is effected through zoning ordinances, subdivision regulations, and other assorted authorities. "Home rule" as it pertains to land use regulation has a long and rich history in New England, and as a result, state government has little authority over local land use decision-making. In Connecticut, the state encourages municipalities to consider the goals and policies of the *Conservation and Development Policies Plan for Connecticut*, issued every five years by the state Office of Policy and Management (OPM).

A. STATEWIDE

As described in Section I, the CT DEP has developed numerous manuals and guidance documents describing a wide range of best management practices (BMPs) for different categories of nonpoint source pollution. The state also requires municipalities to enforce two important state laws that influence development proposals: the "Soil Erosion and Sediment Control Act" and "Inland Wetlands and Watercourses Act." Both laws are intended to minimize the adverse impacts of development activities on nearby wetlands and surface water bodies. The CT DEP is currently in the process of updating and revising its *Guidelines for Soil Erosion and Sediment Control*, which serves as guidance on the proper implementation of the state law. A companion training program will be conducted by CT DEP, in conjunction with the soil and water conservation districts, upon its completion in 2000.

Construction activities disturbing five acres or more are subject to the CT DEP's stormwater discharge permit program, which requires developers to adopt stormwater pollution prevention practices during construction. The second phase of this federally-mandated program, which will reduce the size threshold to one acre and therefore bring more construction activities under regulation, will become effective in 2000. To implement these state and local laws and regulations, municipalities routinely require BMPs to protect wetlands and water quality.