

Delaware Nonpoint Source Management Plan

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OUR VISION:

The Department of Natural Resources and Environmental Control envisions a Delaware that offers a healthy environment where people include a commitment to the protection, enhancement and enjoyment of the environment in their daily lives; where Delawareans' stewardship of natural resources ensures the sustainability of these resources for the appreciation and enjoyment of future generations; and where people recognize that a healthy environment and a strong economy support one another.

OUR MISSION:

The mission of the Department of Natural Resources and Environmental Control is to ensure the wise management, conservation, and enhancement of the state's natural resources, protect public health and the environment, provide quality outdoor recreation, improve the quality of life, and educate the public on historic, cultural, and natural resource use, requirements, and issues.

Executive Summary



Delaware's Nonpoint Source (NPS) Management Plan identifies the pollution management programs, strategies and resources that are currently in place or that are needed to minimize or prevent nonpoint source pollution effects. Delaware's Nonpoint Source Management Program was established in 1988 following submission of the State's first NPS Management Plan and Assessment Report to the U.S. Environmental Protection Agency (EPA). The Delaware Department of Natural Resources and Environmental Control, Division of Soil and Water Conservation has the responsibility of overseeing and implementing the State's NPS Management Program by coordinating with many local, State and federal agencies and organizations throughout the State of Delaware.

This revision to the NPS Management Plan represents the unified effort of many agencies and individuals to outline the various pollution control strate-

gies which are currently taking place or are proposed for future implementation in order to achieve water quality goals. In addition, pollutant source category goals and implementation milestones are described for each of the eight EPA designated NPS pollution categories.

Since its inception, Delaware's NPS Program has strongly supported and promoted the collaborative efforts of state, federal, and local agencies as well as private organizations in order to achieve NPS goals. The State of Delaware is committed to implementing an environmentally sensitive program which focuses on the attainment of water quality goals by using a balanced approach of education, research, technical assistance, financial incentives and regulation.

Introduction



BACKGROUND

The Clean Water Act of 1987, Section 319 required each state in the nation to develop a program to control nonpoint sources of pollution to both surface and ground waters. Nonpoint source pollution has been defined as "pollution caused by diffuse sources" and as such:

"is associated with agricultural, silvicultural, urban runoff, runoff from construction activities, etc. Such pollution results in the human induced alteration of the chemical, physical, biological and radiological integrity of water. In practical terms, nonpoint source pollution does not result from a discharge at a specific, single location (such as a pipe), but generally results from land runoff, precipitation, atmospheric deposition, or percolation. Pollution from nonpoint sources occurs when the rate at which pollutant materials entering water bodies or ground water exceeds natural levels (U.S. Environmental Protection Agency, 1987).

On August 4, 1988, Delaware's original Nonpoint Source Pollution Management Program was approved by the Environmental Protection Agency (EPA) making it one of the first program's in the nation to comply with Section 319 of the Clean Water Act. Subsequent revisions to the Management Plan were submitted in July, 1989, and May 1995. The NPS provisions of the 1987 Clean Water Act required each state management plan to contain the following:

1. An identification of the best management practices and measures which will be undertaken to reduce pollutant loadings;
2. An identification of programs (including as appropriate, nonregulatory or regulatory program for enforcement, technical assistance, financial assistance, education, training, technology transfer, and demonstration projects) to achieve implementation of best management practices;

3. A schedule containing annual milestones for implementation;
4. A certification of the State Attorney General that the laws of the State provide adequate authority to implement the management program;
5. Sources of Federal and other assistance and funding which will be available for supporting implementation of milestones; and
6. Consistency of Federal programs with State NPS requirements

In 1996, the EPA issued guidance for updates to States NPS Programs for fiscal year 1997 and beyond. In response to this guidance, Delaware has undergone this upgrade so we are consistent with the nine key elements of a "dynamic" and "effective" nonpoint source management program. Once this upgrade is approved by the EPA, Delaware will receive Enhanced Benefits Status (EBS) which will entitle the State to decreased EPA oversight on 319 grant monies and additional 319 funding to accelerate our implementation efforts. The NPS Management Plan is to be used as a guide by local, state and federal agencies as they develop projects and implement programs over the next five years. This State NPS Management Plan outlines the issues to be addressed and actions to be implemented over the planning period of 1999 through 2004.

In order to comply with EPA criteria, the NPS Management Plan has been segmented into individual category sections that represent the eight comprehensive groups of nonpoint source pollution identified by the EPA. In addition, these eight EPA Categories listed below have been further broadened into subcategory sections to more clearly characterize the pollution sources. Please note: many of these identified subcategories have not been addressed separately as a subject heading in this document, but rather have been assembled into one overall category.

REPORT STRUCTURE

10. Agriculture

11. Non-Irrigated Crop Production
12. Irrigated Crop Production
13. Specialty Crop Production
14. Pasture Land
15. Range Land
16. Feed Lots — All Types
17. Aquaculture
18. Animal Holding/Management Areas

20. Silviculture

21. Harvesting, Reforestation, Residue Management
22. Forest Management
23. Road Construction/Maintenance

30. Construction

31. Highways/Roads/Bridges
32. Land Development

Introduction



REPORT STRUCTURE continued

40. Urban Runoff

- 41. Storm Sewers (Source Control)
- 42. Combined Sewers
- 43. Surface Runoff

50. Resource Extraction/Exploration/Development

- 51. Surface Mining
- 52. Subsurface Mining
- 53. Placer Mining
- 54. Dredge Mining
- 55. Petroleum Activities
- 56. Mill Tailings
- 57. Mine Tailings

60. Land Disposal (Runoff/Leachate from Permitted Areas)

- 61. Sludge
- 62. Wastewater
- 63. Landfills
- 64. Industrial Land Treatment
- 65. On-Site Wastewater Systems
- 66. Hazardous Waste

70. Hydrologic/Habitat Modification

- 71. Channelization
- 72. Dredging
- 73. Dam Construction
- 74. Flow Regulation/Modification
- 75. Bridge Construction
- 76. Removal of Riparian Vegetation
- 77. Streambank Modification/Destabilization

80. Other

- 81. Atmospheric Deposition
- 82. Waste Storage/Storage Tanks
- 83. Highway Maintenance and Runoff
- 84. Spills
- 85. In-Place Contaminants
- 86. Natural
Marinas (No designated EPA Subcategory#)

For each of the referenced pollutant sources, the management plan contains tabulated sections that address the specific information applicable to each category/subcategory. Each major source category contains the following components:

1. **Goal Statement** - *states overall category goals to control or manage the pollution source. These category goals support the overall goals of the NPS Management Plan.*
2. **Introduction** - *describes pollution problems associated with the pollutant source(s) along with background information on the current status.*
4. **Management Agencies for Implementation** - *identifies the organizations that have a role in the implementation of stated milestones to achieve NPS Program goals.*
5. **Best Management Practices, Management Measures and/or Best Available Technology** - *identifies handbooks or guidance documents that are utilized by the management agencies in the implementation of BMPs. Specific BMPs are not listed in this Management Plan but are referenced.*
6. **State Authority (Statutes and/or Regulations)** - *provides listing of state authorities that apply to a specific source category or subcategory.*
7. **Federal Authority** - *provides listing of federal authorities that apply to a specific source category or subcategory.*
8. **Milestones for Implementation** - *specific program objectives/activities (listed in table format) to be initiated by management agencies in order to achieve NPS goals. May be a quantifiable or qualitative target. Commitments to implementation will be subject to adequate funds being available.*

Introduction



PROGRAM INTENT

The Nonpoint Source Management Program is a dynamic and open-ended program intended to facilitate and promote statewide efforts to manage nonpoint source pollution. The following goals will guide this program:

1. *The NPS Program will support the identification and quantification of those problems that are caused specifically by nonpoint source pollution through assessment updates.*
2. *The NPS Program will be implemented and updated to realistically reduce nonpoint source pollution in a cost-effective manner.*
3. *The NPS Program will address nonpoint source pollution through a program that balances education, research, technical assistance, financial incentives, and regulation.*
4. *The NPS Program will follow a non-degradation policy in areas where surface and ground waters meet state water quality standards and a policy to realistically improve water quality in areas that do not meet these standards.*
5. *The NPS Program will continue to use the coordinated approach for implementation and maintain an open-ended framework to incorporate new initiatives and support interative approaches based on the effectiveness of existing policies and implementation mechanisms.*
6. *The NPS Program will support the development and implementation of Watershed Restoration Action Strategies (WRAS)/Pollution Control Strategies (PCS) for watersheds of identified impaired or threatened waters in accordance with the Unified Watershed Assessment List.*

In Delaware, the lead agency for the development and implementation of the Nonpoint Source (NPS) 319 Program is the Department of Natural Resources and Environmental Control (DNREC), Division of Soil and Water Conservation. The NPS 319 Program operates under a Performance Partnership Agreement (PPA) between the EPA and the DNREC. This process has allowed for decreased oversight and reporting requirements amongst the various EPA funded grant programs in DNREC including the NPS 319 Program.

As part of the PPA, the DNREC is required to develop an annual list of Environmental Indicators and to provide yearly

progress reports to EPA on the accomplishment of stated goals and objectives. This initiative is a significant step forward for our communication of environmental progress. Each year the DNREC uses the Environmental Indicator progress to publish a State of the Environment Report that is mass distributed in area newspapers. The NPS Program is responsible for contributing to the publication of this report and relies on this report as satisfying the annual reporting requirements to EPA.

An ongoing monitoring program will be developed by the Delaware Coastal Management Program (DCMP) in coordination with federal, state, and local agencies to maintain a BMP/Management Measure database and changes in water quality or environmental indicators. Results of this program will be reported annually to EPA and NOAA as part of the implementation requirements of the Section 6217 Coastal Nonpoint Source Pollution Program. Implementation will consider the lag time between pollutant source reduction on the land and the corresponding improvements in water quality in the stream.

This upgrade to the NPS Management Program provides direction for the implementation of nonpoint source initiatives for 1999 through 2004, and beyond in some cases. Delaware will strive to assure effective and efficient use of financial resources by leveraging funds with other programs and by targeting NPS priority issues and areas.

The NPS Program Staff has developed program specific milestones/objectives that focus staff resources on critical issues and areas. These priority issues have been identified in the NPS Assessment Report as well as other assessment processes such as the 305(b) Report and the Whole Basin Preliminary Assessment process. Specific "Milestones for Implementation" that will guide the NPS Program staff for the next five years begin on the following page. Whenever possible, these milestones have been linked back to target actions identified in the 1995 NPS Assessment Report and key actions listed in the Clean Water Action Plan. The NPS Program is directly supported by the following staff:

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MILESTONES FOR IMPLEMENTATION FOR THE NPS PROGRAM STAFF

WORK ACTIVITIES	LEAD IMPLEMENTATION AND COOPERATING AGENCIES	TARGET DATE FOR COMPLETION	FUNDING SOURCES
<p>Commit NPS 319 funds (20% max. allowed) to Total Maximum Daily Load (TMDL) development. Support implementation of TMDL Pollution Control Strategies/Watershed Restoration Action Strategies (N1, N5, S3, P1, P4, T2)</p>	<p>NPS Staff w/ Watershed Assessment Staff</p>	<p>1999-2004</p>	<p>NPS 319 20% Assessment Funds</p>
<p>Commit NPS Staff Resources to Whole Basin Management Initiatives.</p>	<p>NPS Staff w/ Whole Basin Staff and Basin Teams</p>	<p>1999-2004</p>	<p>NPS 319</p>
<p>Coordinate with the Watershed Assessment Section and Whole Basin Management Teams to work with local communities, the public and government agencies to develop Watershed Restoration Action Strategies (WRAS)/ Pollution Control Strategies (PCS) to achieve TMDL compliance. The WRAS/PCS will identify the causes of water pollution and resource degradation, detail the actions that all parties need to take to meet the TMDL, and set milestones by which to measure progress. (CWAP)</p>	<p>NPS Staff, Watershed Assessment, Whole Basin Staff and Basin Teams and Tributary Teams</p>	<p>1999-2004</p>	<p>NPS 319, State General Funds, other federal funds</p>

MILESTONES FOR IMPLEMENTATION FOR THE NPS PROGRAM STAFF

WORK ACTIVITIES	LEAD IMPLEMENTATION AND COOPERATING AGENCIES	TARGET DATE FOR COMPLETION	FUNDING SOURCES
Establish Environmental Indicators. Use indicators for tracking/assessing environmental improvement	DNREC, University of Delaware, Center for the Inland Bays, Chesapeake Bay Program, US Fish and Wildlife	1999-2004	NPS 319 and General Funds
Provide input and technical support to DNREC water quality assessment prioritization such as the Unified Watershed Assessment List and 305(b) List. (CWAP)	Division of Water Resources, Watershed Assessment Branch, Division of Soil and Water Conservation, Nonpoint Source Program	1999-2004	NPS 319
<p><u>Nutrients:</u></p> <p><i>Agriculture</i> - Provide technical and financial support for alternative uses of manure, distribution of manure, and on-farm conservation planning. Seek mass balance of nutrients in the state and regionally. (N3, N4)</p> <p><i>Urban</i> - Develop baseline data for urban loadings</p>	DNREC, NRCS, Conservation Districts, Interagency AFO Committee, State Technical Committee, State Nutrient Management Commission	1999-2004	NPS 319, State General Funds and other Federal Cost-Share Funds, 6217
Provide technical support for Conservation Reserve Enhancement Program (CREP), Confined Animal Feeding Operations (CAFOs), and the Coastal Nonpoint Source Pollution Program (6217). (CWAP, N5, N6)	NPS Staff, DCMP	1999-2004	NPS 319 and State General Funds, 6217, USDA

MILESTONES FOR IMPLEMENTATION FOR THE NPS PROGRAM STAFF

WORK ACTIVITIES	LEAD IMPLEMENTATION AND COOPERATING AGENCIES	TARGET DATE FOR COMPLETION	FUNDING SOURCES
<p><u>Hydromodification:</u></p> <p><i>Agriculture</i> - Support expanded research/implementation of Best Management Practices (BMPs) to prevent nutrient and sediment transport by agricultural drainage ways. (CWAP, N1, N2)</p> <p><i>Urban</i> - Advance research and implementation of improved stormwater management techniques to maintain the stability of streams and rivers and prevent further environmental degradation. Provide public education on the benefits of riparian corridors and the protection of existing corridors. (CWAP, S1, S3)</p>	<p>NPS, DCMP, University of Delaware, DNREC Drainage Section, USDA NRCS</p> <p>NPS, DCMP, USDA NRCS, University of Delaware, DNREC Subaqueous Section</p>	<p>1999-2004</p> <p>1999-2004</p>	<p>NPS 319, private/public, 6217</p> <p>NPS 319, private/public, 6217</p>
<p><i>Information and Education</i> -</p> <p>Promote public outreach on NPS issues by use of the DNREC webpage, NPS display, fact sheets, presentations and public service announcements (PSAs). (CWAP, T1, T3)</p> <p>Provide support and technical assistance to public partners such as watershed groups tributary teams</p> <p>Provide NPS information for the DNREC State of the Environment Report</p>	<p>NPS Staff</p>	<p>1999-2004</p>	<p>NPS 319, State General Funds</p>

MILESTONES FOR IMPLEMENTATION FOR THE NPS PROGRAM STAFF

WORK ACTIVITIES	LEAD IMPLEMENTATION AND COOPERATING AGENCIES	TARGET DATE FOR COMPLETION	FUNDING SOURCES
Participate in DNREC/EPA initiatives such as the Performance Partnership Agreement (PPA).	NPS and other EPA grant programs within DNREC	1999-2004	NPS 319 and General Funds
Develop criteria for expanded uses of the State Revolving Fund. Implement new technologies and best management practices associated with expanded uses. (CWAP)	NPS Program w/ Water Pollution Control Revolving Loan Fund	1999-2004	NPS 319, SRF, and General Funds
Coordinate w/ EPA to increase the number and dollar amount of loans made through the Clean Water Revolving Loan Fund Program for priority projects. Develop an integrated SRF priority-setting system to comparatively evaluate eligible projects. When possible, target SRF resources to priority watersheds (CWAP)	NPS Program w/ Water Pollution Control Revolving Loan Fund	1999-2004	NPS 319, SRF, and General Funds
Finalize 6217 Tracking Program for implementation of BMPs and management measures in order to improve Delaware's ability to measure success. Report to EPA/NOAA annually on implementation efforts and environmental indicators.	DCMP and NPS Program w/ Conservation Districts and USDA	Oct. 1999 - 2003	NPS 319, 6217, and General Funds

Introduction



NINE KEY ELEMENTS

In May, 1995, Delaware submitted its revised Nonpoint Source (NPS) Management Plan to the U.S. Environmental Protection Agency to replace the August, 1988 version. At the time, no updated guidance existed beyond the Clean Water Act of 1987 which mandated the development of the original 1988 Plan. Shortly after the submittal of the revised plan, the EPA developed a guidance document dated May, 1996, that encouraged States to develop "enhanced" NPS Management Programs that focused on "nine key elements". The adoption of these "nine key elements" into a State's NPS Management Program is designed to reward States with benefits such as multi-year work plans, streamlined review of grant applications, increased technical assistance, reduced reporting requirements, and reduced EPA oversight. In response to this guidance, and because the implementation milestones have become dated, the NPS Program has undergone another revision to the NPS Management Plan to incorporate these new issues and to identify new initiatives.

Below are the Nine Key Elements of an effective State Program as outlined by the Environmental Protection Agency (EPA). Below each element is Delaware's response to how it is meeting these goals:

1. The State program contains explicit short- and long-term goals, objectives and strategies to protect surface and ground water. *Short-term five-year implementation milestones (objectives) for FY 99 through FY 04 are outlined in the Management Plan under each contaminant source category and or subcategory. Many of these milestones have been related back to "target actions" for nutrients, sediments, pathogens, and toxics identified in the 1995 NPS Assessment Report for surface and ground water quality protection. In addition, many implementation milestones relating to key action items contained in the Clean Water Action Plan have been incorporated into this revision of the Management Plan. Additional short-term objectives for the Nonpoint Source Program are outlined in the FY98 Environmental Partnership Agreement between DNREC and the EPA. In October 1995, former DNREC Secretary Christophe Tulou established an Environmental Indicators work group to assist in the development and use of environmental goals and indicators. Indicators for nutrients, sediment and bacteria were provided by the Nonpoint Source Program. In addition, the Delaware Coastal Management Program (DCMP) in conjunction with the*

*Environmental Indicators Technical Advisory Committee (EITAC) is developing a list of environmental indicators for the coastal zone, which covers a large part of the state. These environmental indicators will be used to assess and track progress towards identified environmental goals. *Note: for more information on Environmental Indicators and Performance Measures, refer to pages ___ of the Management Plan. The Nonpoint Source Program has identified the following five long-term goals to guide the program: 1) continue to identify and quantify those problems that are caused specifically by nonpoint source pollution through assessment updates; 2) implement and update the program to realistically reduce nonpoint source pollution in a cost-effective manner; 3) address nonpoint source pollution through a program that balances education, research, technical assistance, financial incentives and regulation; 4) follow a non-degradation policy in areas where surface and ground waters meet state water quality standards and a policy to realistically improve water quality in areas that do not meet these standards; and 5) continue to use the coordinated approach for implementation and maintain an open-ended framework to incorporate new initiatives and support interactive approaches based on the effectiveness of existing policies and implementation mechanisms; and 6) support the development and implementation of Watershed Restoration Action Strategies/Pollution Control Strategies for watersheds of identified impaired or threatened waters in accordance with the Unified Watershed Assessment List.*

2. The State strengthens it's working partnerships and linkages to appropriate State, interstate, tribal, regional, and local entities (including conservation districts), private sector groups, citizens groups, and Federal agencies. *This key element is being achieved by the NPS Program's participation and reliance on several coordination teams and advisory committees. These include the following: Whole Basin Coordination Team, Piedmont Whole Basin Team, Chesapeake Whole Basin Team, Inland Bays/Atlantic Ocean Whole Basin Team, Delaware River Basin Team, Christina Task Force for TMDL Development, NRCS State Technical Committee, Nutrient Management Advisory Committee, Unified Watershed Assessment Team, Environmental Indicators Work Group, Performance Partnership Committee, Nanticoke River Watershed Alliance, Delaware*

Introduction



NINE KEY ELEMENTS continued

Association of Conservation Districts, and Composting Association of Delaware. Many of these groups meet on a monthly or quarterly basis, or as needed. The NPS Program is committed to using these collaborative partnerships and the Whole Basin process as the means of involving all stakeholders and the public in implementing NPS pollution control strategies. The NPS Program utilizes the public notice process for sending out Requests for Proposals (RFPs) as well as requesting public comments on the State NPS Management Plan. As needed, the NPS Program relies on a Technical Review Committee consisting of various conservation partners to provide input and guidance on the award of 319 grant funds based on priority issues and areas. The NPS Program is located within the DNREC, Division of Soil and Water Conservation, District Operations Section. This allows for a close working partnership with the three Conservation Districts in the State to effectively address urban and agricultural NPS issues. Each Conservation District is governed by a Board of Supervisors that represents farmers interests, urban interests, and county government. In addition, "Tributary Teams" or the equivalent are viewed as the mechanism for public participation in the development and implementation of Watershed Restoration Action Strategies/Pollution Control Strategies. These teams would likely be made up of representatives from State and local agencies, farmers, business, environmental organizations, federal facilities, and citizens. To date, the first "tributary team" has been established for the Inland Bays Watershed. DNREC should support the establishment of Tributary Teams or the equivalent through the Whole Basin process in order to involve all stakeholders (i.e., citizens, local governments, watershed groups) in carrying out watershed management plans in order to achieve the pollutant load reductions that need to occur to meet TMDLs.

3. The State uses a balanced approach that emphasizes both State-wide nonpoint source programs and on-the-ground management of individual watersheds where waters are impaired or threatened. *The Nonpoint Source Program within the Division of Soil and Water Conservation has taken an active role in the DNREC "whole basin approach". This is designed to employ the resources of all five Divisions in partnership with other governmental entities, private interests and all stakeholders, to more effectively address priority environmental concerns for*

specific basins in specified timeframes. The Nonpoint Source Program vision is embodied in the overall whole basin framework. The vision of whole basin is to encourage all stakeholders to cooperate in the planning and management of protecting natural resources in Delaware. Since many water quality concerns in Delaware are nonpoint, the program vision — to facilitate and promote statewide efforts to manage nps pollution — blends with the larger vision of the whole basin approach. The NPS Program is committed to the Department's Whole Basin Process. As part of that commitment, expertise is provided during the assessment and prioritization phase and funding is provided for activities that are within the purview of the NPS program during the implementation phase. For information on the priorities and recommendations of the DNREC Whole Basin Management Teams, please refer to pages 1-36 of the Management Plan. Attachment 1 (located in the Appendix), "NPS Funded Projects for FY 1991 through FY 1999" clearly identifies how 319 grant funds have been used to implement NPS efforts in priority watersheds/basins as well as projects of State-wide importance. The implementation of all NPS activities and watershed projects are tracked by utilizing the Grants Reporting and Tracking System (GRTS) in Lotus Notes as well as the Coastal Ocean Management, Planning, and Assessment System (COMPAS) which utilizes geographic information system (GIS) technology in order to spatially depict implementation activities. The COMPAS module will be used for tracking implementation of the Coastal Nonpoint Source Control Program as required under Section 6217 of the Coastal Zone Act Reauthorization Amendment (CZARA). The State of Delaware has made significant strides in institutionalizing the NPS Program by providing State General Funds for the NPS Program Manager's position. Also, the General Assembly has significantly increased State Cost-Share funds in recent years which helps to leverage NPS grant funds as well as State Revolving Funds which supports NPS implementation efforts.

4. The State program (a) abates known water quality impairments from nonpoint source pollution and (b) prevents significant threats to water quality from present and future nonpoint source activities. *Delaware's Unified Watershed Assessment List and Watershed Restoration Priorities (located in the Appendix) are closely linked to the 303(d) List of Waters Needing TMDLs. The List includes the TMDL develop-*

Introduction



NINE KEY ELEMENTS continued

ment schedule (located in Appendix) which is consistent with a federal consent degree. In conjunction with this schedule, DNREC will work with stakeholders to develop watershed specific Pollution Control Strategies for those watersheds where TMDLs have been adopted. In addition, Delaware conducts characterizations of State waters through their ambient surface water quality monitoring program. The purpose of the program is to collect data on the chemical, physical and biological characteristics of Delaware's surface waters and there are five major components: priority basin monitoring, toxics in biota monitoring, toxics in sediment monitoring, general assessment monitoring, and biological assessment monitoring. The priority basin monitoring for the Christina, Nanticoke and Inland Bays basins is oriented primarily toward nonpoint sources related to nutrient enrichment, bacterial contamination, toxics and low dissolved oxygen levels. This data has been used in the development of Total Maximum Daily Loads (TMDLs) for these areas. The full TMDL process is an effective and important tool for achieving water quality standards, but is time-consuming, labor-intensive and can be very costly if done in a defensible manner. For example, the development of the TMDL for the Christina Basin is in the 4th year of a five (5) year joint interstate effort by Delaware and Pennsylvania. To date, almost \$4,000,000 has been dedicated to this effort and the implementation phase is yet to come. Attachment # 3 contained in the Appendix details the expenditures to date on this TMDL effort. Delaware has now completed final TMDLs for the Appoquinimink River, Nanticoke River and Inland Bays (Indian River/Bay and Rehoboth Bay). In addition, Delaware has implemented a watershed approach that includes the integration of the TMDL monitoring and assessment program for each watershed in accordance with DNREC's Whole Basin Management Program schedule. These combined processes, actively supported by 319 will result in development and implementation of Watershed Restoration Action Strategies/Pollution Control Strategies. The NPS Management Plan is organized by each significant pollution source category (e.g., agriculture, construction, land disposal), with each category distinguished by a tabulated section. This allows the reader to easily find the category of interest and learn about the resource protection goals, programs, policies, and/or regulations that currently exist to address the contaminant source.

5. **The State program identifies waters and their watersheds impaired by nonpoint source pollution and identifies important unimpaired waters that are threatened or otherwise at risk. Further, the State establishes a process to progressively address these identified waters by conducting more detailed watershed assessments and developing watershed implementation plans, and then by implementing the plans.** On October 1, 1998, Delaware submitted the Unified Watershed Assessment and Watershed Restoration Priorities List to EPA. This "unified" list was developed to identify watersheds in need of remediation or additional protection. Delaware's 1998 Unified Watershed Assessment and Watershed Restoration Priorities were developed by a team of representatives from federal, State, and local agencies and various industry and advocacy groups. The Watershed Assessment Team also serves as the USDA, Natural Resources Conservation Service's State Technical Committee (see list of representatives on page 1-31). The basis for the Assessment and Restoration Priorities is the State of Delaware's 1998 Clean Water Act Section 303(d) List of Waters Needing TMDLs. In addition, State water quality assessments (including those performed under 305(b), 319(a), 303(d), 314, and others have formed the basis for the identification of planned nonpoint source activities and projects. Data from these sources have been used to develop NPS priority watersheds and ERES waters. The NPS Program has funded best management practices (BMPs) to remediate the identified impairments from water quality assessments. As a result of the Clean Water Action Plan, the State has developed its Unified Watershed List which now brings together various state and federal assessment processes to identify common priorities for watershed restoration and protection. In addition, Delaware has been taking an aggressive course of action in watershed management by adopting the Whole Basin Management Approach. This concept involves monitoring, assessment, and management of biological and physical environments of geographic areas, defined on the basis of drainage patterns, throughout the State. Though management is watershed-based, evaluation and management are not confined to water protection but include the full scope of environmental and natural resource consideration. The objectives of Whole Basin Management are to improve relations, maximize resource usage, enhance

Introduction



NINE KEY ELEMENTS continued

coordination, promote public outreach and interaction, and integrate efforts with other State and local government units, to the maximum extent practicable, when evaluating any given basin.

6. **The State reviews, upgrades and implements all program components required by section 319(b) of the Clean Water Act, and establishes flexible, targeted, and iterative approaches to achieve and maintain beneficial uses of water as expeditiously as practicable. The State programs include:**
 - (a) **A mix of water quality-based and/or technology-based programs designed to achieve and maintain beneficial uses of water; and**
 - (b) **A mix of regulatory, non-regulatory, financial and technical assistance as needed to achieve and maintain beneficial uses of water as expeditiously as practicable.**

Each category section of the NPS Management Plan contains the following headings: 1) "Management Agencies for Implementation"; 2) "Best Management Practices and/or Best Available Technology"; 3) "State Authority (Statutes and/or Regulations)"; and 4) Federal Regulations". The "Management Agencies" section contains information on the roles and responsibilities of the various programs that implement nonpoint source controls as well as identifies the technical assistance and education programs that each offers. In addition, applicable resource documents (e.g., USDA NRCS Technical Guide) as well as federal/state/local regulations have been referenced in the other sections for each category. Each pollution source category/subcategory contains goal statements as well as five-year implementation milestones. Over the past several years, the NPS Program has incorporated monitoring in association with the implementation of best management practices in an attempt to correlate water quality improvements with NPS implementation efforts. Short-term program efforts have included: streambank stabilization on the Brandywine; Trap Pond monitoring and subsequent enforcement action; Weber Farm wetland monitoring; Nanticoke Watershed Project; various septic system projects; Red Mill Pond monitoring and BMP evaluations; Dover Mall Retrofit (stormwater/wetland monitoring); Broad Dyke Project; and Draper King Cole monitoring. Long-term program efforts have included: St. Jones Watershed (stormwater modeling and monitoring); agricultural drainage project monitoring and assessment; Christina Basin TMDL; Nanticoke Watershed TMDL, and Inland Bays TMDL. The 319 NPS Program will work closely with the Delaware Coastal

Management Program (DCMP) to coordinate the efforts of the Coastal NPS Management Program (6217) to ensure implementation and compliance with program objectives. This update of the NPS Management Plan contains a draft of the five and fifteen-year implementation plans for the Coastal NPS Management Program which encompasses the whole State. These strategies show how program implementation will occur and describe the mechanisms for tracking and monitoring implementation.

7. **The State identifies Federal lands and activities which are not managed consistently with State nonpoint source program objectives. Where appropriate, the State seeks EPA assistance to help resolve issues.** *The NPS Management Plan contains a section in the Introduction entitled, "Consistency of Federal Programs". This sections describes the federal consistency review process that is conducted by the State Clearinghouse as well as the Delaware Coastal Management Program (DCMP). Consistency offers Delaware's state agencies, through the DCMP, Division of Soil and Water Conservation, an opportunity for a positive voice in federal actions. It ensures that state concerns and policies will be considered by federal agencies in federal development projects, the issuance of federal licenses and permits, the approval of federal licenses and permits, the approval of Outer Continental Shelf plans and programs, and the award of federal grants, loans, subsidies, insurance, or other forms of federal aid. In addition, the Nonpoint Source Program in conjunction with the Department's Whole Basin Management initiative is supporting a full-time conservation planner position to ensure that all State-owned and federally-owned wildlife/agricultural areas have an approved conservation plan that is fully implemented.*
8. **The State manages and implements its nonpoint source program efficiently and effectively, including necessary financial management.** *In October, 1997, the DNREC entered into a Performance Partnership Agreement (PPA) with the EPA Region III and is currently operating under a new PPA for FY 1999. The purpose of this agreement is to clearly define our respective missions and focus on common sense environmental objectives. In addition, the DNREC operates under the Whole Basin Management Approach which allows for leveraging of funds from all DNREC Divisions to solve high priority environmental concerns in the State. For example, NPS 319 funds*

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NINE KEY ELEMENTS continued

are leveraged with State Cost-Share funds and State Revolving Loan Program Funds to implement comprehensive conservation plans for agricultural operations. Through the whole basin framework and the NPS and TMDL Programs, plans are being developed to comprehensively address areas in these Basins that need extra management to bring water into compliance with water quality standards. The NPS Program has an excellent track record of utilizing the Grants Reporting and Tracking System (GRTS) for reporting on the progress of all NPS funded projects. In addition, the State of Delaware uses a fiscal accounting system that is capable of tracking expenditures of both 319 funds and non-Federal match. The Nonpoint Source Program has a good history of effectively closing out grants and documenting Maintenance of Effort (MOE). The Division of Soil and Water Conservation has developed specific environmental indicators for nutrients, sediments, and bacteria as part of the Department's Environmental Indicator Project.

- 9. The State periodically reviews and evaluates its nonpoint source management program using environmental and functional measures of success, and revises its nonpoint source assessment and its management program at least every five years.** The NPS Program will prepare an annual report in conjunction with the Coastal NPS Management Program to outline and track progress in implementing best management practices,

management measures, and milestones in addition to progress toward water quality and environmental indicator goals. This report will be distributed to EPA, NOAA, the State Technical Committee, DNREC Whole Basin Teams, Tributary Teams and others for review and consideration of needed modifications to the State NPS Program. The State has and uses a process to periodically assess both improvements in water quality and new impairments or threats. The NPS Management Plan was originally submitted in 1988, with subsequent revisions in 1989, 1995 and in 1999. With each of these updates, the NPS Program has reevaluated the goals and objectives of the Program and has identified new implementation milestones to address the most significant areas of concern. Since the Program was first developed in 1987, it has utilized a feedback loop based on monitoring and implementation results to help identify and focus future needs and activities. For example, water quality monitoring at Trap Pond led to an enforcement action against an area farmer; the development of the methodology for state-wide ground water recharge mapping has resulted in the passage of a New Castle County Ordinance for protecting sensitive recharge areas against development; and the agricultural drainage project in the Inland Bays Watershed has provided valuable information on the transport processes of sediments and nutrients into drainage ditches. As a result of this project, the agricultural drainage and nutrient management practices in the Inland Bays and the Chesapeake Drainage Basin has become a major issue of concern for the Whole Basin Teams as well as the NPS Program.

NPS PROGRAM INITIATIVES/COORDINATION

INITIATIVE	HOW NPS PROGRAM IS AFFECTED BY INITIATIVE	HOW NPS PROGRAM COORDINATES WITH OR SUPPORTS INITIATIVE
EPA's Nine Key Elements	Specific guidelines developed by EPA for state 319 programs. Integral to "Enhanced Benefits Status" for NPS Management. Updating NPS Management Plan to include 9 key elements results in streamlined EPA oversight.	NPS Management Plan FY99 update is in line with 9 key elements.
319 NPS Assessment Report	Developed by NPS Program in 1995 to evaluate and prioritize nonpoint sources in Delaware. FY99 Management Plan uses assessment report targeting actions, prioritized watersheds, and issues to guide goal and milestone development.	<p>Assessment Report technical information included in Watershed Assessment 305(b) Report and Whole Basin Preliminary Assessment Report.</p> <p>Assessment Report watershed prioritization considered as part of criteria for TMDL 303(d) list and Unified Watershed Assessment List.</p>
NPS Management Program Funding	319 competitive grant dedicated primarily for implementation of NPS BMP's and milestones as identified in the State's NPS Management Plan.	<p>319 funds can be combined with other whole basin designated funds to increase effectiveness where objectives correspond. Whole Basin projects that are nps-based will be prioritized for funding.</p> <p>20% of 319 grant funds can be used for assessment. That portion is used to support TMDL development. Additional funds to be used for implementation.</p>
Clean Water Action Plan (CWAP), Unified Watershed Assessment, and Watershed Restoration Priorities	CWAP requires unified watershed assessment (submitted by Watershed Assessment Branch), building of frameworks and partnerships (carried out through Whole Basin Management) to promote watershed protection, and provides additional 319 grant funds to "restore watershed health".	NPS Program and Watershed Assessment Branch actively participates in Whole Basin Management. 319 funding provided for NPS-related Whole Basin projects.

NPS PROGRAM INITIATIVES/COORDINATION con't

INITIATIVE	HOW NPS PROGRAM IS AFFECTED BY INITIATIVE	HOW NPS PROGRAM COORDINATES WITH OR SUPPORTS INITIATIVE
TMDL Process	TMDL's are developed by Watershed Assessment Branch. Subsequent Pollution Control Strategies are to be developed in conjunction with Whole Basin Process. Many water bodies undergoing TMDL process are stressed by nonpoint sources.	20% assessment funds from 319 grant provided for TMDL development. Additional funds available for implementation.
Whole Basin Management	Department's integrated watershed management approach. Relies on NPS Program expertise for nonpoint source issues.	Active participation on basin teams by NPS program staff providing expertise during assessment/ planning phases and 319 funding during implementation phases.
Environmental/ Performance Indicators	Indicators can be used to measure performance or water quality improvement resulting from nonpoint source pollution remediation or prevention objectives in Performance Partnership Agreement.	NPS Program staff participated in development work group. NPS indicators included in Performance Partnership Agreement.
Federal Consistency	Federal assistance and development initiatives to be reviewed for consistency with State's NPS Management Program.	Delaware Coastal Management Program conducts federal consistency review for the State including requirements from DNREC's NPS Management Program.
Performance Partnership Agreement	DNREC – EPA agreement that clearly defines each agencies respective missions and focuses on common sense environmental objectives. Success is measured using environmental/performance indicators. NPS Management Program must follow associated planning, review, reporting, and timelines.	NPS Program participates in PPA Planning Group. Participated in developing NPS indicators for measurement of success.
Coastal Nonpoint Pollution Control Program (6217)	Joint NOAA-EPA NPS program requires enforceable mechanisms to ensure implementation/compliance with objectives for coastal areas. Entire state of Delaware is within management area. NPS Management Program existed before 6217 but is incentive-based. Significant overlap exists between programs.	NPS and 6217 Programs coordinate to avoid duplication of effort. 6217 5 and 15-year Strategy is incorporated with NPS Management Plan. Coordinates with DCMP to develop tracking program for BMPs/Management Measures.

Introduction



NPS ASSESSMENT REPORT

The purpose of a state's Nonpoint Source (NPS) Assessment Report is to prioritize watersheds and nonpoint source issues of concern for the Nonpoint Source (NPS) Pollution Program. Delaware's NPS Assessment Report, dated May, 1995 identified several key "Targeting Actions" for Nutrients, Sediments, and Pathogens, and Toxics to help direct NPS implementation efforts. These actions are still relevant based on more recent assessment documents such as the 1998 305(b) Report and the Whole Basin Management Preliminary Assessment Reports. Whenever possible, implementation milestones contained in the various contaminant source categories have been linked to one or more of these "targeting actions" by use of a reference number, i.e. N1 for Nutrients, P3 for Pathogens. This will help to ensure that NPS funds are used effectively and are targeted towards state priorities that address NPS issues affecting the waters of Delaware.

Nutrients

N1. Determine nutrient transport processes and use that knowledge to direct management implementation. We do not know the full extent of lake and river sediment contribution or the role of tax ditches.

N2. Advance the use of Sims' nitrogen quick test and phosphorus index. The index may be useful by directing our efforts to the most sensitive areas where loss of phosphorus to the environment occurs.

N3. Develop and implement conservation plans. However, we need to document better, especially with geographic information systems (GIS), so that we can evaluate environmental impacts.

N4. Regional nutrient management is necessary. Nutrients must be more evenly distributed throughout the region and excess must be exported. Pursue projects which improve transportability of manure.

N5. Highly targeted ground water monitoring is needed. In the future, monitoring plans should be constructed to discern short term effects and predict long term trends to give us a better indication of implementation impact.

N6. Sediment, erosion and stormwater runoff control is to be supported since nutrients, especially phosphorus, travel with soil particles.

Sediment

S1. Implement sediment and stormwater demonstration projects which offer solutions to a variety of situations.

S2. Implement inspection and enforcement efforts.

S3. Further development of the relationship between urban land use, natural slope, stormwater volume, and stream habitat quality is needed. Relationships then need to be incorporated into regional land use planning and zoning.

S4. Implement demonstration practices that advance alternative tillage methods to control erosion and runoff.

Pathogens

P1. The data suggests that we should continue to target erosion and stormwater runoff control since increased bacteria levels are correlated with their occurrence.

P2 Ponds and lakes will be carefully evaluated for sources if high bacteria levels are found. Ponds may have the greatest potential for bacteria remediation success.

P3. Sanitary surveys will continue to be a vital part of any project which targets bacteria control. Animal production operations and combined sewer overflows and failing septic systems are typical sources to look for and remediate.

P4. The 319 Program will coordinate with the Shellfish and Recreational Waters Branch, the Delaware Clean Lakes Program, and the Watershed Assessment Program. They have strong programs which would benefit from working with each other to address bacteria concerns.

Toxics

T1. Support educational efforts that help homeowners and residents to handle toxic substance storage and disposal responsibly.

T2. Target stormwater and sediment runoff control efforts as a general method to reduce PCB loading.

T3 Target educational efforts and demonstration projects to marina owners and users to reduce sediment contamination, especially in the Inland Bays.

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NPS ASSESSMENT REPORT con't

The 1995 NPS Assessment Report selected priority watersheds on a countywide basis rather than statewide as was done in 1988. This prioritization is based on ground water and surface water quality, use and susceptibility, as well as associated land use intensity which may cause pollutant loadings. The text of this document provides supporting logic and documentation for the prioritization method and conclusions.

The priority watershed list below which coincides with the Unified Watershed Assessment List is intended to aid the NPS Program with directing limited funds. Proposed projects which address prioritized issues and watersheds/basins will take precedent when ranking proposals for competitive funding. In addition, projects that support Total Maximum Daily Load (TMDL) development, Whole Basin Management implementation, and Watershed Restoration Action Strategies will be given highest consideration for awarding NPS 319 grant funds. A map depicting the location of Delaware's watershed drainage basins can be found in the Appendix.

Why watersheds were chosen:

New Castle County:

White Clay Creek

- ◆ ERES and Public Water Supply designation
- ◆ Stocked with trout
- ◆ high ground water concern
- ◆ very high urban runoff concern
- ◆ very high level of development occurring
- ◆ high on-site system concern
- ◆ part of the "Christina Basin", a Whole Basin Planning priority
- ◆ undergoing evaluation for national "Wild and Scenic River" designation

Appoquinimink River

- ◆ high ground water concern
- ◆ high level of development anticipated
- ◆ moderate agricultural concern
- ◆ TMDL in progress
- ◆ National Monitoring Project currently under development
- ◆ historically high level of participation

Christina River

- ◆ designated public water supply
- ◆ high urban runoff concern
- ◆ high level of development occurring
- ◆ high on-site system concern
- ◆ main stem of the "Christina Basin", a Whole Basin Planning priority
- ◆ Becks Pond targeted for Phase II project under Clean Lakes Program
- ◆ Toxic Substances a concern

Chesapeake and Delaware Canal

- ◆ very high development occurring
- ◆ Lums Pons Phase II project plan approved under Clean Lakes Program
- ◆ on-site system concern is moderate but septic system failure is chronic as a result of placement and installment methods

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NPS ASSESSMENT REPORT con't _____

Kent County:

Saint Jones River

- ◆ high surface water concern
- ◆ very high ground water concern
- ◆ development anticipated/occurring
- ◆ moderately high on-site system concern
- ◆ focus of Dover/Silver Lake Stormwater Utility Project
- ◆ Derby Pond is a Clean Lakes Program priority
- ◆ vegetable production is a concern
- ◆ toxic substances are a concern

Murderkill River

- ◆ High ground water concern
- ◆ high agricultural concern; vegetable production is a concern
- ◆ high on-site system concern; Kits Hummock has a high system failure rate
- ◆ Killens Pond is undergoing a Phase I project under the Clean Lakes Program

Mispyllion River

- ◆ high ground water concern
- ◆ high agricultural concern

Little Creek

- ◆ Little Creek Wildlife Area
- ◆ very high ground water concern
- ◆ moderately high on-site system concern; Pickering Beach has a high system failure rate
- ◆ moderate agriculture concern; some vegetable production
- ◆ moderate development and urban runoff anticipated
- ◆ included because concerns associated with the Saint Jones River watershed extend into this watershed

Sussex County

Broad Creek

- ◆ ERES designation
- ◆ high ground water concern
- ◆ very high agriculture concern (poultry and swine)
- ◆ Trap Pond has been the focus of efforts to reduce bacteria related swimming closures
- ◆ Broad Creek watershed is currently the focus of a 319 watershed project

Nanticoke River

- ◆ ERES designation
- ◆ high ground water concern
- ◆ very high agriculture concern (poultry and swine)
- ◆ TMDL underway
- ◆ Hearn's Pond is a 314 priority

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NPS ASSESSMENT REPORT con't

Sussex County Con't

Indian River Bay

- ◆ ERES designation
- ◆ very high groundwater concern
- ◆ high surface water concern
- ◆ very high agriculture concern (poultry)
- ◆ high on-site system concern; Ocean View has a high failure rate; White Creek has high bacteria degradation possibly related to on-site systems
- ◆ Marina Program priority
- ◆ Inland Bays Comprehensive Conservation and Management Plan recently drafted
- ◆ has not been prioritized higher because level of effort over several years has been very high; maintenance efforts and further research/analysis are recommended at this time

Rehoboth Bay

- ◆ ERES designation
- ◆ very high ground water concern
- ◆ high surface water concern
- ◆ high level of development occurring
- ◆ Marina Program priority

Issues Prioritization:

In addition to prioritizing areas, specific issues are brought to prominence as well. Nutrients and sediments are the major pollutants of concern throughout the state.

Nutrients ultimately cause reductions in fauna abundance and diversity. Boating, fishing, and swimming are inhibited as a result of excessive plant growth.

Sediments also affect fauna and flora populations as a result of turbidity and sedimentation filling in habitat on waterbody floors. Cost is incurred when navigable waters must be dredged to remove sediment. Toxic substances are transported with sediments.

Although not a statewide priority, pathogens and toxic substances are localized problems. Pathogens, evaluated by measuring bacteria concentrations, are a concern when designated swimming areas and shellfish harvesting areas are affected. Although bacteria is the most common pollutant causing nonattainment of a designated use (primary contact), it is still considered a localized problem; the limitations of testing methods and pervasive background levels limit our ability to attain water quality standards on a large scale. However, where localized contamination is a problem, bacteria sources can be located and effectively controlled.

Ground and surface water contamination from toxic substances affect human and environmental health. Considerable expense is incurred when remediation and well replacement is required. Recreational and industrial fishing is affected when fish consumption advisories are posted. PCB's is perhaps the most pervasive toxicant. Hazardous waste sites and leaking underground storage tanks are sources of localized toxic contamination. Marinas may contribute to localized build up of toxic substances in bay sediments.

Stormwater volume, although not technically a pollutant, has been implicated as the cause of habitat destruction in Piedmont streams and may have similar affects in some coastal plain watersheds. Further evaluation is required.

Introduction



NPS ASSESSMENT REPORT con't _____

Program Prioritization:

To deal with these pollutants, some programs should be considered in particular:

Agriculture:

Pollutants:	nutrients, bacteria, sediments
Affected waters:	surface and ground
Programs:	Delaware Department of Agriculture Conservation Districts Natural Resources Conservation Service Delaware Extension Services

Sediment and Stormwater:

Pollutants:	nutrients, sediments, toxic substances, bacteria, stormwater volume
Affected waters:	surface
Programs:	Sediment and Stormwater Management Program, DNREC NPDES Stormwater Program, DNREC Conservation Districts County planning and zoning agencies

Sewage Disposal:

Pollutants:	nutrients, bacteria
Affected waters:	surface and ground
Programs:	municipal planning departments On-Site Program

Toxic Substances:

Affected waters:	surface and ground
Programs:	Sediment and Stormwater Management Program, DNREC NPDES Stormwater Program, DNREC Underground Storage Tank Program, DNREC Hazardous Waste Group, DNREC Marina Program, DNREC

Assessment/Research/Development

Programs:	Clean Lakes Program Watershed Assessment Branch Shellfish and Recreational Waters Branch
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Introduction



NPS MANAGEMENT PROGRAM FUNDING

Section 319(h) of the Clean Water Act of 1987 authorized specific funding for the purpose of implementing approved State nonpoint source management programs. In order to be eligible for 319 funding, a State must have an approved nonpoint source assessment report and management program (plan). Final grant awards are to be based on management program priorities to assure that the funds will be used effectively to achieve the objectives of the nonpoint source program. Whenever possible, 319 grant funds will be focused in sub-watersheds where NPS control activities are likely to have the greatest positive impact. Funded restoration activities will be implemented using the most effective measures and practices available in order to achieve water quality improvements.

Eligible types of management program implementation activities include the following: 1) nonregulatory or regulatory programs for enforcement; 2) technical assistance; 3) financial assistance; 4) education; 5) training; 6) technology

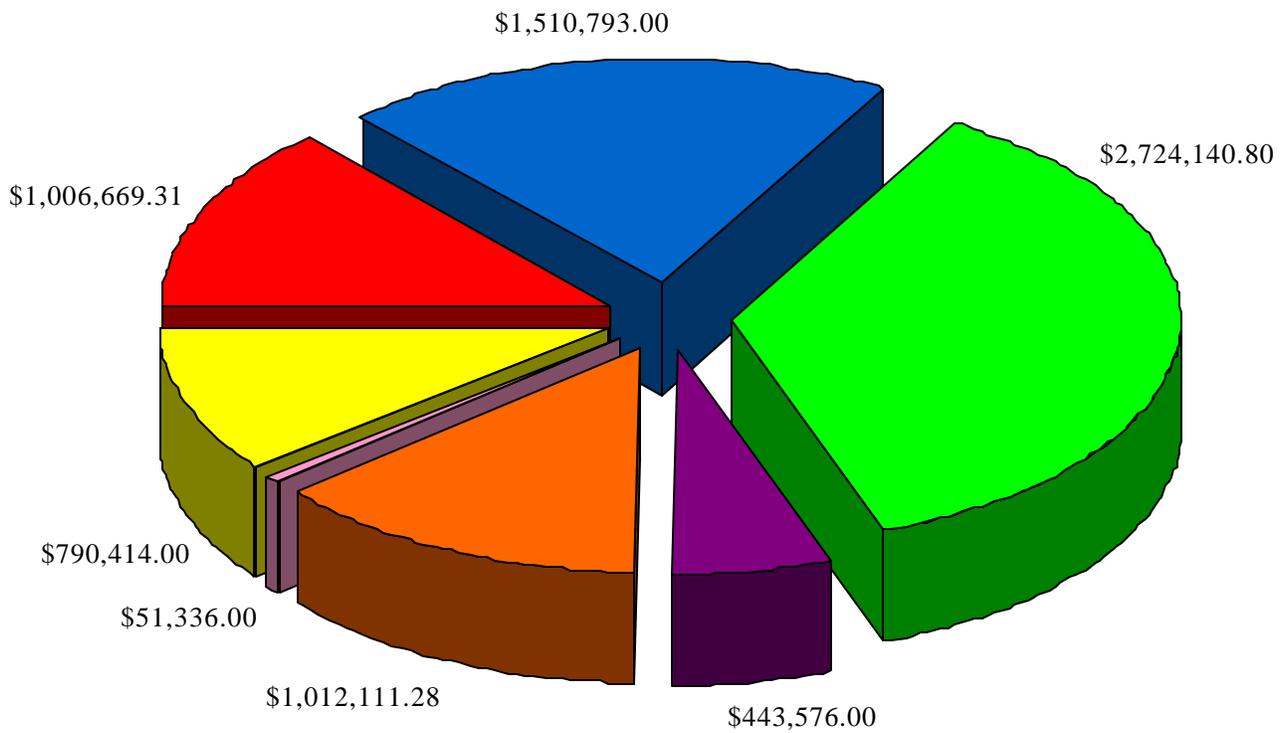
transfer; and 7) demonstration projects. In addition, monitoring to assess the success of specific nonpoint source implementation projects is considered an eligible implementation activity, whereas general nonpoint source surface water assessment activities are not eligible.

Each Fiscal Year, the Environmental Protection Agency (EPA) oversees the administration of 319 grant funds based on Congressional appropriations and issues regional guidance by which the grant funds are to be managed and allocated. The availability of annual 319 grant funds presents the opportunity and challenge for States and EPA to work together to implement successful NPS management programs. The two charts which follow represent total NPS project funds as well as NPS category distribution from FY 1991 through FY 1999. In addition, Attachment #1 located in the Appendix details the specific implementation projects that have been funded by Section 319 NPS competitive grant dollars from Fiscal Year 1991 through 1999.

Introduction

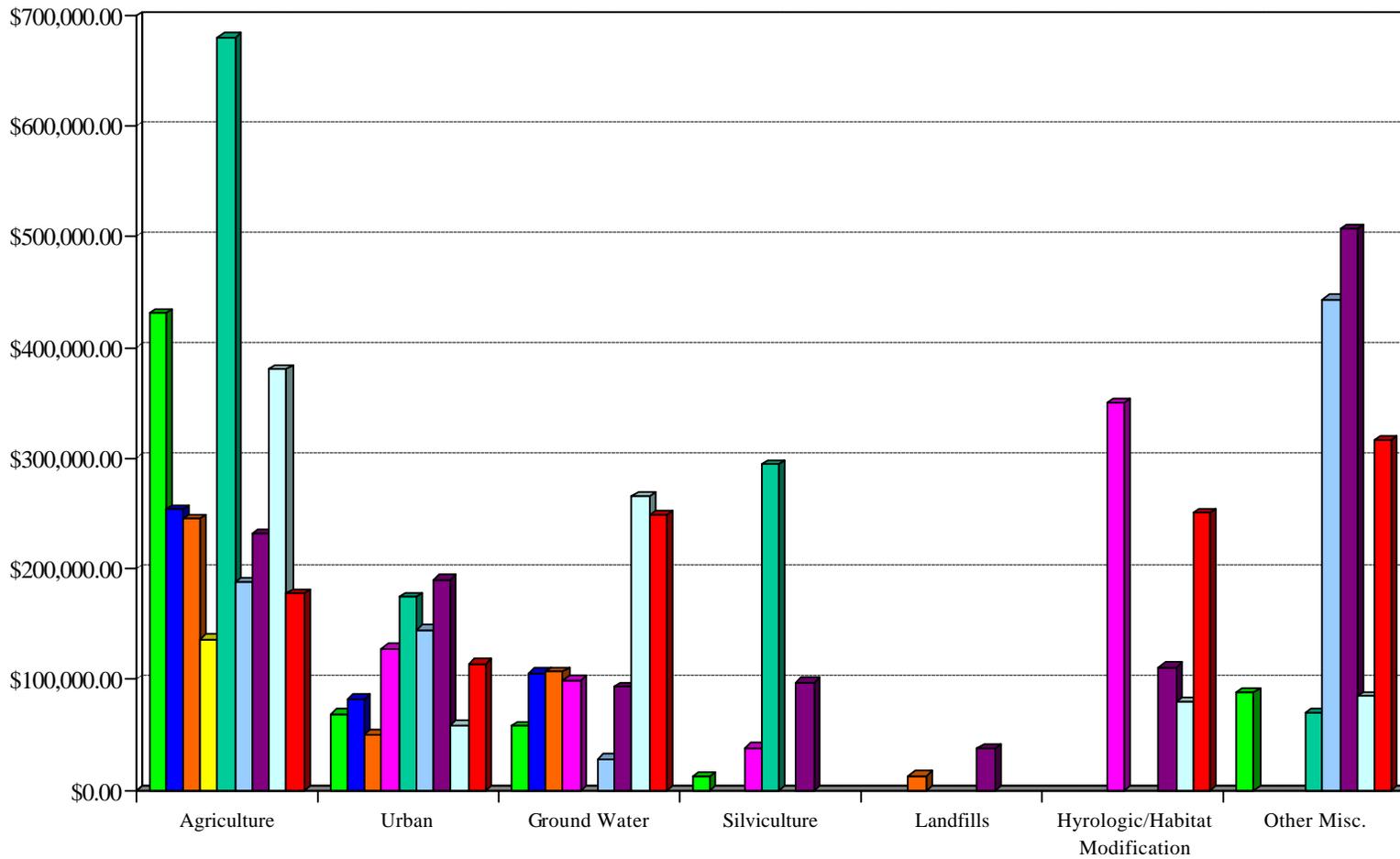


Section 319 NPS Funding Levels FY 1991 through 1999 (Federal and State Match Totals)



NPS Category Funding Levels
 FY 1991 through FY 1999
 (Federal and State Match)

FY 1991 FY 1992 FY 1993 FY 1994 FY 1995 FY 1996 FY 1997 FY 1998 FY 1999



Introduction



Clean Water Action Plan: Restoring and Protecting America's Waters

On the 25th anniversary of the 1972 Clean Water Act, Vice President Al Gore directed the U.S. Environmental Protection Agency and the U.S. Department of Agriculture to work with other federal agencies and the public to develop a Clean Water Action Plan. This Plan would chart the course toward fulfilling the original goal of the Clean Water Act – “fishable and swimmable” waters for all Americans. Over the past 25 years, America has made outstanding progress in reducing water pollution and restoring rivers, lakes and coastal waters. Despite this progress, serious water pollution problems persist. States report that about 40 percent of the waters they assessed do not meet water quality goals. About half of the nation's over 2,000 major watershed have serious or moderate water quality problems.

The Clean Water Action Plan provides a blueprint for restoring and protecting the nation's precious water resources. A key element in the Action Plan is a new cooperative approach to watershed protection in which state, federal and local governments, and the public first identify the watersheds with the most critical water quality problems and then work together to focus resources and implement effective strategies to solve those problems. The Action Plan also includes new initiatives to reduce public health threats, improve the stewardship of natural resources, strengthen polluted runoff controls, and make water quality information more accessible to the public.

Ten key principles to guide clean water efforts in the years to come are described below. These principles provide an overall context for the specific initiatives proposed in the Clean Water Action Plan dated February 14, 1998. Specific “key actions” to immediately expand and improve existing water quality programs are described in detail in the Clean Water Action Plan. Many of these “key actions” have been incorporated into various NPS Management Plan contaminant source categories as five-year implementation milestones. Implementation of these key actions by federal, and state agencies is supported by a long-term commitment of billions of dollars and is designed to support watershed management.

1. Strong Clean Water Standards. EPA has defined water quality “criteria” for over 100 specific water pollutants. These criteria draw on the best science to ensure that a water body is clean enough for basic uses established by the state (e.g., fishing, swimming). States use this criteria as the basis for adopting enforceable water quality standards for specific

pollutants. Now that many pollution sources have implemented basic treatment requirements, water quality standards will play a critical role in defining problem areas and setting pollution reduction goals. EPA will develop strong criteria for nitrogen and phosphorus that protect public health and the environment; expand efforts to assess the overall health of waters; and work with states to assure the adoption of a full set of needed water quality standards. The enforceable mechanism for implementing water pollution control requirements is the discharge permit required under the Clean Water Act. For the past decade, most discharge permits have been issued by state agencies with oversight by EPA. Discharge permits are a proven tool for reducing water pollution. Existing permits must be reviewed and revised in a timely manner and key types of unpermitted discharges (e.g., certain animal feeding operations, storm water discharges from small cities and towns) must be brought into the permit program.

2. Clean Water: Healthy People. The primary objective of the Clean Water Act is to protect the “chemical, physical and biological integrity of water.” Aggressive efforts to reduce water pollution over the past 25 years have also had dramatic benefits for public health. Advances in pollution control, medicine, and science have swept aside the concerns of past generations that drinking water and swimming in a lake or at the beach posed a risk of cholera, polio, and other diseases. Despite dramatic progress, water pollution still poses threats to human health. Microorganisms, such as *Pfiesteria* and *Cryptosporidium*, are recognized as threats to human health. To reduce human health threats from water, fish and shellfish, federal, state and local governments must work together to more clearly establish and enforce public health standards and programs. Employing a watershed framework and improving coordination between clean water and safe drinking water programs at all levels of government is a critical part of this effort.

3. Watershed Management: The Key to the Future. Watershed management fosters the coordinated implementation of programs to control point source discharges, reduce polluted runoff, and protect drinking water and sensitive natural resources such as wetlands. A watershed approach highlights opportunities to go beyond reducing chemical contamination to think about ways to enhance the overall health of the aquatic system and preserve biodiversity. If the clean water program is to make this

Introduction



Clean Water Action Plan: Restoring and Protecting America's Waters continued

transition to watershed management, the public must support this effort by getting actively involved in the formation of watershed partnerships. Federal agencies and states can support and promote these efforts by providing improved information, technical and financial assistance and training.

4. **Restore Watersheds Not Meeting Clean Water Goals.** EPA is working with states and other federal agencies to focus greater attention on defining and restoring impaired waters that do not meet clean water goals. States are developing revised lists of waters not meeting clean water goals and long-term schedules for developing corrective actions. In the future, the national water program will "scale up" assessments of problem areas from localized pollution problems in segments of water bodies to a larger landscape of watersheds. This process should grow beyond assessment of whether chemical contamination exceeds standards, to include other factors (e.g., health of wetlands, sediment quality, drinking water sources) and an assessment of whether the aquatic system in the watershed is functioning properly.
5. **Build Bridges Between Water Quality and Natural Resource Programs.** As the clean water program moves to address problems on a watershed basis, other impairments to aquatic systems (e.g., damage to fish habitat, loss of wetlands that are nurseries of aquatic life, stream corridor degradation) have become more obvious and of greater concern. Natural resources – cropland, forests, wetlands, and riparian areas are the building blocks of most watersheds. Stewardship of these natural resources is the fundamental first step toward clean water and pollution prevention. Linking federal natural resource conservation and federal land management programs more closely with federal and state clean water programs is a promising opportunity to quicken the pace of clean water efforts across the country. Actions to enhance assistance to private landowners and to strengthen the stewardship of federal lands on a watershed basis are major elements of this Action Plan.
6. **Respond to Growth Pressures on Sensitive Coastal Waters.** The 1990 census provided striking new data on the shift of the nation's population to coastal areas and the sharp growth rates in these areas. In response to this new information and awareness, federal and state agencies have stepped up efforts to protect coastal waters and to expand efforts to understand, prepare for, and address the changes that will occur in coastal areas. It is critical that the quality of coastal

waters is maintained and improved so that those waters can continue to support the increasing numbers of people who live, work, and play on the coast, as well as those who eat or otherwise enjoy coastal living resources.

7. **Prevent Polluted Runoff.** After 25 years, the clean water program has addressed many of the major pipe discharges of sewage and industrial waste. By far, the predominant source of remaining water pollution problems is runoff from urban and agricultural lands and facilities such as animal feeding operations. Governments must pick up the pace of existing efforts to reduce polluted runoff and must provide the information and the financial incentives to citizens need to make decisions that support clean water.
8. **Stewardship of Federal Lands and Resources.** Lands and resources managed by the federal government cover over 800 million acres and include many of the nation's most treasured water resources. In many watersheds, these lands are the headwaters of streams and rivers and valued sources of clean water for sport fishing, recreation, and drinking water. Policies for protecting and managing these lands must balance these diverse interests and needs. By further implementing a watershed approach, federal land managers can gain a greater understanding of watershed functions, promote the identification and targeting of priority projects, encourage greater stakeholder involvement, and build partnerships with states and local governments.
9. **Improve Water Information and Citizens' Right to Know.** As the clean water program moves to a watershed approach with a commitment to identify and address the remaining water quality problem areas, good information about the condition of waters and the health of aquatic systems on a watershed scale is critical. Federal, state and the private sector will need to make increased investments in water quality information. Existing monitoring programs and resources can be better coordinated and focused under the leadership of the National Council on Water Quality Monitoring, recently established by the Department of the Interior (DOI). Better data is important, but this information needs to be delivered to the public in a useful and easily accessible form. Using new computer systems capable of mapping water quality data, it is now possible to generate detailed information about the condition of specific waters and watersheds. In addition, the Internet makes it possible to deliver detailed and localized water quality data and maps to

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home computers throughout the nation. By providing this information and the assessment tools to make it meaningful, government agencies can inform people about the condition of waters where they live and thereby empower citizens to get involved in restoring and protecting water quality.

10. Ensure Compliance and Protect All Citizens Fairly.

Full and fair implementation of clean water programs requires strong compliance and enforcement efforts and a firm commitment to protect all citizens equally. Sustaining compliance will require supplementing existing tools with new efforts to ensure that program requirements, especially newer programs to control wet-weather sources of pollution, are understood by both the regulated community and the public. For example, working with its coastal state partners and through public feedback, NOAA will continue to evaluate the performance of state coastal management programs, with new attention to programs designed to reduce polluted runoff.

The Action Plan proposes to accelerate progress toward watershed management with action in several areas:

- ◆ **Unified Watershed Assessments:** A new cooperative, intergovernmental, and public process to assess watershed condition, including a public and accountable identification of watersheds where aquatic systems do not meet clean water and other natural resource goals.
- ◆ **Restore Aquatic System Health on a Watershed Basis:** Implementation of diverse actions to restore watershed health on a watershed basis, supported by substantially increased federal resources in FY 1999 targeted to watershed restoration.
- ◆ **Build Strong Partnerships to Speed Restoration and Protection:** Affirmative efforts to build watershed partnerships to speed protection and restoration of all watersheds.
- ◆ **Watershed Management Framework:** An institutional framework to promote and support watershed assessment, restoration, and management, including a new National Watershed Forum made up of diverse public and private sector representatives.

Unified Watershed Assessments

State and federal agencies currently use multiple processes to assess water quality and other natural resource conditions. States monitor water quality and identify waters

and watersheds not meeting clean water goals through various means:

- ◆ Under section 305(b) of the Clean Water Act, collecting water quality information and reporting on the condition of waters every two years.
- ◆ Under section 303(d) of the Act, using monitoring and other water quality information to develop lists of waters not meeting clean water goals and needing response actions to restore water quality.
- ◆ Under section 319 of the Act, identifying water bodies that are impaired by nonpoint sources of pollution.
- ◆ Working with EPA and other federal agencies to organize diverse information concerning watershed health and to present this information for each of the over 2,000 watersheds in the country. Included are data on wetland loss, sediment contamination, discharge permit violations, and related factors.
- ◆ Conducting assessments of drinking water sources required under the Safe Drinking Water Act.
- ◆ Developing project priority systems for clean water and drinking water state loan funds.
- ◆ With federal agencies, conducting flood plain studies and developing appropriate plans.
- ◆ Identifying coastal water quality problem areas as part of efforts to reduce polluted runoff to coastal waters.
- ◆ Developing assessments of wetland areas that need special attention or protection.

The Action Plan provides a new opportunity to bring together these multiple assessment processes to identify common priorities for watershed restoration and protection. Unified assessments of water quality and watershed conditions will help make the assessment process more efficient and accountable, highlighting geographic areas where multiple problems exist (e.g., chemical water pollution, sediment contamination, wetland loss, and threats to drinking water). These assessments will also provide a basis for linking state and federal programs with common objectives and resolving conflicting agency priorities.

States should take the lead, working with federal agencies and the public to prepare a single, Unified Watershed Assessment. This Assessment should draw on the full range of available information to:

- ◆ Assess the health of watersheds and identify watersheds in need of restoration
- ◆ Identify watersheds that need preventive action to

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sustain water quality using ongoing, core state and federal programs.

- ◆ Identify pristine or sensitive watersheds on federal lands that need an extra measure of protection.

Restore Aquatic System Health on a Watershed Basis

Based on the Unified Watershed Assessment each State should establish an overall approach to defining priorities for watershed restoration. State processes for defining watershed restoration priorities will vary but should include the following core elements:

- ◆ Criteria for defining watersheds that do not meet clean water goals and are most in need of restoration.
- ◆ A long-term schedule for developing response plans with focus on an initial schedule of actions in the 1999-2000 period.
- ◆ A process for involving diverse state agencies in setting watershed restoration priorities, including the agencies for water quality, drinking water, coastal zone management, agriculture, forestry, wildlife and fisheries, and transportation.
- ◆ Consideration of existing restoration priorities, such as approved state priority rankings of impaired waters, priorities established in an approved National Estuary Program, Intended Use Plan for State Water Pollution Control and Drinking Water Revolving Funds, source water assessments, and environmental justice policies.
- ◆ Identification of Interstate or intergovernmental coordination issues.
- ◆ A process for consulting with and involving applicable federal agencies including EPA, USDA, DOI, NOAA, and where applicable, federal land and resource management agencies.
- ◆ A process for involving local government, the public, and other interested groups in defining watershed restoration priorities.

Build Strong Partnerships to Speed Restoration and Protection

Federal and state programs can help produce clean water and healthy watersheds, but the commitments and resources of local communities, private landowners, and citizens are essential to clean up and maintain lakes, rivers, coasts, and wetlands. Effective and strong partnerships are the foundation for both restoring impaired watersheds and sustaining watersheds that are currently healthy. Federal and state governments should commit to building

and supporting partnerships among public and private parties, wherever and whenever they can, to restore and protect the health of all aquatic systems on a watershed basis.

Watershed Management Framework

The Action Plan recommends an institutional framework to support watershed restoration and protection efforts, including a new National Watershed Forum, federal program coordinators, and reinvention opportunities. The National Watershed Forum will provide a coordinating mechanism for the development of watershed assessment, restoration and protection efforts. Federal program coordinators will assist with state and local watershed efforts by helping state and local officials obtain information about the watershed and federal water quality programs and services that apply to the watershed. Federal program coordinators may be employed by one of several agencies. If the watershed is coastal, for example, NOAA might provide the coordinator.

Although many federal and state agencies have already undertaken activities to provide nonregulatory incentives and streamline program operations to facilitate watershed management, much work remains. To spur more innovative programmatic changes, federal agencies will review program operations to identify strategies and frameworks to: increase collaboration; eliminate inconsistencies; provide incentives for voluntary, nonregulatory actions; make permitting programs more flexible, efficient, and predictable; and, most important, ensure environmental improvements.

Many of the components in the Clean Water Action Plan are designed to provide for additional development of information, assessment, and dialogue prior to decisions on specific actions. These processes will assure multiple opportunities for input by the public before significant decisions are made.

To obtain a copy of the President's Clean Water Action Plan, please call, write, or fax your order to EPA's clearinghouse, the National Center for Environmental Publications and Information, 1-800-490-9198 (toll-free), P.O. Box 42419, Cincinnati, Ohio, 45242, (513) 489-8695 (fax). Ask for EPA-840-R-98-001. The Clean Water Action Plan is also available for viewing on the Internet at <http://www.epa.gov/cleanwater> or <http://www.nhq.nrcs.usda.gov/cleanwater/>.

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Delaware's Unified Watershed Assessment and Watershed Restoration Priorities

President Clinton's *Clean Water Action Plan* presents a broad vision of watershed protection, and includes a new, cooperative approach to restoring and protecting water quality. State, federal, tribal, and local governments are asked to work with stakeholders and interested citizens to: 1) identify watersheds with the most critical water quality problems, and 2) work together to focus resources and implement effective strategies to solve these problems.

At the State level, the assessments and the priorities for restoration guide the development of restoration strategies in 1999 and steer the use of most new resources made available through President Clinton's FY 1999 Clean Water and Watershed Restoration Budget Initiative to accelerate watershed restoration in a coordinated manner to achieve maximum effect. Existing federal authorities and programs can also make contributions to improving watershed health. By setting watershed restoration priorities, states can help guide federal assistance to achieve their local goals. At the national level, the information will be used to demonstrate that the nation has a coordinated strategy and can effectively use increased levels of financial resources should they be made available by Congress. If the President's budget is approved by Congress, additional financial resources may become available to Delaware.

Assessment Purpose

Unified watershed assessments characterize the condition of waters within a watershed/basin and the overall health of the aquatic system in watersheds, using the following general framework:

Category I -- Watersheds in Need of Restoration. These watersheds do not now meet, or face imminent threat of not meeting clean water or other natural resources goals. Section factors include --

- ◆ nonattainment of national clean water goals (including exceedances of state water quality standards, or impaired drinking water sources, etc.);
- ◆ nonattainment of natural resource goals related to aquatic systems, including goals related to habitat, ecosystem health, and living resources;
- ◆ other appropriate measures and indicators of degraded aquatic system conditions (e.g., wetland condition and current and historical loss rates, percent impervious surface, and other measures of aquatic habitat); and
- ◆ decline in the condition of living and natural resources

that are part of the aquatic system in the watershed (e.g., decline in the populations of rare and endangered aquatic species, decline in healthy populations of fish and shellfish, etc.).

Category II -- Watersheds Meeting Goals, Including Those Needing Action to Sustain Water Quality. These watersheds meet clean water and other natural resource goals and standards and support healthy aquatic systems. All such watersheds need the continuing implementation of core clean water and natural resource programs to maintain water quality and conserve natural resources. Section factors include --

- ◆ meeting national clean water goals (including state water quality standards, drinking water protection objectives, etc.);
- ◆ meeting natural resource goals, including goals related to aquatic habitat, ecosystem health, living resources; and
- ◆ other measures and indicators of aquatic system conditions, including the condition of living and natural resources.

Category III -- Watersheds with Pristine/Sensitive Aquatic System Conditions on Lands Administered by Federal or State Governments. States work cooperatively with federal land managers to identify watersheds with exceptionally pristine water quality, other sensitive aquatic system conditions, and drinking water sources that are located on lands administered by federal or state governments. These areas include currently designated and potential candidate Wilderness Areas, Outstanding Natural Resource Waters, and Wild and Scenic Rivers.

Category IV -- Watersheds With Insufficient Data to Make An Assessment. These watersheds lack significant information, critical data elements, or the data density needed to make a reasonable assessment at this time.

Many public agencies and private entities are involved in the monitoring, assessment, and management of Delaware's watersheds. They utilize a variety of methods, tools, and protocols to evaluate ecological and environmental conditions and to establish priorities for addressing identified problems. Further, many are involved in the protection and management of healthy natural systems. Hence, there was a need to bring together representatives from these agencies, private groups and

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Delaware's Unified Watershed Assessment and Watershed Restoration Priorities

businesses to develop a consolidated or "unified" list of watersheds in need of remediation or additional protection. The section below identifies the individuals involved in this effort and the approach they used to develop Delaware's Unified Watershed Assessment and Watershed Restoration Priorities.

Watershed Assessment Team

Delaware's 1998 Unified Watershed Assessment and Watershed Restoration Priorities were developed by a team of representatives from federal, State, and local agencies and various industry and advocacy groups. The Watershed Assessment Team also serves as the U.S. Department of Agriculture, Natural Resources Conservation Service's State Technical Committee. The Committee was established to provide advice and guidance regarding the various conservation programs available to landowners.

Following are the organizations represented on the Team:

Center for Inland Bays
Delaware Association of Conservation Districts
Delaware Council of Farm Organizations
Delaware Department of Agriculture
Delaware Department of Natural Resources & Environmental Control
Delaware Estuary Program
Delaware Farm Bureau
Delaware Forest Service
Delaware Forestry Association
Delaware Geological Survey
Delaware League of Women Voters
Delaware Nature Society
Delaware State Historic Preservation Office
Delaware Wildlands
Delmarva Poultry Industry Inc.
DuPont Agricultural Products
Home Builders Association of Delaware
Land Improvement Contractors Association
Sierra Club
Southern States Cooperative
The Nature Conservancy
University of Delaware
U.S. Army Corps of Engineers
U.S. Geological Survey
U.S. Environmental Protection Agency
USDA, Farm Services Agency
USDA, Forest Service
USDA, Natural Resources Conservation Service
USDI, Fish & Wildlife Service

Assessment Approach

The Watershed Assessment Team evaluated the chemical and biological health of Delaware's waterways and the condition of habitats in and around those waterways using a variety of existing assessment tools. These tools are described by the documents listed below. Copies of these documents are available by contacting the agencies listed.

DNREC. 1995. Nonpoint Source Pollution Program Assessment Report, Delaware Department of Natural Resources and Environmental Control, Division of Soil and Water Conservation, Nonpoint Source Program, 89 Kings Highway, Dover, DE 19901, 302-739-3451.

DNREC. 1996. State of Delaware 1996 Watershed Assessment Report (305(b)). Department of Natural Resources and Environmental Control, Division of Water Resources, Watershed Assessment Branch, 29 South State Street, Dover, DE 19901, 302-739-4590.

DNREC. 1998. State of Delaware 1998 Watershed Assessment Report (305(b)). Department of Natural Resources and Environmental Control, Division of Water Resources, Watershed Assessment Branch, 29 South State Street, Dover, DE 19901, 302-739-4590.

DNREC. 1998. Final Determination for the State of Delaware 1998 Clean Water Act Section 303(d) List of Waters Needing TMDLs. Department of Natural Resources and Environmental Control, Division of Water Resources, Watershed Assessment Branch, 29 South State Street, Dover, DE 19901, 302-739-4590.

Delaware Estuary Program. 1996. Comprehensive Conservation and Management Plan for the Delaware Estuary. Partnership for the Delaware Estuary, Inc., P.O. Box 9569, Wilmington, DE 19802, 302-793-1701 or 1-800-445-4935 (toll free).

Inland Bays Estuary Program. 1995. Comprehensive Conservation and Management Plan for Delaware's Inland Bays. Center for the Inland Bays, P.O. Box 297, Nassau, DE 19969, 302-645-7325.

DNREC. 1998. Piedmont Basin Preliminary Assessment Report. Department of Natural Resources and Environmental Control, Office of the Secretary, Whole Basin Management Program, 89 Kings Highway, Dover, DE 19901, 302-739-4403.

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The Assessment and Watershed Restoration Priorities

The basis for the Assessment and Restoration Priorities is the State of Delaware's 1998 Clean Water Act Section 303(d) List of Waters Needing TMDLs. The factors that were considered in establishing the priorities assigned to the various water quality limited segments are listed below.

- 1) Breadth, depth, and quality of available data (i.e. "weight of evidence");
- 2) Severity of impact (e.g., magnitude, duration, and frequency of standards violation; toxics versus conventional pollutants; geographic extent of violation, etc.);
- 3) Uses impaired (e.g., ERES waters and public water supplies given priority);
- 4) Whether the contaminant (or stressor) of concern is elevated due to anthropogenic factors (caused by or related to human activities) or is due to natural, essentially uncontrollable factors;
- 5) Existence of on-going activities (e.g. Draft or Final Management Plans already in place);
- 6) Current availability of technical and financial resources to correct the problem;
- 7) Extent of population potentially impacted;
- 8) Degree of local interest;
- 9) Whether the segment is contiguous with other upstream or downstream segments also identified as water quality limited;
- 10) Whether the segment is part of an interstate basin;
- 11) Whether the segment is among the watershed priorities listed in Delaware's 1995 Nonpoint Source Pollution Program Assessment Report; and
- 12) Political interest.

The 303(d)List includes TMDL development schedules (see Appendix) which are consistent with a federal consent decree. The consent decree evolved during out-of-court lawsuit settlement negotiations between the Environmental Protection Agency, Department of Natural Resources and Environmental Control, and several Plaintiffs. Since EPA

and DNREC are legally obligated to meet the court-ordered deadlines, it is imperative that these deadlines be reflected in the Unified Watershed Assessment and Watershed Restoration Priorities. DNREC intends to work with interested stakeholders to develop watershed specific Pollution Control Strategies/Watershed Restoration Action Strategies for those watersheds where TMDLs have been adopted. These Strategies will include a combination of voluntary and regulatory methods to achieve pollution reduction goals set by the TMDLs. Delaware's Unified Watershed Assessment List along with the Watershed Restoration Priorities can be found in the Appendix.

Currently, Delaware has several documents that have been completed that contain core elements of a "WRAS" such as the Comprehensive Conservation Management Plans (CCMPs) for the Inland Bays Estuary and the Delaware Bay Estuary. In addition, the Whole Basin Management Teams have completed or will be completing preliminary Assessment Reports for the Piedmont, Chesapeake, and Inland Bays Basins by the end of 1999. All of these documents contain a large portion of the suggested elements of a WRAS based on the Clean Water Action Plan recommendations. Delaware's NPS Management Plan contains the most significant elements of a WRAS (refer to page 1-34) as identified in the Clean Water Action Plan. For example, the NPS Management Plan identifies all technical, financial, and education components being applied to water quality protection. In addition, the Management Plan identifies water quality goals and defines the course of action that the State is going to take over the next five years. Specific implementation objectives are defined in order to achieve our desired water quality goals. Because Delaware is a small state and driven by statewide pollution issues (i.e., nutrients, sediments) rather than sub-watershed boundary issues, it makes practical sense to continue to focus our efforts at a larger scale, such as the basin level.

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Delaware's TMDL Process Federal Clean Water Act Requirements

Section 303(d) of the 1972 Federal Clean Water Act (CWA), as amended, requires states to develop a list of waterbodies that need additional pollution reduction beyond that provided by the application of existing conventional controls. These waters are referred to as "Water Quality Limited" and must be periodically identified by the Department of Natural Resources and Environmental Control (DNREC) or the federal Environmental Protection Agency (EPA).

Water Quality Limited waters requiring the application of Total Maximum Daily Loads (TMDL) are identified in a document commonly referred to as the "303(d) list." A TMDL is the level of pollution or pollutant load below which a waterbody will meet water quality standards and thereby allow use goals such as drinking water supply, swimming and fishing, or shellfish harvesting to be achieved. A state's 303(d) list must be reviewed and approved by EPA by April 1st of every even-numbered year.

A full TMDL process determines the pollutants causing water quality impairments, identifies maximum permissible loading capacities for the waterbody in question, and, for each relevant pollutant, assigns load allocations—Total Maximum Daily Loads—to each of the different sources, point and nonpoint, in the watershed.

The full TMDL process is an effective and important tool for achieving water quality standards, but is time-consuming and labor-intensive. For this reason, TMDLs are currently pursued for high priority waters with the most severe water quality problems including the Inland Bays, Nanticoke River, Christina, and the Appoquinomink River. These waters are typically impacted by both point sources (e.g., sewage treatment plants, industrial facilities) and nonpoint sources (e.g., stormwater runoff from urban and agricultural lands).

The CWA mandates that EPA perform all of the responsibilities not adequately addressed by a state. To date, scores of Section 303 lawsuits across the county have been filed against EPA. Plaintiffs have prevailed in most of those cases resulting in court-ordered TMDL development schedules as short as five years.

Citizen Groups Sue EPA Over Delaware Water Quality

In August, 1996, the Environmental Law Clinic at Widener University School of Law, on behalf of the American Littoral

Society (and its affiliate, Delaware River Keeper Network) and the Sierra Club, filed a federal complaint charging the U.S. EPA with "the failure to perform its mandatory duties to identify and then to improve the water quality of hundreds of miles of rivers, streams, and Atlantic coastline, and thousands of acres of lakes, reservoirs, ponds, bays, estuaries, and wetlands in the State of Delaware which fail to meet the fishable and swimmable water quality standard as required by the Federal Water Pollution Control Act, 33 U.S.C. 1251 *et seq.* (1988) commonly known as the Clean Water Act American Littoral Society, et al. v. United States Environmental Protection Agency, et al. (Civil Action No. 96-5920)

The Complaint asks the Court to order EPA to:

- ◆ Comply with CWA requirements for TMDLs in Delaware on a short time line.
- ◆ Commit to updating Delaware's Continuing Planning Process (CPP) which serves as the overall framework for water resources management in the state.
- ◆ Not issue or approve any new or renewed National Pollutant Discharge Elimination System (NPDES) permits discharging into impaired waters for which TMDLs or TMDTLs (Total Maximum Daily Temperature Loads) have not been established.
- ◆ Cease any additional grant funding to Delaware to administer the 303(d) program until the State's 303(d) list meets the requirements of the CWA.
- ◆ Administer the NPDES program for Delaware until the State has an EPA-approved CPP in place.

DNREC agreed to be present during a federally funded mediation process and assist EPA with program and technical issues. A settlement was reached and former DNREC Secretary Christophe Tulou and EPA Regional Administrator Mike McCabe signed an interagency Memorandum of Understanding (MOU) dated July 25, 1997.

Delaware's Total Maximum Daily Load Program

Since the early 1990's, EPA has urged states to adopt a watershed approach to water quality management. EPA issued a new TMDL guidance document in 1991 encouraging the development of TMDLs on a watershed basis. Delaware has implemented a watershed approach that includes the integration of the TMDL monitoring and assessment program for each watershed in accordance

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Delaware's TMDL Process Federal Clean Water Act Requirements con't

with DNREC's Whole Basin Management Program Schedule. Delaware has completed final TMDLs for the Appoquinimink River, Nanticoke River and Inland Bays (Indian River/Bay and Rehoboth Bay). Implementation of TMDL Regulations will be achieved through development and implementation of Pollution Control Strategies. Strategies will be developed by DNREC in concert with the Department's Whole Basin Management Program and the affected public.

Settlement Negotiations

Plaintiffs demanded an accelerated schedule to ensure that TMDLs for all 1996-listed waters will be established by 2006. DNREC and EPA agreed to a schedule for completion of the TMDLs on a 10-year schedule.

Included in the settlement with EPA, and in addition to the commitment to a 10-year schedule for TMDL development in Delaware, are commitments to prepare a supplement to Delaware's 1996 List of Impaired Waters to include waters impacted by habitat degradation from agricultural and urban activities, develop guidance documents regarding the use of biological and habitat data for listing waters in 1998, and develop protocols for assessing wetlands in Delaware. The MOU between EPA and DNREC sets forth the duties of EPA and DNREC that will serve as the framework for administering the TMDL program in Delaware.

Budget Implications

DNREC and EPA acknowledge that significant financial resources will be required to assist Delaware in timely TMDL development. DNREC's TMDL and Continuing Planning Process (CPP) activities are funded by a mix of State General Funds and federal (EPA) grants. Federal grant funding levels have remained stable or declined over the last 5 years. However, even the stable resources have been eroded by inflation. Approximately two-thirds of the necessary funding is expected to be available from State sources; the remaining one-third is being requested.

Delaware's Nonpoint Source 319 Program has provided technical and financial support to the development and implementation of TMDLs since 1995. Both Delaware and Pennsylvania 319 Programs co-sponsored and co-funded the TMDL Initiative in the Christina Basin. As of January, 1999, contributions of NPS 319 dollars from both Delaware

and Pennsylvania total over \$700,000, primarily for monitoring and modeling (see Attachment #3 in the Appendix for a list of expenditures). Both states are anticipating increased contributions for the implementation of the Christina TMDL beginning in FY 2000.

Delaware's NPS Program is providing up to 20% of current funding levels towards TMDL assessment efforts on a yearly basis. This is the maximum amount allowed under current federal legislative guidance. In addition, program staff are providing technical assistance in the development of priority watersheds, 305(b)/303(d) Reporting, and development of TMDL Watershed Restoration Action Strategies (WRAS)/Pollution Control Strategies (PCSs).

Future Pollution Management Activities

The *Clean Water Action Plan* calls for states to develop watershed restoration action strategies for those watersheds most in need of restoration, in cooperation with federal, interstate, and local agencies, watershed-based organizations, and the public. Once a TMDL is promulgated, a Watershed Restoration Action Strategy (WRAS)/Pollution Control Strategy (PCS) will be developed for each watershed. A WRAS/PCS will specify the necessary pollutant load reductions that need to occur such that loadings will be less than or equal to the TMDL. Currently, no formal WRAS/PCS has yet been completed for any basin or watershed in the state, although a pre-WRAS is currently being drafted for the Christina Basin. WRASs/PCSs for the Nanticoke and the Inland Bays will be completed by the end of 2000. Based on the recommendations of the *Clean Water Action Plan*, a WRAS is likely to include the following elements:

- 1) identification of measurable environmental and programmatic goals;
- 2) identification of sources of water pollution and the relative contribution of sources;
- 3) implementation of pollution control and natural resource restoration measures (e.g., permit revisions, implementation of best management practices and buffer strips) to achieve clean water and other natural resource goals, especially those measures which will achieve multiple environmental and public health benefits;
- 4) schedules for implementation of needed restoration measures and identification of appropriate lead agencies to oversee implementation, maintenance, monitoring, and evaluation;

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Delaware's TMDL Process Federal Clean Water Act Requirements con't

5) implementation of total maximum daily loads (TMDLs) for pollutants exceeding state water quality standards;

6) implementation of source water assessment and protection programs;

7) needed monitoring and evaluation to assess progress towards achieving environmental and programmatic goals;

8) funding plans to support the implementation and maintenance of needed restoration measures;

9) a process for cross-agency (federal, state, interstate, and local) coordination to help implement watershed restoration action strategies; and

10) a process for public involvement.

Plans are for reductions to be achieved through voluntary (for those activities that are voluntary now) and regulatory (for those activities that are regulated now) actions. However, TMDLs will provide watershed-wide pollution reduction targets which DNREC (and EPA) will be legally obligated to meet. This obligation will require new approaches for addressing point and nonpoint sources of pollution. Concepts such as "pollution trading" between different sources of pollution, geographic targeting, and pollution prevention will all be considered as part of the PCS. Meeting these targets may require regulation under existing law.

Current Status:

The TMDL's for the Nanticoke River and Broad Creek (for nitrogen and phosphorus) as well as Indian River, Indian River Bay, and Rehoboth Bay were recently approved in late 1998. The TMDL Regulations for the Nanticoke and Broad Creek will call for 30% reductions of nonpoint source nitrogen loads and 50% phosphorus load reductions. The Regulations for Indian River, Indian River Bay and Rehoboth Bay in the Inland Bays Watershed will call for the following nonpoint source load reductions: 85% reduction of nitrogen loads and 65% reduction of phosphorus from tributaries in the upper Indian River; and 40% reduction for both nitrogen and phosphorus loads from all tributaries to the Indian River, Indian River Bay, and Rehoboth Bay. Copies of these TMDL Regulations can be found in the Appendix. The regulations state that the implementation of the TMDL shall be achieved through the development and implementation of a Pollution Control Strategy. The Strategy will be developed by DNREC in concert with the Department's ongoing Whole Basin Management Program and the affected public.

Currently, DNREC is working with the State of Pennsylvania and other parties to develop a comprehensive water quality management plan for the entire Christina River Basin. The Christina Basin TMDLs will be established for both low flow and high flow conditions and are expected to be completed by the end of 1999. In addition, a pre-WRAS for the Christina is currently being drafted by the multi-agency work group.

The NPS Program will continue to support the TMDL process by providing staff input and NPS grant funds for TMDL assessment in addition to supporting full implementation of the Pollution Control Strategies/Watershed Restoration Action Strategies for nonpoint sources when they are developed. A color chart which illustrates the TMDL development schedule integrated with the Whole Basin Management planning process through the year 2009 is located in the Appendix. This schedule calls for the Piedmont (Christina) Basin's Pollution Control Strategy/Watershed Restoration Action Strategy to be completed by the end of 2000 followed by the Chesapeake Bay Basin and the Inland Bays.

The State of Delaware has committed to implementing TMDL Regulations through the development of Pollution Control Strategies (PCS)/Watershed Restoration Action Strategies (WRAS). Strategies will be developed by DNREC in cooperation with the Department's Whole Basin Management Program and the affected public. The PCS/WRAS will outline the necessary pollutant load reductions that need to occur to meet the TMDL. These plans will include specific implementation targets in order to achieve TMDL goals. In order to help develop and implement these Strategies, it is proposed by the NPS Program that "Tributary Teams" or the equivalent might be formed for each basin and used as the mechanism for involving the public. The teams could be made up of representatives from State and local agencies, farmers, business, environmental organizations, federal facilities, and citizens. To date, three "tributary teams" have been established for the Inland Bays Watershed under the leadership of the Center for the Inland Bays. The Inland Bays Whole Basin Team is providing technical information and guidance to the tributary teams. DNREC and the tributary teams have joined forces under a formal agreement to work together on the development and implementation of PCS/WRAS.

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Delaware's Whole Basin Management Approach

Whole Basin Management is an integrated approach to environmental management that involves the monitoring, assessment, and management of biological, chemical, and physical environments on a geographic basis defined on the basis of drainage patterns. Whole Basin Management activities are carried out in four geographic planning and management units, referred to as basins, and the watershed units contained within them. A series of watershed planning and management activities occur throughout a five-year cycle. The Whole Basin Management approach emphasizes assessing and addressing the state of the environment from a broad perspective, taking into consideration all facets of an ecosystem and the many human factors that affect water quality and other environmental problems. The intent of Whole Basin Management is not exclusively "implementation". The purpose of the coordinated basin team approach is to identify assessment gaps, coordinate monitoring efforts, and to compile an holistic watershed management strategy. Implementation of best management practices will occur as needed throughout the five-year cycle. In many cases, the first phase of a Whole Basin Project will be assessment, followed by the implementation phase.

Whole Basin Management calls for cooperative efforts by staff in all Divisions within the Department, the Office of the Secretary, and numerous partner agencies and organizations. Key issues are identified in each basin followed by the development and implementation of management strategies and action plans. The NPS Program has incorporated the Whole Basin Management approach into their program recognizing the need to utilize all available resources from within and outside the Department to address NPS-related issues and problems.

A team of staff drawn from all five divisions evaluates each basin. A new basin team has been created each year since 1996, starting with the Piedmont Team, followed by the Chesapeake Drainage Team, and the Inland Bays Team. The Delaware Bay and Estuary Team will be initiated in 1999. Consequently the basins are at different stages of the five-year process with the Piedmont Team being most advanced.

The NPS Program is committed to the Department's Whole Basin Process. As part of that commitment, expertise is provided during the assessment and prioritization phase and funding is provided for activities that are within the

purview of the NPS program during the implementation phase.

Likewise, the Watershed Assessment Branch is committed to the Whole Basin Process. They are responsible for the 305(b) report, the 303(d) and Unified Watershed Assessment Lists, and completion of TMDL's. They are committed both to contributing expertise as well as utilizing Whole Basin information and priorities in completing all of the products noted.

Because of this far-reaching integration of disciplines, agencies, and public participation, the NPS Program is most effective in working with Whole Basin watershed and issue priorities to address nonpoint source problems. The development of those priorities is on-going as basin teams are sequentially established and progress through the five-year process.

Piedmont Team Priorities

After the Piedmont Team completed the preliminary assessment report, an addendum was created, "Cross Cutting Issues Identified in the Piedmont Basin", that addressed what the team considered the most important environmental issues of the basin. The issues were identified based on evaluation of the information gathered in the preliminary assessment report and were developed through interaction among staff from a variety of professional perspectives. Those issues are the focus of attention by the Piedmont Team and other programs within and outside the Department.

Within the addendum, fifteen issues were discussed and for each, the issue was described, and evaluation, assessment, and implementation needs were briefly outlined. Subsequently the team has developed projects that address the key issues identified. Those projects are listed in the "Project Planning Document" which includes projects from all basin teams and is updated regularly. The priority Whole Basin Project list for FY 1999 - 2000 follows on page 1-40. Many of these projects are currently being implemented. In addition, the Whole Basin Management Annual Report for FY 1999 is currently available. This report provides an update on Whole Basin activities and highlights the various ways that the Whole Basin approach is working to address key environmental issues.

Introduction



Delaware's Whole Basin Management Approach Con't

Key issues discussed in the Piedmont Basin addendum include:

AIR QUALITY ISSUES

Characterizing potential air toxics problems and meeting the new standard for fine particulate matter were identified as priorities. All actions recommended are within a regulatory framework and not open for 319 funding. Though not stipulated in the addendum, one possible avenue for coordination may be in educational efforts directed toward motorists since they significantly contribute to fine particle emissions.

CONTAMINANT ISSUES: ZINC, POLYCHLORINATED BIPHENYLS (PCB'S), OTHER

Elevated zinc levels are predominantly the result of site and stream sediment contamination from industrial facilities. Site remediation is the most effective solution and falls under the Site Investigation and Remediation Branch. Activities are not eligible for 319 funds.

Further evaluation and expedited remediation of known contaminant sites is recommended under the PCB's section of the addendum. These activities fall under the purview of other regulatory and assessment programs. Assessment activities are currently under way, funded by penalty funds. The potential exists for the use of 319 funds to implement if enhanced sediment and stormwater management is needed in areas of known or anticipated high PCB's concentrations.

SEDIMENT/STREAM STABILITY ISSUES: NONPOINT SOURCES, POINT SOURCES, EXCESSIVE SEDIMENT DEPOSITION, STREAM CHANNEL SOURCES

This issue has the strongest link with NPS Program concerns. Several of the on-going actions are currently supported by 319 funds. Anticipated activities should be strongly advocated and supported by the 319 program where resources are needed.

Nonpoint Sources: Identification of agricultural sources through the Natural Resources Conservation Service (NRCS) and the New Castle Conservation District (NCCD) was recommended. The NPS Program does not provide

funding for conservation planners in New Castle County as is done in the other counties because funding has not been requested. Agriculture is very limited in extent in the Piedmont Basin. Critical agricultural lands have been identified for BMP's through the Highly Erodible Lands Program. Public Law (PL) 566 money is being used for BMP implementation in the White and Red Clay Creek watersheds. At this time it is felt that additional 319 funds are not necessary for control of agricultural sources of erosion with the possible exception of the mushroom industry.

A recommendation was included to identify potential urban sources by establishing a statewide GIS coverage of active construction sites. The Sediment and Stormwater Program is planning to carry out a pilot over the next two years for a chosen area. An ACCESS database will be developed and transferred to GIS coverage. When the database is ready to be expanded statewide, delegated agencies will require equipment, software, and technical support. Additional funds may be required and could be provided by the NPS Program with the possible exception of equipment costs.

Chemical water quality sampling and trend analysis based on STORET in addition to sampling and trend analysis of stormwater runoff as recommended in the addendum are being carried out as part of the Christina TMDL process which is supported with 319 funding from both Pennsylvania and Delaware.

Additional analysis using biological monitoring and the "triad" approach were recommended. The Watershed Assessment Branch carries out biological sampling using random sampling strategies for large areas. To date, watershed and sub-watershed level studies have not been done and may be valuable in targeted areas such as the upper Christina which has been established as a "designated" watershed for enhanced erosion and stormwater protection. NPS assessment funds could be used to evaluate and verify the relationship between percent imperviousness and stream biological quality and to establish criteria based on that relationship for determining what should be done to protect the stream within sub-watersheds.

The "triad" approach uses EPA protocol to analyze water, sediment, and biological data combined to give a more comprehensive picture of stream health in a given reach. Again, this may be a valid tool for targeted areas.

Introduction



Delaware's Whole Basin Management Approach can't

Point Sources: Recommendations in this section are oriented toward implementation of the NPDES Stormwater Program and are not eligible for NPS funding.

Excessive Sediment Deposition: This section focuses on finding, evaluating and potentially removing in-stream sediment buildups in severe problem areas as well as appropriate source controls. This work has begun through the Riparian Corridor Project, which involves walking or boating all stream reaches of the Piedmont Basin and collecting an array of data including embeddedness, sediment deposition, highly eroded stream banks, and extent of riparian buffers. NPS staff is participating on this project. NPS support could be directed toward source controls.

Stream Channel Sources: Stream channels may be a critical source of sediments as a result of hydrology changes from urbanization, resultant increased impervious surface, and ultimate increase in stormwater runoff volume that must be handled by streams. Recommendations in this section focus on refining those links, developing predictive indicators, establishing criteria to determine the best stream management approach based on the level of development in the watershed, and refining criteria used in regulatory programs to better protect streams. Overall stream channel erosion is being evaluated through the Riparian Corridor Project discussed above. Data from that project can be evaluated in conjunction with map coverages of percent imperviousness developed as part of the Christina TMDL process to verify links between land use and stream stability. Advanced stream hydrology and geomorphology methods may be used in targeted areas of concern and could be eligible for 319 funding. Peak control criteria used by the Sediment and Stormwater Program within the Department was established primarily for flood control and is not adequate for stream channel protection. They are currently considering changes to the criteria that would likely result in additional protection measures such as extended detention.

The NPS program strongly supports development of predictive indicators based on criteria such as percent imperviousness and stream stability evaluation methods. Such indicators would be a valuable tool for determining appropriate management measures for a given stream reach. Information developed over the last several years suggests that watersheds can be broken into three management categories according to percent imperviousness. Below a

certain percentage, watersheds should be targeted for open space preservation. Within the middle range of imperviousness, restoration techniques should be implemented. At the upper levels of imperviousness, streams cannot be restored and enhancement projects are more appropriate. Predictive criteria could also be used potentially to guide development; new construction in a watershed already at the middle range of percent imperviousness is inadvisable if the stream is to be protected.

SURFACE WATER ISSUES: NUTRIENT LOADING, PATHOGEN LOADING, PROTECTION OF DESIGNATED USES, RIPARIAN CORRIDOR INVENTORY/PROTECTION

Nutrient and pathogen loading is identified as a problem and several steps of the TMDL process are listed as recommendations within the addendum to address the problem. The NPS program has provided over a million dollars of 319 funds to date for assessing the Christina Basin as part of the TMDL process. Funding of Christina basin assessment is not anticipated to continue in subsequent grant cycles. More funding may be provided once the implementation phase begins.

Suspending water quality standards to divert surface water for public water supply compromises efforts to meet designated uses. The ability to address this problem through the establishment of a 7Q-10 and developing additional water supplies lies within other programs of the Department as well as other agencies.

Riparian corridor protection was recommended as one of the top three environmental priorities of the Piedmont Basin. Of the non-regulatory actions listed, inventorying, protecting, and restoring riparian areas is equally important to NPS Program goals. An inventory project is already under way. NPS staff support has been and will continue to be provided to this effort. NPS funds could be used to restore riparian areas through a complementary buffer initiative for urban lands since they are not eligible under Conservation Reserve Enhancement Program (CREP).

GROUND WATER QUALITY ISSUES: GROUND WATER BASEFLOW INTO SURFACE WATER, PROTECTION OF DRINKING WATER SUPPLIES, DELINEATION AND ASSESSMENT

Introduction



Delaware's Whole Basin Management Approach con't

The quality of ground water discharging into surface waters is not fully characterized and is important to critical surface waters, especially to protect those used for drinking water supply. Definition of "critical" surface waters and monitoring of ground water in those areas, as well as other evaluation and coordination efforts will occur through the Source Water Protection Program and the TMDL process, and will not require NPS funding support. The NPS Program continues to financially support the TMDL process as it has in the past.

Similarly, delineation of ground-water attributes, water supply wells, and ground water protection areas will be carried out using Safe Drinking Water Act-Source Water set aside funds and will not require NPS funding support.

Chesapeake Team Priorities

The Chesapeake Team has nearly finalized a preliminary assessment report. Though evaluation and prioritization of issues has not been completed, anticipated critical issues have been identified. Based on the number of recommendations and the extent of discussion, nutrient management, land use, and channelization management are perhaps the most significant issues.

Within nutrient management, numerous recommendations were put forth for agriculture. Septic systems and ground water management/assessment were also strongly represented. The NPS program strongly supports and is actively pursuing many of the nutrient management recommendations. The NPS program recognizes septic systems as a significant source of nutrient pollution. NPS funds have been used to date in the development of new on-site systems and, in one project, for the replacement of all septic systems in a community of special need.

Land use management is virtually impossible to address directly since counties and municipalities have primary control. However numerous recommendations were identified for promoting and supporting development and zoning practices that improve numerous environmental and resource concerns. Likewise, the NPS Program supports efforts to protect watersheds preventatively through conservation-minded land use decisions.

Channelization was discussed at length especially as a conduit for nutrient loading. The NPS program supports active development and implementation of conservation BMP's in the construction and management of drainage channels. Justification exists for a joint Whole Basin - NPS Program effort to establish a technical group to evaluate drainage issues and develop BMP's based on recently completed research. NPS funding for demonstrations and education are appropriate.

Inland Bays Team Priorities

The Inland Bays/Atlantic Ocean Basin Team is currently in the process of developing a preliminary assessment report. Although the team has not yet compiled a list of priority issues and recommendations, some issues stand out as priorities.

The Inland Bays/Atlantic Ocean Basin Team has recognized nutrient management as the largest issue facing the basin. The TMDL's developed for the basin's waterways call for nonpoint source reductions of as much as 85%. Meeting this TMDL will be a great challenge for the Department and the stakeholders in the basin. One of the top priorities for the Inland Bays/Atlantic Ocean Team will be to work across the Department and with the interested parties in the basin to make strides in reducing the level of nutrients in the Inland Bays and their tributaries. This priority is equally important to the NPS Program and strong support for nutrient reduction efforts is warranted, especially through funding of implementation efforts. Because the Inland Bays TMDL is based on nutrient standards, the NPS Program is already contributing to this effort through funding of TMDL activities such as stormwater monitoring.

Sprawling development is also likely to be a high priority for the Inland Bays/Atlantic Ocean Basin Team as they move forward with the preliminary assessment. The cumulative effects of poorly planned development are being felt throughout the basin. Poorly planned development puts strain on the basin's infrastructure and natural resources. The team will work with Sussex County and the basin's municipalities to address this issue.

Introduction



SUMMARY OF WHOLE BASIN PROJECT PLANS

The following information contains a description of projects and initiatives that have been identified for implementation at this time by the Piedmont, Chesapeake, and Inland Bays Whole Basin Management Basin Teams. The team members have identified specific recommendations and the level of resources (personnel and/or financial) required for each initiative. Many of these projects have been funded for FY 1999 and are underway. An Annual Report that summarizes implementation activities to date is available upon request.

PIEDMONT BASIN TEAM PROJECTS

-
1. PCBs in Piedmont Streams (N6, T2)
 - ◆ Detailed inventory and ranking of known and potential PCB contaminated sites (currently underway).
 - ◆ Compile and discuss all DNREC previously collected PCB surface water, sediment, fish tissue, and soil analytical data into one comprehensive document.
 - ◆ Develop Department-wide criteria for investigating PCB contamination.
 - ◆ Sediment Core Sampling of the Tidal Reaches in the Christina Basin.
 - ◆ Determine Sources of PCBs in Combined Sewer Overflows (CSOs)
 - ◆ Develop a Data Base of Estimated PCB Loading to Surface Water Bodies.
 - ◆ Develop and Implement a Railway PCB Study.
 - ◆ Develop a Departmental Guidance Document for the Remediation of PCB Contaminated Sites.

 2. Restore Tidal Exchange to Wetlands and Tributaries-
 - ◆ Department-wide support through Whole Basin Management to create a wetland mitigation bank for New Castle County.

 3. Surface Water Nutrient Loadings (N6)
 - ◆ Point sources phosphorus monitoring.
 - ◆ Walk/boat stream corridors to find failed septic systems (underway as part of the Riparian Corridor Mapping Project).
 - ◆ Evaluate golf courses and urban turf impacts to determine need for nutrient controls, etc.
 - ◆ Incorporate microfilm and hard copy records into existing septic system database.

 4. Non-Point Sources of Sediment (N6, S1, S3, T2)
 - ◆ Determine the magnitude of the problem by sampling receiving waters and stormwater surface runoff.
 - ◆ Identify potential sources of total suspended solids (TSS) in surface runoff.
 - ◆ Continue existing programs which are aimed at implementing Best Management Practices designed to reduce TSS loadings.

 5. Stream Channel Sources of Sediment (N1, N6, S1, S3)
 - ◆ Determine the magnitude of the problem.
 - ◆ Identify potential causes of stream channel instability.
 - ◆ Restore unstable streams having a reasonable chance for success.
 - ◆ Identify program elements which may be modified to address stream channel stability problems.

 6. Excessive Sediment Deposition (N1, N6, S3)
 - ◆ Determine the magnitude of the problem.
 - ◆ Identify potential sources of excessive sediment deposition.
 - ◆ Where appropriate, remove excess sediment deposits.
 - ◆ Implement source controls.

 7. Upland Forest Protection
 - ◆ Review status of existing forests in the Piedmont and prioritize areas for protection and restoration; begin protection efforts.

Introduction



SUMMARY OF WHOLE BASIN PROJECT PLANS con't

-
8. Riparian Corridor (CWAP, N6, S3)
-
- ◆ Inventory riparian areas. (*Currently underway*).
 - ◆ Design, editing and reproduction of Mapping Project final report.
 - ◆ Improve coordination with New Castle County on riparian protection.
 - ◆ Initiate a 401 program.
 - ◆ Reexamine Chapter 72 of the Delaware Code.
 - ◆ Work proactively to protect and restore riparian areas.
-
9. Protecting Public Ground Water/Drinking Water Supplies (N5)
-
- ◆ Inclusion of all classes of public water supplies (both surface and ground water based) in both state and local protection programs.
 - ◆ Compile a listing of and elevate priority of all contaminated sites located within 300 feet of critical water resource protection areas
 - ◆ Update of Contaminant Source Coverages on DNREC GIS and Site Index Database
-
10. Ambient Groundwater Monitoring Network
-
- ◆ Prioritize Areas That Would Benefit from Ambient Ground Water Quality Monitoring
 - ◆ Development of an Ambient Ground Water Monitoring Network for Critical Areas
-
11. Quality of Treated Public Water
-
- ◆ Send a letter to the water utilities and the Department of Public Health informing them of concerns expressed by the public at the May 1997 Piedmont Team Public Meeting.
-
12. Zinc in Red Clay Creek
-
- ◆ Remediation of a site which is the primary discharge source of zinc into the Red Clay Creek
-
13. Other Contaminants(T2)
-
- ◆ Identify other key contaminants of concern that may be present in Piedmont Basin streams; link to upland sources (e.g., the process done to identify PCBs in the Piedmont)
 - ◆ *Status: Project plan under development*
-
14. Urban Coordination (T1, T3)
-
- ◆ *Status: Project plan under development*
-
15. Fresh Water Wetlands
-
- ◆ Conduct a trend analysis to assess the loss of fresh water wetlands in the Piedmont Basin and examine options to further protect wetlands.

INLAND BAYS BASIN TEAM PROJECTS

-
16. Shoreline Stabilization (N6)
-
- ◆ Implement shoreline stabilization projects that incorporate the use of natural (vegetative) methods of controlling shoreline erosion in Delaware's Inland Bays area.
-
17. Exchange Process in the Lewes-Rehoboth Canal
-
- ◆ Conduct an observational study to 1) determine the mean flow as well as the temporal fluctuations in the exchange through the canal and 2) establish the relationship between the exchange and forcing mechanisms such as tides and wind events.

Introduction



SUMMARY OF WHOLE BASIN PROJECT PLANS con't

-
18. Pfiesteria Monitoring (CWAP)
- ◆ Continue program established in 1998 with EPA funding (EPA future funding uncertain) to monitor for : (a) for pfiesteria organisms; (b) water chemistry (to study associations/causative factors).
-
19. Inland Bays/Atlantic Ocean Basin Preliminary Assessment Report
- ◆ Development and distribution of a final draft Preliminary Assessment report for the Inland Bays/Atlantic Ocean basin.

CHESAPEAKE BASIN TEAM PROJECTS

-
20. Environmentally Sensitive Areas Compilation
- ◆ Involves proactive recommendations regarding land use and development that will help to prevent environmental problems caused by poorly-planned development
 - ◆ Continue ongoing/funded mapping efforts
 - ◆ Implement new mapping projects to fill in vital data gaps: Forest Mapping, Develop Floodplain GIS Coverage, Develop Floodplain GIS Coverage, Update Hydrology GIS Coverage, Extract Sensitive Ecosystem Locations from SWMP Maps
 - ◆ Establish an a fixed duration workgroup for establishing data-layer-ranking criteria
-
21. Conservation Management Plans on state and federal lands (N3)
- ◆ Ensure that agriculture lands owned by the *state* and *federal* governments are covered by conservation management plans.

STATEWIDE PROJECTS

-
22. Whole Basin Information & Education Public Outreach Poster (CWAP)
- ◆ Develop and distribute a two-sided color poster outlining the basins and watersheds accompanied by pictures and narrative describing unique features ("treasures") and "challenges" for each basin.
-
23. Delaware Watershed Education (CWAP, T1, T3)
- ◆ Integrate existing environmental education materials and programs with watershed-specific and resources into a watershed education program for the state of Delaware.
-
24. Total Maximum Daily Load Program (CWAP, N1, N6, S3, P1, P4)
- ◆ Identification of resource needs to satisfy terms and conditions of consent decree

Introduction



Delaware's Environmental Indicators

In October, 1996, the Department of Natural Resources and Environmental Control entered into a Performance Partnership Agreement (PPA) with the U.S. Environmental Protection Agency (EPA) Region III for fiscal years 1997 and 1998. This agreement is still in effect for FY 1999. This PPA establishes the workplan for administering environmental programs in Delaware. This agreement is structured to reflect strategic priorities that establish long term direction for the Department. Key goals have been set which define the end result and address the environmental concerns that must be dealt with in the environment if it is to be conserved, preserved, protected or restored. It is the objectives that set the targets for environmental achievement, establish the basis for measuring the success of the Agreement, and provide the foundation for keeping the process adaptive and iterative. The use of environmental indicators relates how the Department is doing in meeting these objectives in clear and concrete terms that are easily understandable to the public. Setting clear goals with specific time frames allows for accurate measurement of progress or, in some cases, the lack of it. In the PPA we have identified our use of indicators as an area of continuing improvement for both EPA Region III and DNREC.

Indicators provide information in a quantitative form that enables and promotes clear communication. They supply a metric against which some aspects of public policy issues, such as policy performance, can be measured. Indicators also provide information in a simpler, more readily understood form than complex statistics or other kinds of economic or scientific data.

A widely used framework for environmental indicators arises from a simple set of questions:

1. What is happening to the state of the environmental or natural resources?

Indicators of changes or trends in the chemical, physical, or biological state of the natural

world or the state of human welfare (*state indicators*) answer this question

2. Why is it happening?

Indicators of stresses or pressures from human activities, biophysical stressors, natural events, or social stress that cause environmental change (*pressure indicators*) answer this question

3. What are we doing about it?

Measures of the societal actions such as policy adopted in response to the state of the environment problems by government, the private sector, or individuals including cooperative efforts (*response indicators*) answer this question

Factors contributing to our drive for indicators:

Need for accountability (e.g. State legislation (H.B. 410); Executive Branch Oversight; Public; Federal agencies

Better identification of environmental problems - indicator development

Quantify environmental improvements - help to set goals/objectives with the public

Budget development - based on goals/objectives

This initiative is a significant step forward for our communication of environmental progress. Used with wisdom and restraint, indicators can build support for needed changes and guide our actions for the future of Delaware's environment. The current listing of indicators are contained in the FY 1999 Performance Partnership Agreement. This agreement is updated on an annual basis.

Introduction



SOURCES OF FEDERAL AND OTHER ASSISTANCE FUNDING

In order to facilitate the implementation of stated NPS milestones as contained in this Management Plan, the State shall aggressively seek and utilize other complementary sources of funding. These available sources include, but are not limited to the following:

U. S. Department of Agriculture (USDA)

Natural Resources Conservation Service (NRCS)

- ◆ PL566
- ◆ EQIP

Farm Services Agency (FSA)

- ◆ CRP
- ◆ CREP

Delaware Department of Agriculture (DDA)

- ◆ Consolidated Pesticide Compliance Monitoring and Program Cooperative Agreements

Department of Natural Resources and Environmental Control (DNREC)

Division of Soil and Water Conservation (DSW)

Delaware Coastal Management Program (DCMP)

- ◆ 6217 Competitive Grant

District Operations

State Soil Conservation Districts*

- ◆ State Conservation Cost-Share Program

Nonpoint Source Program

- ◆ 319 Competitive Grant

Division of Water Resources (DWR)

Watershed Assessment Branch

- ◆ 106 Grant

- ◆ 604(b) Grant

Ground Water Protection Branch

- ◆ Source Water Protection Grant

Financial Assistance Branch

- ◆ State Revolving Loan Fund

Division of Air and Waste Management (DAWM)

- ◆ Underground Injection Control

- ◆ Hazardous Waste Financial Assistance

- ◆ Underground Storage Tank Program

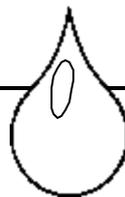
Office of the Secretary

- ◆ Environmental Education

- ◆ Pollution Prevention Incentives for States

* Though DNREC is responsible for their administration, the Districts are actually governmental subdivisions.

Introduction



CONSISTENCY OF FEDERAL PROGRAMS

Pursuant to Section 319(b)(2)(F) of the Clean Water Act, each State, as part of its NPS management program is to develop a list of the Federal assistance programs and development projects which it will review for consistency with the State's NPS Management Program. In Delaware, federal consistency reviews are conducted in accordance with the State's Single Point of Contact (SPOC) established by Executive Order 12372. Executive Order 12372 "Intergovernmental Review of Federal Programs" structures the Federal government's system of consultation with State and local governments on its decision involving grants, other forms of financial assistance and direct development. Under E.O. 12372, States, in consultation with their local governments, design their own review processes and select those Federal financial assistance and direct development activities they wish to review.

Currently the State's Single Point of Contact (SPOC) sends notification of all federal applications and projects to the DNREC so that appropriate coordination and review can take place with those proposed projects that impact DNREC's programs and to coordinate with the State's Land Use Planning Act.

In addition, SPOC processes all federal grant applications that could effect natural resources through the DNREC Delaware Coastal Management Program (DCMP) federal consistency, as DNREC is the authorized agency to administer the CMP for Delaware.

Further, the DCMP covers the entire State of Delaware. Subsequently, all programs that affect Delaware, i.e., federal programs, are reviewed for consistency. The DCMP incorporates all federal consistency requirements for DNREC's programs, such as the NPS Management Program, Delaware Estuary Program, RCRA, etc., along with other programs throughout the State.

Delaware submits the following list which identifies federal financial assistance programs and development projects for which the State will undertake a review of individual assistance applications or development projects (under Executive Order 12372 procedures) or their effect on water quality and consistency with the State's NPS Management Program.

FINANCIAL ASSISTANCE PROGRAMS

Department of Agriculture

- 10.025 Plant and Animal Disease and Pest Control
- 10.054 Emergency Conservation Program
- 10.062 Water Bank Program
- 10.063 Agricultural Conservation Program
- 10.064 Forestry Incentives Program
- 10.068 Rural Clean Water Program
- 10.069 Conservation Reserve Program
- 10.410 Low to Moderate Income Housing Loans
- 10.411 Rural Housing Site Loans
- 10.414 Resource Conservation and Development Loans
- 10.415 Rural Rental Housing Loans
- 10.416 Soil and Water Loans
- 10.418 Water & Waste Disposal Systems for Rural Communities
- 10.419 Watershed Protection & Flood Prevention Loans
- 10.422 Business and Industrial Loans
- 10.423 Community Facilities Loans
- 10.500 Cooperative Extension Service
- 10.652 Forestry Research
- 10.664 Cooperative Extension Service
- 10.669 Accelerated Cooperative Assistance for Forest Programs Boundary Waters Canoe Areas
- 10.901 Resource Conservation and Development
- 10.902 Soil and Water Conservation
- 10.904 Watershed Protection and Flood Prevention
- 10.906 River Basin Surveys and Investigations
- 10.910 Rural Abandoned Mine Program

Department of Commerce

- 11.300 Economic Development - Grants and Loans for Public Works and Development Facilities
- 11.301 Economic Development - Business Development Assistance
- 11.302 Economic Development - Support for Planning Organizations
- 11.304 Economic Development - State and Local Economic Development Planning
- 11.307 Special Economic Development and Adjustment Assistance Program - Long Term Economic Deterioration
- 11.405 Anadromous and Great Lakes Fisheries Conservation
- 11.407 Commercial Fisheries Research and Development
- 11.415 Fishing Vessel Obligation Guarantees

Introduction



CONSISTENCY OF FEDERAL PROGRAMS continued

- 11.417 Sea Grant Support
- 11.419 Coastal Zone Management Program Administration Grants
- 11.420 Coastal Zone Management Estuarine Research Reserve
- 11.426 Financial Assistance for Marine Pollution Research
- 11.427 Fisheries Development and Utilization - Research and Demonstration Grants and Cooperative Agreements Program
- 11.429 Marine Sanctuary Program

Department of Defense

- 12.100 Aquatic Plant Control
- 12.101 Beach Erosion Control Projects
- 12.104 Flood Plain Management Services
- 12.105 Protection of Essential Highways, Highway Approaches and Public Works
- 12.106 Flood Control Projects
- 12.107 Navigation Projects
- 12.108 Snagging and Clearing for Flood Control
- 12.109 Protection, Clearing and Straightening Channels
- 12.110 Planning Assistance to States

Department of Housing and Urban Development

- 14.218 Community Development Block Grants/Entitlements Grants
- 14.219 Community Development Block Grants/Small Cities Program
- 14.221 Urban Development Action Grants
- 14.223 Indian Community Development Block Grant Program

Department of the Interior

- 15.214 Non-Sale Disposal of Mineral Material
- 15.252 Abandoned Mine Reclamation Program
- 15.501 Distribution System Loans
- 15.502 Irrigation Systems Rehabilitation and Betterment
- 15.503 Small Reclamation Projects
- 15.600 Anadromous Fish Conservation
- 15.605 Fish Restoration
- 15.611 Wildlife Restoration
- 15.916 Outdoor Recreation - Acquisition, Development and Planning

Department of Transportation

- 20.106 Airport Improvement Program
- 20.205 Highway Planning and Construction

- 20.500 Urban Mass Transport Capital Improvement Grants
- 20.507 Urban Mass Transport Capital and Operating Assistance Formula Grants
- 20.509 Public Transportation for Nonurbanized Areas
- 20.801 Development and Promotion of Ports and Intermodal Transportation

Small Business Administration

- 59.012 Small Business Loans
- 59.013 State and Local Development Company Loans
- 59.031 Small Business Pollution Control Financing Guarantee

Environmental Protection Agency

- 66.001 Air Pollution Control Program Grants
- 66.418 Construction Grants for Wastewater Treatment Works
- 66.443 State Underground Water Source Protection
- 66.435 Clean Lakes Cooperative Agreements
- 66.456 Comprehensive Estuarine Management
- 66.600 Environmental Protection Consolidated Grants Program Support
- 66.700 Pesticides Enforcement Program
- 66.801 Hazardous Waste Management State Program
- 66.802 Hazardous Substance Response Trust Fund (Superfund)
- 66.804 State Underground Storage Tanks Program

Department of Energy

- 81.065 Nuclear Waste Disposal Siting
- 81.092 Remedial Action and Nuclear Waste Technology

Introduction



FEDERAL DEVELOPMENT PROJECTS

Forest Service (USDA)

- ◆ Chemicals/Pesticides
- ◆ Area Analysis/Cumulative Impacts Analysis
- ◆ Recreation Development
- ◆ Transportation Plans
- ◆ Watershed Management
- ◆ Water Development
- ◆ Watershed Rehabilitation projects
- ◆ Public Water Supply Watershed Management
- ◆ Hydrologic Modification
- ◆ Wetlands Protection
- ◆ Rise to the Future/Fisheries Program
- ◆ Riparian Management Plans
- ◆ SMZ Activities/(stream-side impact zone)
- ◆ Minerals Exploration & Development
- ◆ Fuels Management
- ◆ Applications for Permits to Drill
- ◆ Oil & Gas Leasing/Reclamation Plans
- ◆ FERC Activities/Federal Energy Regulatory Commission
- ◆ ORV Activities/off-road vehicles
- ◆ D-J/W-B Activities (Dingall-Johnson & Wallop-Breoux-fish and game)

Bureau of Land Management (DOI)

- ◆ Watershed Projects
- ◆ Mineral Exploration & Development
- ◆ Coal, Oil and Gas Leasing
- ◆ ORV Activities
- ◆ Timber Activities
- ◆ Grazing Allotment/Grazing management
- ◆ Chemicals/Pesticides
- ◆ Area Analysis/Cumulative Impacts
- ◆ Public Watershed Management
- ◆ Wetlands Protection
- ◆ Riparian Management Plans
- ◆ Hydrologic Modification
- ◆ Transportation Plans
- ◆ Watershed Activity Plans
- ◆ ACEC Plans

Natural Resources Conservation Service/ Consolidated Farm Services Agency

- ◆ ACP (Agricultural Conservation Program)
- ◆ GPCP (Great Plains Conservation Program)
- ◆ PL-566 (Small Watersheds)
- ◆ RCWP (Rural Clean Water Project)
- ◆ RCWP BMP 15 - Fertilizer Management
- ◆ RCWP BMP 16 - Pesticide Management

Department of Defense

Defense Installations

- ◆ Land Management Plans
- ◆ Waste management Plans
- ◆ Re-vegetation Plans
- ◆ Location, design and acquisition of new or expanded defense installations
- ◆ Plans, procedures and facilities for handling or storage use zones
- ◆ Establishment of impact, compatibility or restricted use zones

Corps of Engineers

- ◆ Proposed authorizations for:
 - ◆ dredging
 - ◆ channel improvement
 - ◆ breakwaters
 - ◆ other navigational works
 - ◆ beach replenishment
 - ◆ dams or flood control works
 - ◆ ice management practices
- ◆ Land Acquisition for spoil disposal or other purposes
- ◆ Selection of open water disposal sites

Federal Highway Administration (DOT)

- ◆ Highway Construction/Reconstruction

Federal Aviation Administration (DOT)

- ◆ Location and design, construction, maintenance, and demolition of Federal aids to air navigation

Coast Guard

- ◆ Location and design, construction or enlargement of Coast Guard Stations, bases and lighthouses
- ◆ Location, placement or removal of navigation devices which are not part of the routine operations under the Aids to Navigation Program
- ◆ Expansion, abandonment, designation of anchorages, lightering areas or shipping lanes and ice management practices and activities

Bureau of Reclamation (DOI)

- ◆ Irrigation Development

Office of Surface Mining/SMRCA

- ◆ Abandoned Mine Lands Program
- ◆ Mineral Development
- ◆ Lease sale activities, including tract selection

Introduction



FEDERAL DEVELOPMENT PROJECTS continued

Fish and Wildlife Service

- ◆ Management of National Wildlife refuges and proposed acquisitions

General Services Administration

- ◆ Acquisition, location and design of proposed Federal government property or buildings, whether leased or owned by the Federal government
- ◆ Disposition of Federal surplus lands and structures

Department of Commerce (National Marine Fisheries Service)

- ◆ Fisheries Management Plans

CERTIFICATION OF ATTORNEY GENERAL

Pursuant to Section 319 (b)(2)(D) of the Water Quality Act of 1987, the State Attorney General must certify that the laws of the State of Delaware provide adequate authority to implement the NPS Management Program. A copy of the original certification from the Delaware State Attorney General dated 1988 follows on the next page. Also, the Delaware Coastal Management Program (DCMP) has approved the federal consistency determination for the revision of this NPS Pollution Management Plan.

PUBLIC PARTICIPATION

In updating Delaware's NPS Management Plan, the Nonpoint Source Program has considered input from state, federal and local and private agencies and groups. A complete draft of the NPS Management Plan has been available for public review since January, 1999 on DNREC's web page at www.dnrec.state.de.us. In addition, the document has been placed on 30-day public notice.

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Agriculture Category #10:

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- ◆ Nancy Goggin, DNREC, Division of Soil and Water Conservation
- ◆ Jenny McDermott, DNREC, Division of Soil and Water Conservation
- ◆ Miriam Lynam, DNREC, Delaware Coastal Management Program
- ◆ Eric Buehl, Sussex Conservation District

Aquaculture Subcategory #17:

- ◆ Paul Janiga, DNREC, Division of Water Resources
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- ◆ Nancy Goggin, DNREC, Division of Soil and Water Conservation

Silviculture Category #20:

- ◆ Nancy Milliken, Delaware Department of Agriculture, Delaware Forest Service
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- ◆ Nancy Goggin, DNREC, Division of Soil and Water Conservation
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- ◆ Frank Piorko, DNREC, Division of Soil and Water Conservation, Sediment and Stormwater Program
- ◆ Elaine Webb, Kent Conservation District

Land Disposal Category #60:

- ◆ Karen J'Anthony, DNREC, Division of Air and Waste Management, Hazardous Waste Management Branch
- ◆ Ron Graeber, DNREC, Division of Water Resources, Groundwater Discharges Branch
- ◆ Rodney Wyatt, DNREC, Division of Water Resources, Underground Discharges Branch
- ◆ Steve Rohm, DNREC, Division of Water Resources, Surface Water Discharges Section
- ◆ Mike Apgar, DNREC, Division of Air and Waste Management, Solid Waste Management Branch

Hydrologic/Habitat Modification Category #70:

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- ◆ Cathy Martin, DNREC, Division of Fish and Wildlife

Other Sources Category #80:

- ◆ Rob Allen, DNREC, Division of Air and Waste Management, Superfund Branch
- ◆ Mick Butler, DNREC, Division of Air and Waste Management, Underground Storage Tank Branch
- ◆ John T. Barndt, DNREC, Division of Water Resources, Groundwater Management Section
- ◆ John Mohrman, DNREC, Division of Air and Waste Management, Environmental Response
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Abbreviations



NPS MANAGEMENT PLAN LIST OF ABBREVIATIONS

- ACP** - Agricultural Conservation Program. A cost-share program administered by the CFSA for farmers to carry out conservation and environmental protection practices on agricultural land.
- BMP** - Best Management Practice. BMPs are structural and can include management practices that can be used to reduce or eliminate water quality problems related to nonpoint source pollution.
- CD** - Conservation District.
- CES** - Cooperative Extension System under the University of Delaware and Delaware State College
- CFSA** - Consolidated Farm Services Agency under the United States Department of Agriculture
- COE** - Corps of Engineers
- CRP** - Conservation Reserve Program. As part of the Food Security Act of 1985, farmers may enter a contract with the CFSA to remove highly erodible cropland from production.
- CREP** - Conservation Reserve Enhancement Program. Program to establish high-value practices such as filter strips, and forested riparian buffers to protect streams, lakes, and rivers from sedimentation and pollution.
- CWA** - The federal Clean Water Act formerly referred to as the Federal Water Pollution Control Act has been a public law since 1972. It requires the development of comprehensive programs for preventing, reducing or eliminating the pollution of the navigable waters and groundwaters and improving the sanitary condition of surface and underground waters.
- DAWM** - Division of Air and Waste Management under the Delaware Department of Natural Resources and Environmental Control
- DCMP** - Delaware Coastal Management Program.
- DDA** - Delaware Department of Agriculture.
- Del. C.** - Delaware Code
- DeIDOT** - Delaware Department of Transportation
- DFS** - Delaware Forest Service under the Delaware Department of Agriculture
- DFW** - Division of Fish and Wildlife under the Delaware Department of Natural Resources and Environmental Control.
- DGS** - Delaware Geological Survey
- DNREC** - Department of Natural Resources and Environmental Control.
- DSWA** - Delaware Solid Waste Authority.
- DSWC** - Division of Soil and Water Conservation under the Delaware Department of Natural Resources and Environmental Control
- DWR** - Division of Water Resources under the Delaware Department of Natural Resources and Environmental Control.
- EPA** - U.S. Environmental Protection Agency.

Abbreviations



NPS MANAGEMENT PLAN LIST OF ABBREVIATIONS

- EPO** - Environmental Protection Officer employed by the Delaware Department of Natural Resources and Environmental Control
- ERB** - Emergency Response Branch under the Division of Air and Waste Management, Delaware Department of Natural Resources and Environmental Control
- FIFRA** - Federal Insecticide, Fungicide and Rodenticide Act
- FIP** - Forestry Incentive Program. A federal program to provide cost-share funds to landowners to carry out forestry projects.
- GIS** - Geographic Information System.
- HSCA** - Delaware's Hazardous Substances Cleanup Act
- HWMB** - Hazardous Waste Management Branch under the Division of Air and Waste Management, Delaware Department of Natural Resources and Environmental Control
- IPM** - Integrated Pest Management. Concept of pest management combining various non-chemical techniques with controlled chemical applications.
- NPDES** - National Pollutant Discharge Elimination System. Federal operating permits issued by EPA to industrial facilities (to help these facilities comply with the Clean Water Act).
- NPS** - Nonpoint source pollution. Pollution that cannot be traced to a specific origin or starting point, but seems to flow from many different sources. NPS pollutants are generally carried off the land by stormwater (or melting snow) runoff.
- NRCS** - Natural Resources Conservation Service under the United States Department of Agriculture
- OSDS** - On-Site Disposal System
- PS**- Point source. Pollution discharged into waterbodies from specific, identifiable pipes or points, such as an industrial facility or municipal sewage treatment plant.
- RCRA** - Resource Conservation and Recovery Act
- SARA** - Superfund Amendments and Reauthorization Act
- SRF** - State Revolving Fund. A low interest revolving loan fund to be used to finance loans for nonpoint source pollution prevention practices.
- SWB** - Solid Waste Branch under the Division of Air and Waste Management, Delaware Department of Natural Resources and Environmental Control
- UIC** - Underground Injection Control
- USDA** - United States Department of Agriculture
- UST** - Underground Storage Tank(s).



Introduction

The United States Coastal Zone Act Reauthorization Amendments of 1990 included a new section (6217) requiring states with approved coastal management programs to develop and implement a Coastal Nonpoint Pollution Control Program (CNPCP). A state's 6217 Program should build on existing state coastal management and nonpoint source pollution programs to reduce and prevent coastal water quality problems. Congress charged the National Oceanic and Atmospheric Administration (NOAA) and the Environmental Protection Agency (EPA) with oversight of 6217 development and implementation. The Delaware Coastal Management Program (DCMP) now coordinates the network of state agencies with regulatory authority over coastal nonpoint pollution control. DCMP is responsible for Delaware's CNPCP. DCMP works cooperatively with the 319 Nonpoint Source (NPS) Program and other state agencies to implement this program.

A CNPCP must demonstrate and maintain enforceable mechanisms and/or policies to ensure implementation and compliance with the program's objectives. NOAA and EPA define the term "enforceable policies" as "State policies which are legally binding through constitutional provisions, laws, regulations, land use plans, ordinances, or judicial or administrative decisions, by which a State exerts control over private and public land and water uses and natural resources in the coastal zone." These enforceable

mechanisms can be either regulatory or non-regulatory. State authorities that ensure management measure implementation must back non-regulatory approaches as well. States must demonstrate that they have the authority to take enforcement actions where incentives or other non-regulatory programs do not result in implementation of management measures, or where significant harm to coastal waters exists.

Delaware utilizes a combination of regulatory and non-regulatory approaches. Since the area managed by DCMP encompasses the entire state and coincides with the statewide NPS Program, it only makes sense that the two programs coordinate to eliminate duplication in their nonpoint pollution control work. The pollution categories addressed by the CNPCP are not identical to those addressed by the 319 NPS Program. However, the CNPCP and NPS chose to incorporate the 6217 Program elements into the 319 NPS Management Plan. The federally designated categories and subcategories that must be addressed for 6217 are listed below.

This document also includes a 5 Year Enhancement Plan, 15 Year Implementation Strategy, and a management measure Tracking and Monitoring Plan for Delaware's CNPCP. The Delaware CNPCP document contains a more comprehensive description of the goals, approaches, and management measures specific to the 6217 CNPCP.

Management Categories

Agriculture

- Erosion and Sediment Control
- Facilities Wastewater and Runoff from Confined Animal Feeding Operations
- Nutrient Management
- Pesticide Management
- Grazing Management
- Irrigation Water Management

Forestry

- Preharvest Planning
- Streamside Management Areas (SMA)
- Road Construction/Re-construction
- Road Management
- Site Preparation
- Forest Regeneration
- Fire Management
- Revegetation of Disturbed Areas
- Forest Chemical Management
- Wetlands Forest Management



Management Categories (cont.)

Urban

- Urban Runoff
- Construction Activities
- Existing Development
- On-Site Disposal Systems
- Pollution Prevention
- Roads and Highways

Marinas and Recreational Boating

- Siting and Design
- Marina and Boat Operations

Hydromodification

- Channelization and Channel Modification
- Dam Management
- Streambank and Shoreline Erosion

Wetlands, Riparian Areas, and Vegetated Treatment Areas

(This category is not addressed by the 319 NPS Program)

- Protection of Wetlands and Riparian Areas
- Restoration of Wetlands and Riparian Areas

History and Current Status

In July, 1995 Delaware submitted its CNPCP plan for federal approval. In 1997, NOAA and EPA granted Delaware conditional approval of its CNPCP, with the provision that the state meet specific conditions for final approval. These conditions include providing further information on the management practices of other state agencies and establishing the enforceability of state management measures. Several of the 1997 conditions have been satisfied. In early 1999, the CNPCP sent NOAA and EPA information on state activities meeting many remaining conditions. The information included state statutes and agency regulations, established management measures, descriptions of permit processes, and public information campaigns. The sources of the information included the State Attorney General's Office, the Departments of Agriculture, Transportation, Natural Resources and Environmental Control, and county level agencies. The CNPCP is currently awaiting NOAA and EPA's assessment of the submission. The 1997 conditions and the current status of CNPCP compliance are listed on the following page.

In addition to specific conditions for final approval, NOAA and EPA have tasked the CNPCP with development of a 5 year implementation plan, a 15 year program strategy, and a management measure

tracking and monitoring plan. To comply with the request for a 5 year plan, the CNPCP identified specific activities planned for the coming 5 year period (1999-2003), by the network of participating agencies. Because the CNPCP document thoroughly describes the current management measures and authorities used in Delaware, the 5 Year Enhancement Plan found in this report highlights changes or additions to current practices in the CNPCP. In many cases, the areas identified for CNPCP management are well controlled in Delaware and meet the requirements in the federal guidance for Section 6217.

The Tracking and Monitoring Plan found in this document will allow improved coordination between participating agencies and, for the first time, create a readily accessible information management system. The system will allow assessment of management measure effectiveness and compliance with overall CNPCP goals. DCMP, the lead agency in the tracking project, can complement work done by NPS and other participating agencies with this system. Rather than duplicate or supercede any current state pollution control programs, DCMP will make information on pollution control activities available and then use the information along with monitoring data to assess management measure effectiveness and implement required changes.



Conditions for Final Approval

Agriculture

Condition: Within two years, Delaware will develop a strategy to implement the agricultural measures throughout the 6217 management area (entire state).

Status: Delaware is currently addressing agricultural issues throughout the state with a variety of forums: a Draft Unified Assessment Strategy; the Animal Feeding Operation dialogue with EPA; and the new Delaware Nutrient Management Commission (DNMC). The DNMC will, as required by law, establish legally binding certification requirements for agricultural operations across the state.

integrate the provisions of the site development management measure into the site development plan, an approved sediment and erosion plan or similar mechanism.

Status: The Sediment and Stormwater Section of DNREC is the responsible agency for implementation of this condition. The Sediment and Stormwater section developed and adopted a Conservation Design for Stormwater Management manual in September of 1997. This manual appears to meet the above stated condition. The Sediment and Stormwater Section may need to make minor revisions to their regulations, but the guidance provided by the manual meet the management measures.

Forestry

Condition: Within two years, Delaware will finalize and implement the proposed Forestry Erosion and Sediment Rules and Regulations.

Status: Completed

Condition (Construction Site Erosion and Sediment and Chemical Control): Within one year, Delaware will complete revision of the Erosion and Sediment Control Handbook to include construction site chemical management practices consistent with the elements of the construction site chemical control management measures. [NOTE: This condition also applies to the construction site chemical control management measures for Roads, Highways and Bridges as well as the construction site chemical control management measures for Hydromodification.]

Status: The Erosion and Sediment Control Handbook, scheduled for release in early 2000, will contain legally binding standards covering chemical management for construction sites. The Handbook provides technical specifications for Delaware's Sediment and Stormwater Regulations. This should meet the requirements for the management measures.

Urban

Condition (Watershed Protection and Existing Development): Within one year, Delaware will develop a process to ensure full implementation of the elements of the watershed protection and existing development management measure.

Status: Whole Basin Management Implementation is proceeding: Piedmont, Chesapeake, Inland Bays, and now Delaware Estuary watersheds are underway. DNREC is linking the Whole Basin approach to the TMDL efforts. The DCMP will also utilize the COMPAS process for land use planning, zoning, and vegetated stream buffer analysis.

Condition (Site Development): Within three years, Delaware will incorporate provisions into the State Sediment and Stormwater Regulations that



Conditions for Final Approval (cont.)

Condition (New and Operating On-Site Disposal Systems [OSDS]): Within three years, Delaware will amend its program by adding provisions to address the inspection of operating OSDS.

Status: Proposed amendments to the Regulations Governing the Design, Installation and Operation of On-Site Wastewater Treatment and Disposal Systems will implement stricter siting and design standards, a new inspector certification system and require annual inspections of community level and alternative/experimental systems.

Hydromodification

Condition: Within one year, Delaware will develop a process to ensure full implementation of management measures for protecting surface water quality and habitat from the effects of dams and surface water withdrawals.

Status: The Erosion and Sediment Control Handbook, as revised, will address this condition in its application to all construction activities.

Condition: Within one year, Delaware will develop a process to address eroding streambanks and shorelines

causing nonpoint pollution problems that are not reviewed under existing authorities, and to ensure full implementation of the management measures for eroding streambanks and shorelines.

Status: Delaware will soon begin its Riparian Buffer Initiative project, funded by an EPA grant, which will provide science based buffer designs and implementation strategies to reduce erosion in riparian areas. The new Erosion and Sediment Control Handbook will also address this condition.

Wetlands, Riparian Areas, and Vegetated Treatment Areas

Condition: Within three years, Delaware will further develop its program to address activities in wetlands and riparian areas that are not currently reviewed under existing permit authorities.

Status: NOAA and EPA would like Delaware to develop a Non-tidal Wetlands program within three years. Delaware will work towards accomplishing this goal, but the success will depend on the legislative support and funding for any new initiatives.

5 Year Enhancement Plan

To comply with the request by NOAA and EPA for a 5 year plan, the CNPCP (DCMP Jul 1995) identified specific activities planned for the coming 5 year period (1999-2003), by the network of participating agencies. Because the CNPCP document thoroughly describes the current management measures and authorities used in Delaware, the 5 Year Enhancement Plan

found in this report highlights changes or additions to current practices in the CNPCP. Unless otherwise noted, the various state agencies in the networked CNPCP will continue to enforce the regulations and provide oversight for the activities affecting nonpoint source pollution, as described in the conditionally approved CNPCP document.



5 Year Enhancement Plan (cont.)

Agriculture

Delaware will continue to utilize a combination of existing regulatory and non-regulatory approaches for the agricultural component of the 6217 Program. This approach has worked in Delaware for many years, as exemplified by the Pesticide Law Rules and Regulations and the Manure Management Guidelines, which have enforceable mechanisms already in place. New statutes, such as the Nutrient Management Law passed in mid 1999, will also have a significant impact on nonpoint source pollution in Delaware. Types of non-regulatory approaches utilized include economic incentives such as state and federal cost-share funds and low interest loan programs, such as the Agricultural Nonpoint Source Loan Program.

Erosion and Sediment Control -

DNREC Division of Soil and Water will complete an update to its Erosion and Sediment Control Handbook in early 2000. The Handbook will provide new, legally binding standards for activities affecting erosion and sediment loading in state waters. In the coming 5 years, DNREC will focus on implementing these new standards.

The NRCS and County Conservation Districts continue to increase the number of acres within the Conservation Reserve Program (CRP). They plan to add another 6,500 acres with CRP plans in the coming 5 years. They also plan to include 17,000 new acres per year for the next 5 years into the new Conservation Reserve Enhancement Program (CREP).

Facility Wastewater and Runoff from Confined Animal Feeding Operations -

The state will continue to require operations to design and implement systems that collect solids, reduce contaminant concentrations, and reduce runoff to minimize the discharge of contaminants in both facility wastewater and in runoff caused by storms up to and including a 25

year, 24 hour frequency storm. The Department of Agriculture (DDA) and DNREC will coordinate to develop NPDES policies for Confined Animal Feeding Operations (CAFOs) in accordance with 40 CRF 123.21. This work will occur over the next two years (1999-2000).

The new Delaware Nutrient Management Law requires nutrient management plans for all animal feeding operations (AFOs) with greater than eight animal units, or any owner of property in excess of 10 acres in size upon which nutrients are applied.

Nutrient Management -

In July, 1999 the Delaware Legislature passed the Delaware Nutrient Management Law and bound the state to create the Delaware Nutrient Management Commission (DNMC). The DNMC is empowered to regulate all aspects of nutrient management. The Nutrient Management Legislation contains provisions for the following: (1) to regulate the generation and application of nutrients to improve and maintain the quality of Delaware's ground and surface waters and to meet or exceed federally mandated water quality standards, in the interest of the overall public welfare; (2) to establish a certification program that encourages the implementation of best management practices in the generation, handling or land application of nutrients in Delaware; (3) to establish a nutrient management planning program; and (4) to formulate a systematic and economically viable nutrient management program which will both maintain agricultural profitability and improve water quality in Delaware.

The DNMC is to have a fully implemented State Nutrient Management Program by January 1, 2007. This legislation affects all persons directly involved with the generation or application of nutrients and will require them to be certified or licensed by the DNMC. Under the new law, the DNMC will develop criteria for nutrient management certification by mid 2000. The Law also



5 Year Enhancement Plan (cont.)

stipulates that 20 percent of applicable operations must have approved nutrient management plans in place by January 1, 2003.

Pesticide Management -

Delaware will continue to require pesticide management plans using soil characteristics and other physical parameters as criteria to reduce the possibility of runoff into state waters. Delaware will also continue to encourage the use of integrated pest management (IPM) strategies that apply pesticides most efficiently and at times when runoff losses are unlikely.

DDA recently submitted the third draft of an enforceable Pesticide Management Plan to the EPA. Upon approval, DDA will have 22 months to create detailed management plans for four herbicides. DDA and the University of Delaware Agricultural Extension Service will then use the detailed

plans to provide more comprehensive regulation of pesticide use in Delaware.

DDA and the United States Geological Survey (USGS) will soon have water monitoring wells within 3 miles of all pesticide application operations in the State. This will allow for better assessment of individual compliance with pesticide use regulations. It will also provide important data for the CNPCP Tracking and Monitoring Program.

Irrigation Management -

DDA and the Department of Natural Resources and Environmental Control (DNREC) will continue to allocate groundwater withdrawal rates for irrigation at a level that produces little or no runoff from agricultural operations. The system ensures that the timing and amount of irrigation water applied match crop water needs.

Forestry

The CNPCP will review all new and current forestry practices and management measures with the Tracking and Monitoring Program. This will allow staff to assess management effectiveness in meeting the long term CNPCP goal of improved water quality through nonpoint pollution control.

Preharvest Planning -

The Delaware Forest Service (DFS) will continue to perform advanced planning for forest harvesting by doing the following: (1) identify the location of water bodies and sensitive areas such as wetlands, threatened aquatic species habitat areas, or high erosion areas within a harvest unit; (2) time the activity for the season or moisture conditions when the least impact occurs; (3) consider potential water quality in the selection of sites; (4) reduce the risk of severe erosion by avoiding hazardous areas; and (5) consider additional contributions from harvesting or roads to any known water quality concerns.

Streamside Management Areas -

DFS will continue to manage the Streamside Management Area (SMA) Program to protect against soil disturbance in the SMA and delivery to the stream of sediments and nutrients generated by forestry activities, including harvesting.

DFS will also continue to manage the SMA canopy species to provide a sustainable source of large woody debris needed for instream channel structure and aquatic species habitat.

DCMP will use the CNPCP Tracking and Monitoring Program to assess the effectiveness of the current SMA program and identify required changes for improved watershed protection.

DCMP will also implement the Riparian Buffer Initiative to reduce streamside erosion by developing a more site specific, science based buffer plan for riparian areas.



5 Year Enhancement Plan (cont.)

Road Construction/Reconstruction and Management -

DFS will continue to support the following practices: (1) avoid using roads where possible during wet or thaw periods on roads not designed and constructed for these conditions; (2) close roads that will not be needed; (3) leave closed roads and drainage channels in a stable condition to withstand storms; (4) following completion of harvesting, close and stabilize temporary spur roads and seasonal roads to control and direct water away from the roadway; (5) conduct maintenance practices, when conditions warrant, including cleaning and replacement of deteriorated structures and erosion controls, grading or seeding of road surfaces, and, in extreme cases, slope stabilization or removal of road fills where necessary to maintain structural integrity; (6) conduct maintenance activities, such as dust abatement, so that chemical contaminants or pollutants are not introduced into surface waters to the extent practicable; and (7) avoid constructing new roads in SMAs to the extent practicable.

In the coming years, DNREC will enforce the new standards for road construction and management found in the updated Erosion and Sediment Control Handbook.

Revegetation of Disturbed Areas -

DFS will continue to encourage reduction of erosion and sedimentation by rapid revegetation of areas disturbed by harvesting operations or road construction.

DFS will continue to use mixes of species and concentrate on priority areas with high erosion potential. DNREC will coordinate with DFS on the Riparian Buffer Initiative to improve decisions on how and where to concentrate revegetation efforts.

Forest Chemical Management -

DNREC will implement and enforce the new Erosion and Sediment Control Handbook standards for chemical management in construction operations where applicable in silviculture operations.

Wetlands Management -

DFS will continue to use the recently adopted Forestry Best Management Practices Manual for Delaware, the Forestry Statute and Forestry Regulations to maintain nonpoint pollution control in wetland areas. DNREC and DFS will work together through the Tracking and Monitoring Program to assess the long term effectiveness of current regulations and policies.

Urban

Urban Runoff -

The municipalities of Newark, Dover, and Camden-Wyoming will require surface water discharge permits from DNREC based on proposed regulations covering NPDES MS4 areas. DNREC will continue to monitor urban runoff and to use the Conservation Design for Stormwater Management to guide nonpoint pollution control decisions.

Construction Activities -

DNREC will implement and enforce the new Erosion and Sediment Control Handbook standards covering construction site pollution BMP policies. These include specific standards for management of chemicals on urban construction sites consistent with the elements of the 6217 construction site chemical control management measures.



5 Year Enhancement Plan (cont.)

On-Site Disposal Systems –

DNREC plans to amend the Regulations Governing the Design, Installation, and Operation of On-Site Wastewater Treatment and Disposal Systems by the summer of 2000. Changes will include the adoption of an inspector certification system to provide more inspectors for more regular site visits, stricter regulations for domestic systems, more detailed site inspections for large/community systems, and annual inspections for innovative/alternative systems.

Pollution Prevention –

DNREC will integrate the Total Maximum Daily Load (TMDL) process into its current

Pollution Control Strategy Program to move toward a more watershed based approach to water quality monitoring and protection.

Roads, Highways, and Bridges –

The updated Erosion and Sediment Control Handbook will have standards and specifications covering nonpoint pollution control from road construction and maintenance. The Handbook will have general guidance for construction and maintenance activities. A supplement to the Handbook produced by the Department of Transportation will have more detailed specifications for control of pollution from roads. DNREC will implement the new standards in the coming years.

Marinas

Delaware has a very strong Marina program based on several state statutes and backed by Marina Regulations. Delaware has also developed a Marina Guidebook that provides information on the permitting process, as well as technical guidance in the design and operation of marinas. Topics covered in the Guidebook include: (1) Environmental Siting considerations with respect to water quality, wetlands, shellfish resources, submerged aquatic vegetation, benthic resources, and critical habitats; and (2) Planning and Design Requirements such as dredging, shoreline protection, navigation access, water supplies, wastewater facilities,

stormwater management, maintenance areas for boats, fuel storage and delivery facilities, and many others.

Because the Marinas program meets or exceeds the 6217 guidance, DNREC will concentrate on assessing this management area for effectiveness in meeting CNPCP goals. DNREC will use the Tracking and Monitoring Program to determine if the current regulations and activities in Marinas are reducing nonpoint pollutants from the large variety of possible pollutants related to marina and boat operations.

Hydromodification

Channelization and Channel Modification -

DNREC will continue to require a Subaqueous Permit for dredging projects, in addition to a 401 Water Quality Certification from the US Army Corp of Engineers. DNREC is currently developing a Policy Framework for Decision Making Related to the Evaluation, Monitoring, and Design of

Dredging Projects. This policy framework will provide clear guidance for dredging applicants and will maintain a consistent approach to dredging permit decisions among the regulatory agencies with oversight. The framework will allow easy identification of environmental concerns in a proposed project. It will also help regulators streamline their decision making process.



5 Year Enhancement Plan (cont.)

As a standard practice, the Wetlands and Subaqueous Lands Section (WSLS) of DNREC does not allow the channelization of streams. However, when a channelization project does occur, the applicant is required to restore natural functions of the stream. The WSLS has undertaken significant educational efforts to inform planning and zoning officials, and construction contractors about the effects of channelization on instream and riparian habitats.

Dam Management –

DNREC will continue to require that plans be developed by a certified design professional and approved by the delegated agency prior to dam construction. These plans require that sediment and stormwater practices be implemented to reduce erosion potential, retain sediment on-site, and provide for adequate stormwater retention/detention. The updated Erosion and Sediment Control Handbook will cover dam construction and modification since the Handbook does not differentiate between causes of land disturbance; it covers all sources of erosion from earth moving activities. The updated Handbook will also cover chemical control in dam construction activities, as it has new standards for chemical management in all construction activities.

Streambank and Shoreline Erosion –

DNREC recognizes that some amount of natural erosion is necessary to provide sediment for beaches in estuaries and coastal bays, for point bars and channel deposits in rivers, and for substrate in tidal flats and wetlands. DNREC recommends vegetative stabilization methods to protect shorelines and streambanks. DNREC often requires return walls, toe protection and proper maintenance as permit design conditions for shoreline stabilization projects. The BMP Manual for Tax Ditch Projects includes BMPs such as: (1) promotion of permanent vegetation growth in off-sided construction areas; (2) minimizing vegetation control; and (3) maintenance of an adequate vegetative strip between channel edge and cultivated field.

In addition to existing policies and programs, DNREC will soon begin work on the Riparian Buffer Initiative. This project will bring together the science required to develop site specific buffer models to improve water quality, protect riparian habitat, and reduce excessive erosion in riparian areas.

Wetlands, Riparian Areas, and Vegetated Treatment Areas -

Protection of Wetlands and Riparian Areas –

DNREC will continue to require permits for most activities within tidal salt marshes and tidal freshwater wetlands. DNREC will also begin the Riparian Buffer Initiative to protect critical areas from water quality degradation.

Restoration of Wetlands and Riparian Areas –

DNREC may soon begin development of a set of environmental mitigation projects, including wetland restoration, connected to recent state regulations requiring the Department to allow flexibility for coastal zone industrial activities in exchange for a net improvement in environmental quality. Wetland restoration may play a large part in mitigating for industrial activities proposed under the new law.

**Delaware Coastal Nonpoint Pollution Control Program
5-Year Enhancement Plan**

Management Category	Management Measure	Anticipated New Activity/Action	Implementation Schedule					Lead Agency(ies)	Notes
			99	00	01	02	03		
Forestry	Streamside Management	Implement Riparian Buffer Initiative to reduce streambank erosion due to silviculture in riparian areas.	x	x				DNREC, DDA DFS, County Conservation Districts	Evaluate effectiveness of current Streamside Management Zone policy with Tracking and Monitoring Program.
	Road Construction	Implement new Standards and Specifications for road construction and management.	x	x	x	x	x	DNREC DSW, DDA DFS, DeIDot	Included in updated Erosion and Sediment Control Handbook
	Road Management								
	Pre-Harvest Planting	Examine existing forestry practices and management measures for compliance and effectiveness in nonpoint pollution control.						DNREC, DDA DFS, County Conservation Districts	Review effectiveness with Tracking and Monitoring Program.
	Timber Harvesting								
	Site Preparation								
	Fire Management								
	Revegetation								
	Forest Chemical Management								
Wetlands Management									
Urban	Urban Runoff	Review Surface Water Discharge permits for Newark, Dover, and Camden-Wyoming under NPDES MS4 regulations.	x	x				DNREC DWR, Municipal Agencies	
	Construction Activities	Implement new Standards and Specifications for Construction Site Pollution policies covering BMPs for chemical management.	x	x	x	x	x	DNREC DSW	Included in updated Erosion and Sediment Control Handbook
	Existing Development	Examine existing urban pollution control measures for compliance and effectiveness in nonpoint pollution control.	x	x	x	x	x	DNREC, County Conservation Districts, Municipal Agencies	Review effectiveness with Tracking and Monitoring Program.
	On-Site Disposal Systems	Require more detailed site inspections of large/community systems and annual inspections for innovative/alternative systems.		x	x	x	x	DNREC DWR	Proposed changes to existing regulations.

**Delaware Coastal Nonpoint Pollution Control Program
5-Year Enhancement Plan**

Management Category	Management Measure	Anticipated New Activity/Action	Implementation Schedule					Lead Agency(ies)	Notes
			99	00	01	02	03		
Urban		Adopt an inspector certification system.		x				DNREC DWR	
	Pollution Prevention	Integrate the TMDL process into current Pollution Control Strategy Program.		x				DNREC DSW	
	Roads, Highways, and Bridges	Implement new Standards and Specifications for road construction and management.	x	x	x	x	x	DNREC DSW, DeIDot	Included in updated Erosion and Sediment Control Handbook
Marinas	Siting and Design	Examine existing marina management measures for compliance and effectiveness in nonpoint pollution control.						DNREC, County Conservation Districts	Review effectiveness with Tracking and Monitoring Program.
	Marina and Boat Operation		x	x	x	x	x		
Hydromodification	Channelization and Channel Modification	Implement new Policy Framework for Decision Making Related to Dredging.		x	x	x	x	DNREC, USACE, USFWS, NMFS	The Framework will provide clear guidance for applicants and maintain a consistent approach among regulatory agencies.
	Dam Management	Examine existing dam management measures for compliance and effectiveness in nonpoint pollution control.	x	x	x	x	x	DNREC, County Conservation Districts	Review effectiveness with Tracking and Monitoring Program.
	Streambank and Shoreline Erosion	Implement new Standards and Specifications for streambank and erosion control.	x	x	x	x	x		Included in updated Erosion and Sediment Control Handbook
Hydromodification	Streambank and Shoreline Erosion	Implement Riparian Buffer Initiative to reduce streambank erosion due to landuses bordering riparian areas.	x	x				DNREC, County Conservation Districts	Funded through EPA Wetland Development Grant Program
Wetlands, Riparian	Protection of Wetlands and Riparian Areas	Implement Riparian Buffer Initiative to protect critical areas from water quality degradation.	x	x				DNREC, County Conservation Districts	Funded through EPA Wetland Development Grant Program



15 Year Program Strategy

Non-point source pollution is an extremely complex and difficult problem to address. As a result it is expected to take many years to address the environmental problems associated with this pollutant type. In order to ensure the Delaware CNPCP stays on track for the duration, it is important that a long range framework, in the form of a CNPCP 15-Year Program Strategy exist to guide the program down this challenging road ahead.

The primary objective of this 15-Year Program Strategy is to ensure that all necessary or applicable Section 6217-management measures are fully implemented to protect and restore Delaware's Coastal waters within 15 years. Over time, it is important that the CNPCP be refined to ensure its effectiveness. These refinements will be based upon:

- continued and/or intensified implementations of management measures being demonstrated to improve coastal water quality,
- modifications of the program to provide alternative management measures anywhere Delaware finds better approaches to addressing specific NPS problems than an existing management measure, and;
- addition of any new management measures where full implementation of the 6217 management measures are not accomplishing the intended improvement to coastal water quality in a coastal watershed.

Delaware's CNPCP 15-Year Program Strategy includes three five-year phases that provide opportunities for comprehensive assessments of program progress and mid-course correction. Each of these phases is described below.

Phase I: Initial Implementation and Assessment (1999-2004)

This phase will essentially be the implementation of the previously described 5-Year Implementation Plan, the full implementation of a comprehensive tracking program (described in the section that follows). It will also include the implementation of a stormwater-monitoring program that provides detailed local data for specific management measures needed to determine if alternative measures should be considered for specific NPS problems in Delaware. Administratively, this phase will also fully integrate the CNPCP and the Section 319 NPS program into an operational and administrative plan.

Phase one will culminate with the final assessment document to be completed as part of the comprehensive tracking program, which will provide detailed 5-Year program assessment of CNPCP effectiveness that will be used to provide detailed direction for Phase 2 of the 15-Year Program Strategy. The results of this assessment will also be used to make recommendations for the state and federal funding appropriations.

Phase II: Program Refinement and Adjustment (2005-2009)

Phase 2 will continue to work toward full implementation of all applicable management measures. However, it will also include some geographic prioritization of implementation efforts based on the finding of the 5-year assessment. It may include the implementation of alternative management measures in some specific cases if they are found, based on detailed monitoring and implementation results, to be more effective approaches to local NPS problems than the specific management measures outlined in the original Section 6217 guidance document.

Throughout phase two, the tracking system will be maintained in an operational mode,



and should be fully institutionalized in its use by the network of programs implementing the management measures throughout the state.

Similar to Phase one, this phase will culminate in a final assessment document based on the analysis of the comprehensive tracking program that will be used to provide detailed direction for the final phase of the 15-Year Program Strategy.

Phase III: Achieving Full Implementation (2010-2014)

Phase three is expected to fully implement any remaining applicable management measures throughout Delaware. Similar to phase II, it will include some refinements

based on the second 5-year program assessment. It may also include some significantly new management measures resulting from improvements in our level of understanding and scientific knowledge regarding both NPS pollution and approaches to addressing specific sources.

Any specific categories of NPS identified to still be significant problems should be reviewed in detail to determine why the problem is not being addressed. If the issues are not demonstrated to be limited by our current level of technology, efforts should be considered for additional public policy adoption to ensure their full implementation in the remaining 5-years of this strategy.



Tracking and Monitoring Plan

As mentioned above, Delaware's CNPCP is a networked program with implementation responsibilities distributed throughout the state. DCMP can ensure implementation of management measures by complementing the efforts of other agencies with this tracking and monitoring program.

DCMP developed this plan to ensure 6217 implementation in five phases. Each phase will take approximately one year to complete and will result in specific products, including an annual 6217 Tracking and Monitoring Status Report. A chart summarizing the phases, products, and milestone schedule for the plan follows this section. The primary goals of this 5 year 6217 Tracking and Monitoring Plan are:

- To provide a timely and efficient system for tracking nonpoint pollution control activities in Delaware;
- To create, by the end of the plan, a method for analyzing the effectiveness of the CNPCP on water quality control.
- To ensure the CNPCP is working and to provide data on areas requiring improvements for the out-years of the 15 year strategy.

Phase 1: Development of Information Requirements and Implementation Plan

To create an efficient system for tracking and monitoring nonpoint source pollution control measures, all of the organizations involved in creating and managing these measures must agree on a common system or accessing their stored information. To make the tracking system effective, the organizations must also agree to provide necessary and timely information in a commonly accessible format. For these reasons, the first phase of this plan will involve development of common standards for data collection and storage among the 6217 partner agencies.

DCMP will host one or more workshops for all agencies implementing 6217 measures. Agency representatives will identify data requirements and sources for an effective

6217 tracking and monitoring program. Workshop participants will also identify a format with which DCMP can access all required information for an efficient and timely system.

At the end of this phase, DCMP will have a detailed description of existing information types and those requiring development to properly track 6217 management measures in Delaware. Along with its partner agencies, DCMP will develop an plan for collecting the required information and maintaining an accessible and up-to-date system for monitoring management measures.

DCMP will document the identified data needs, sources, and its implementation strategy in the 6217 Tracking and Monitoring Year 1 Status Report.

Phase 2: Database Design and Initial Data Consolidation

Parts of Phase 2 may occur concurrently with Phase 1 activities in the workshop(s) for partner agencies. Once the agencies have identified information ready for use in a standard digital format, DCMP will prioritize the data for integration into the new tracking system. Depending on decisions made in the Phase 1 workshop(s), Phase 2 will most likely include design and development of a tracking and monitoring database system. Phase 2 will also ensure that data included in the new system have metadata consistent with established standards.

Once DCMP has entered the initial data and metadata into the new tracking system, it will test the system by querying for management measures related to nonpoint source pollution in a specific geographic area, such as measures reducing agricultural runoff into Delaware's Inland Bays. By reviewing monitoring data and management measures in the test area, DCMP will be able to assess management effectiveness and required changes. DCMP will document



Tracking and Monitoring Plan (cont.)

decisions made, standards set, and system test results in its 6217 Tracking and Monitoring Year 2 Status Report.

Phase 3: Operational Implementation and Data Consolidation

In Phase 3, DCMP will continue to collect data in the standard format for integration into the new tracking system. This will involve both conversion of data from other digital formats and capture of non-digital formats, such as paper maps and documents, in the established electronic standards. Along with refinement of the database system, this phase will include development of Web-based access to the information to improve the general accessibility of the system.

During this phase, staff from the network of partner agencies will receive training in new system standards and management skills. DCMP will continue to work closely with its partner agencies to institutionalize the use and maintenance of the tracking system.

At the end of this phase, DCMP will document data types and sources added to the system and introduce the new Web-based access in the 6217 Tracking and Monitoring Year 3 Status Report.

Phase 4: Operational Implementation, Data Consolidation, and Initial Development of Decision Support System

In Phase 4, DCMP will continue to integrate the information identified by the partner agencies into the new tracking system by converting digital sources and capturing non-digital sources to a standard format.

Training of partner agency staff on the tracking system will also continue.

By Phase 4, the system should be well enough established to do a preliminary assessment of management measure effectiveness. Another workshop of partner agencies will be held to identify methods for analysis of the system. DCMP will use the results of this workshop to create a customized decision support system for analysis of the 6217's effectiveness in controlling nonpoint sources pollution.

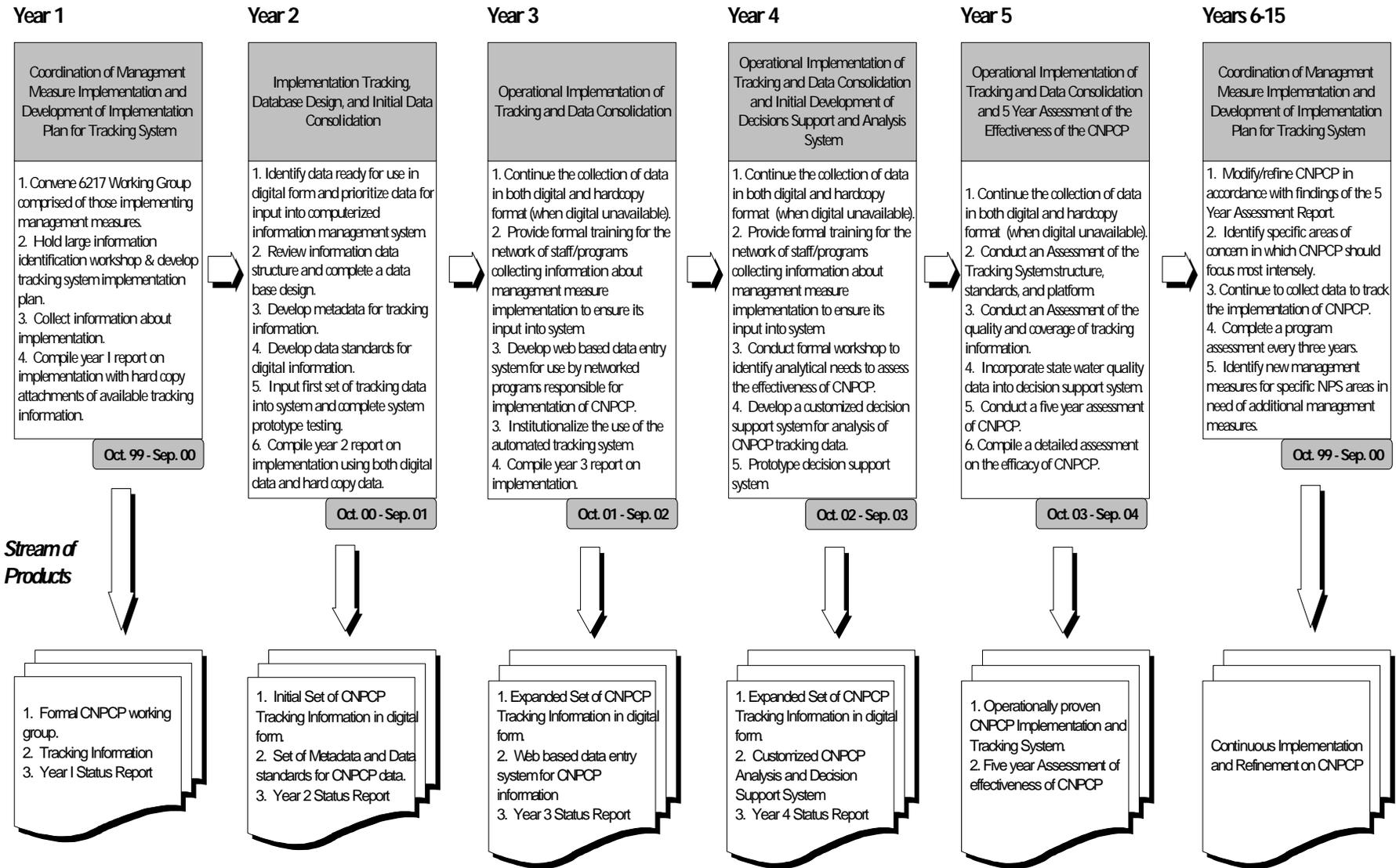
At the end of this phase, DCMP will document data types and sources added to the system and introduce the new 6217 Effectiveness Decision Support System in its 6217 Tracking and Monitoring Year 4 Status Report.

Phase 5: Operational Implementation, Data Consolidation, and 5-Year Assessment of 6217 Effectiveness

Phase 5 of this plan will emphasize assessment of the 6217's effectiveness and identification of required changes to specific management measures. During this phase, DCMP will continue to integrate identified data into the tracking system. Using its tracking system based decision support system and state water quality data, DCMP will identify areas of concern in nonpoint source control. This will form the basis of its five year 6217 assessment and recommendations for changes, including changes in geographic focus and management measures for more effective water quality control.

This phase will result in an operationally proven 6217 Tracking System, a documented 5 year assessment of CNPCP effectiveness, and recommendation for specific changes to the Program.

Overview of the Process for Implementation of Delaware's Coastal Nonpoint Pollution Control Program - CZIMA Section 6217





6217 Partner Agencies/Proposed Working Group

State Attorney General's Office
Departments of Agriculture
Department of Forestry
Department of Natural Resources and Environmental Control
 Division of Soil and Water Conservation
 Delaware Coastal Management Program (DCMP)
 Nonpoint Source (NPS) Pollution Control Program (319)
 Division of Water Resources
 Division of Air and Waste Management
New Castle County Conservation District
Kent County Conservation District
Sussex County Conservation District

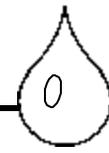
References

DCMP. Jul 1995. *Delaware's Coastal Nonpoint Pollution Control Program*, a program submittal to NOAA and EPA. Dover, DE: Delaware Coastal Management Program.

Appendix

- ◆ NPS 319 FUNDED PROJECTS (FY 1991 - FY 1999)
- ◆ DELAWARE WATERSHEDS/BASINS MAP
- ◆ FLOW CHART -- TMDLS AND THE DEVELOPMENT OF WATERSHED POLLUTION CONTROL STRATEGIES
- ◆ DELAWARE'S UNIFIED WATERSHED ASSESSMENT AND WATERSHED RESTORATION PRIORITIES
- ◆ DELAWARE'S WHOLE BASIN MANAGEMENT PLAN PROCESS AND TIMELINE FOR TMDL DEVELOPMENT PROCESS SCHEDULE
- ◆ TMDL REGULATIONS FOR THE NANTICOKE RIVER AND BROAD CREEK
- ◆ TMDL REGULATIONS FOR INDIAN RIVER, INDIAN RIVER BAY AND REHOBOTH BAY
- ◆ TMDL ACTIVITIES IN THE CHRISTINA BASIN
- ◆ CHRISTINA BASIN PHASE I TMDL EXPENDITURES
- ◆ ATTORNEY GENERAL'S CERTIFICATION OF LOCAL AUTHORITY FOR NONPOINT SOURCE POLLUTION MANAGEMENT PROGRAM

NOTE: THE DOCUMENTS CONTAINED IN THE APPENDIX ARE NOT AVAILABLE FOR VIEWING ON THE INTERNET. TO OBTAIN A INFORMATION ON ANY OF THESE DOCUMENTS, PLEASE CONTACT STEPHANIE BREEDING OF THE NONPOINT SOURCE PROGRAM AT (302) 739-8014 OR VIA E:MAIL AT: SBREEDING@STATE.DE.US



GOAL

The goal of the agriculture category is to protect surface and ground water while maintaining a viable agricultural industry. In order to restore designated uses in streams from impairments within 15 years, the program will emphasize:

- ◆ 100% nutrient management plan development and implementation by 2007
- ◆ comprehensive resource management planning, implementation and follow-up with a goal of 100% implementation within 15 years;

- ◆ implementation of best management practices (BMP's) and best available technology (BAT's); and
- ◆ public and private partnerships

This goal can be accomplished through an economically balanced program of education, technical assistance, financial incentives, research and regulation. The implementation of stated milestones and best management practices/management measures in association with Watershed Restoration Action Strategies will be used to achieve our water quality goals.

INTRODUCTION

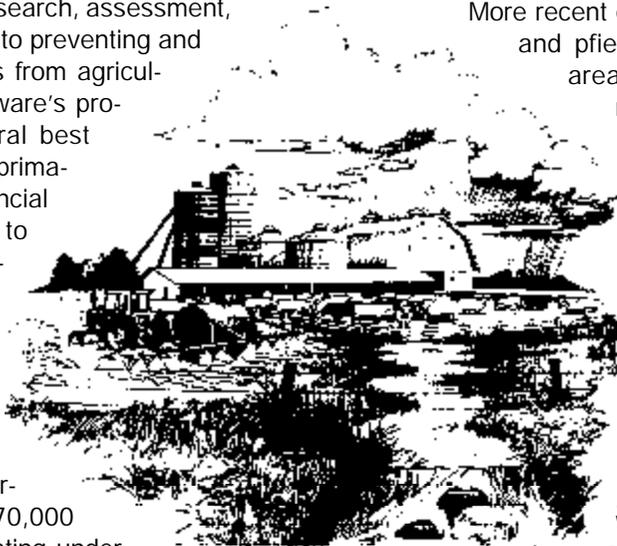
Delaware's Agriculture Category was first approved by the EPA in 1989. Since that time, the state has applied the general principles of education, research, assessment, and technical/financial assistance to preventing and reducing nonpoint source impacts from agricultural activities. In the past, Delaware's program for implementing agricultural best management practices has been primarily voluntary. Technical and financial incentives have been provided to overcome any economic disadvantages created in this process. According to the Delaware Ag. Statistics Service, Delaware has 2700 farms totalling 580,000 acres which accounts for 46 percent of Delaware's land area. The USDA, Natural Resources Conservation Service estimates that 170,000 acres (< 30%) are currently operating under a voluntary conservation plan. On average, an individual conservation planner in Delaware can complete comprehensive resource management plans on 6,000 acres per year. With eight NPS 319 supported planners, we estimate that within 10 years we will be able to complete plans on 480,000 acres including new and updated plans.

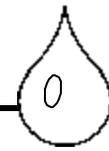
Delaware and other coastal states' use of voluntary measures was first questioned with the introduction of the 1990 Coastal Nonpoint Pollution Program (Section 6217 of the CZARA), which allowed states the freedom to develop programs utilizing both regulatory and non-regulatory approaches as long as the program contained "enforceable" mechanisms. Opinions have varied widely on what constitutes "enforceable".

Delaware Takes Action:

More recent events such as failing swine lagoons and pfiesteria outbreaks in Atlantic coastal areas heightened the debate for more regulatory control, use of permits and enforcement of agricultural pollution control activities. In response, many states have, or are in the process of passing legislation and developing regulations for animal operations. Federal action outlined in the Unified Joint Strategy for Animal Feeding Operations (AFO) and probable revisions to the federal Concentrated Animal Feeding Operations (CAFO) Regulations (Clean Water Act, 1972) will require permits for a comprehensive list of activities for animal agriculture. Under Executive Order #52, Governor Carper established the Agricultural Industry Advisory Committee On Nutrient Management to provide advice and solicit input from the agricultural community regarding what policies the State should implement to improve water quality in Delaware while maintaining the profitability of the State's agricultural industry.

As a result of this committee, on June 17, 1999, Governor Tom Carper signed into law Delaware's Nutrient Management Legislation (Attachment 1) which establishes a 15-member Delaware Nutrient Management Commission (DNMC). The DNMC is empowered to regulate all aspects of nutrient management. The Nutrient Management Legislation contains provisions for the following: (1) to regulate those activities involving the generation and application of nutrients in order to help improve and maintain the quality of Delaware's ground and surface waters and to





INTRODUCTION continued

meet or exceed federally mandated water quality standards, in the interest of the overall public welfare; (2) to establish a certification program that encourages the implementation of best management practices in the generation, handling or land application of nutrients in Delaware; (3) to establish a nutrient management planning program; and (4) to formulate a systematic and economically viable nutrient management



program which will both maintain agricultural profitability and improve water quality in Delaware. The DNMC is to have a fully implemented State Nutrient Management Program by January 1, 2007. This legislation affects all persons directly involved with the generation or application

of nutrients and will require them to be certified or licensed by the DNMC. The legislation requires mandatory nutrient management plans for all animal feeding operations (AFOs) with greater than eight animal units, or any owner of property in excess of 10 acres in size upon which nutrients are applied. Under the new law, 20 percent of the nutrient management plans must be in place by January 1, 2003, 40 percent the following year, and so forth, until the Nutrient Management Program is completed by the January 1, 2007 deadline.

Another important aspect of the legislation is a requirement that within six months, the Delaware Secretary of Agriculture, in consultation with the DNMC and the Secretary of the Delaware Department of Natural Resources and Environmental Control (DNREC) is to prepare a State National Pollutant Discharge Elimination System (NPDES) Program for confined animal feeding operations (CAFOs) in accordance with 40 CFR Part 123.21. This NPDES Program is to be submitted to the EPA administrator for approval. The Nutrient Management Legislation calls for the Delaware Department of Agriculture (DDA) to administer the AFO/CAFO Program upon EPA approval of Delaware's program.

The final chapter, not yet written in full, deals with Total Maximum Daily Loads (TMDLs). Many states including Delaware are dealing with law suits for not developing TMDLs for impaired waters. The TMDL process will de-

fine water quality waste load allocations according to scheduled deadlines negotiated in numerous consent decrees. Based on the required pollutant load reductions called for by the TMDL, Pollution Control Strategies/Watershed Restoration Action Strategies (PCS/WRAS) will be developed for point and nonpoint sources. The specific pollutant load reduction activities determined during the development of the PCS/WRAS will fully involve all stakeholders. The PCS/WRAS development process will set the timetable for full implementation of the load reduction activities/TMDL. The PCS/WRAS will be developed to consider appropriate and cost-effective measures for implementation which will achieve water quality standards.

Challenges:

As yet, we have not been able to draw a straight line from implementation activities to water quality improvement. Critics would suggest that voluntary efforts have failed, that water quality improvement can not be achieved through a voluntary process alone. In part this is true, voluntary and regulatory approaches are a function of a process which is elementary to obtaining goals but are not necessarily successful unless supported by "sound science" and "advanced technology". At this time, research in Delaware continues to raise as many questions as it answers (e.g., phosphorus transport mechanisms, and environmental/economical alternative uses of manure). What can we realistically achieve, if we continue to debate the level of science we can or can not live with, in order to proceed? The tools for implementation currently are defined as Best Available Technology (BAT). We can not clearly or adequately quantify the effectiveness of these BMPs to date and it is unclear what new and perhaps advanced technology will be needed to meet our goals. How much more time, resources and money will be spent on process, such as writing regulations or issuing permits, when the tools to indicate success are not clearly defined, identified, quantified, or may not currently exist?



INTRODUCTION continued

Voluntary Approach:

If we are to believe what some expouse, "that people cannot be adequately motivated to care for land by general principles or by incentives that are merely economic "(Berry, 1993), what assurances do we have to indicate that more regulatory-type controls will be any more successful than voluntary measures?

In the past, Delaware has focused program efforts and funds toward voluntary implementation because it provides a common ground and a common goal agreed to by conservationists and farmers. A relationship is formed that respects the need for people to feel the land belongs to them, that they belong to it, and that this belonging is a settled and unthreatened relationship. This relationship has accomplished a great deal to date. Approximately 50% of all poultry growers are storing manure under cover, over 70% are no longer burying their animal mortality in the ground, but are composting instead. Farmers have reduced manure application rates and many are using new technologies such as Pre-sidedress Nitrogen Tests (PSNTs), manure analysis, and precision agriculture equipment to cut costs and help the environment. We all have gained knowledge and experience in dealing with many different social, economic and cultural affairs relating to agriculture and the environment.

Conservation Planning:

Development and implementation of on-farm conservation plans has been the mainstay of our efforts. Conservation planners funded by the 319 program - three in Sussex County and one in Kent - are providing additional one-on-one education to landowners and facilitating technical/financial assistance for implementation of structural and non-structural BMPs. With the passage of Delaware's FY 2000 budget, the State will be providing \$130,000 for four additional conservation planners which will then be supplemented by the NPS 319 Program. These additional staff resources will facilitate Delaware's charge to develop and implement nutrient management plans on all applicable operations by January 1, 2007. Delaware's conservation planners have received or are pursuing nutrient manage-

ment certification through the Maryland Department of Agriculture – Nutrient Management Certification Program. Delaware conservation planners are also receiving regional agronomic certification in accordance with the Certified Crop Advisor (CCA) Program. At this time, it is presumed that anyone certified under Maryland's or Delaware's Nutrient Management Program will be given reciprocity to use that certification in either State.

Delaware continues to provide funding for research and new technology. Program funds have 1) advanced commercial scale composting as a means to achieving nutrient reduction, 2) been used to develop new technology such as the "smart spreader", 3) provided for additional research to better define phosphorus and nitrogen concerns in the state, and 4) assessed the role tax ditches play in generating and delivering nutrients to surface waters. Delaware has initiated GIS tracking of agricultural BMPs for Kent and Sussex Counties and is using PSNT as an indicator of real time reduction of nitrogen use throughout the state.

Delaware's Approach:

Many of the "new" issues facing agriculture were outlined in Delaware's 1995 NPS Management Plan and Assessment Report. Our experience continues to indicate a need to: 1) implement conservation plans farm by farm; 2) support demonstration of alternative uses and distribution of manures; 3) support demonstration and implementation of new technologies; 4) expand our efforts to educate and participate in local and interstate initiatives; and 5) support assessment activities to better define the science and refine assessment methods for linking BMP effectiveness to water quality improvement.

In summary, Delaware agriculture is taking on significant measures to address water quality standards. Agriculture shares the goal of improving or maintaining the quality of Delaware's ground and surface waters while also maintaining the viability of the agricultural industry in the State. The milestone tables which begin on page 10-8 list the goals of the State NPS Management Program and action items for agriculture to be undertaken in the next five years and beyond to accomplish our water quality objectives.

MANAGEMENT AGENCIES FOR IMPLEMENTATION

DNREC, Division of Soil and Water Conservation, District Operations Section - The Division of Soil and Water Conservation is the lead management agency with the local conservation districts to carry out the State's Nonpoint Source (NPS) Pollution Management Program for agriculture. The Division administers the Delaware Conservation Districts Law which provides authorities to develop comprehensive statewide conservation plans such as the State's NPS Management Program. Both the NPS Program and the Delaware Coastal Management Program (DCMP) are housed in this Division. In addition, the Division, through the Districts Law, has established a conservation cost-sharing program and a delivery mechanism for technical assistance. Through DNREC, the Division of Soil and Water Conservation has the authority to enter into agreements with other agencies and organizations to carry out a comprehensive NPS Management Program. This Division provides:

◆ **Technical Assistance -**

- ◆ Nutrient Management planning
- ◆ Conservation Cost-Share
- ◆ Agricultural NPS Loan Program
- ◆ NPS and DCMP grant programs
- ◆ Pollution Source Assessment
- ◆ Project monitoring plan development

◆ **Education Programs -**

- ◆ Manure management education workshops
- ◆ Dead-bird composting display
- ◆ Participation in Ag Days at the Dover Mall
- ◆ Participation in Farm and Home Field Day
- ◆ Water Wise Display & Fact Sheets
- ◆ Delaware Guidelines for Manure Management
- ◆ Delaware State Fair and Coast Day Displays
- ◆ Delaware National Estuarine Research Reserve

DNREC, Division of Water Resources - The Division of Water Resources is the lead agency for water quality and quantity in the State of Delaware. The Delaware Environmental Protection Act (7 Del. Code, Ch. 60) provides authority for this Division to establish water quality and quantity programs. Programs include the implementation of the Clean Water Act and the establishment of water quality standards and TMDLs for the State of Delaware. This Division provides:

◆ **Technical Assistance -**

- ◆ Surface and Ground water resource assessment
- ◆ Permit issuance for water wells, septic systems, and other on-site waste water treatment systems

- ◆ Grants and loans for construction of waste water systems
- ◆ Operation of EPA-certified laboratory for technical and scientific testing and analytical services
- ◆ Funding oversight for Agricultural NPS Loan Program (AgNPSLP)

◆ **Education Programs -**

- ◆ Public display booths for: Earth Expo., Coast Day, Delaware State Fair, etc.
- ◆ Pamphlets on the subject of ground water pollution

Conservation Districts - Delaware's local conservation districts were designated NPS Program management agencies with the Division of Soil and Water Conservation. A conservation district is established in each of the three counties. Under the Delaware Conservation Districts Law, the conservation districts are governmental subdivisions of the State with the authority to develop comprehensive plans for, and to carry out, preventive and control measures and works of improvement for the prevention of erosion, floodwater and sediment damages, and the conservation, development and utilization of land and water resources. For many, the Conservation Districts are the first point of contact for technical expertise in soil erosion, water management, fish and wildlife habitat management, forestry, organic waste disposal, water quality, and recreational development. The Districts provide:

◆ **Technical Assistance -**

- ◆ Funding for on-farm and urban-suburban conservation practices through the state Conservation Cost-Share Program
- ◆ Tax ditch planning and organization
- ◆ State Sediment Control and Stormwater Management Program
- ◆ Help for landowners applying conservation practices and management measures according to Total Resource Management Plans
- ◆ Applicant assistance with the Agricultural NPS Loan Program

◆ **Education Programs -**

- ◆ Delaware Association of Conservation Districts Annual Meeting
- ◆ Display at Delaware State Fair
- ◆ Tax Ditch Managers Educational Meetings
- ◆ Displays at Ag. Days at Dover Mall, Farm and Home Field Day, etc.
- ◆ Local Soil and Water Stewardship Week Sponsorship

MANAGEMENT AGENCIES FOR IMPLEMENTATION continued

USDA, Natural Resources Conservation Service -

The Natural Resources Conservation Service (NRCS) is the technical agency within the USDA. Agency staff provide detailed on-site evaluation, planning, design, installation, operations and maintenance assistance for resource management systems in rural and urbanizing areas. NRCS technical assistance is provided through the local conservation districts. NRCS can provide financial assistance for installing conservation practices through long-term contracting with District Cooperators. This financial assistance is available only within certain designated watersheds where water quality degradation or other natural resource concerns require special emphasis. NRCS provides:

◆ **Technical Assistance -**

- ◆ Resource Management System Planning
- ◆ Site evaluations
- ◆ Conservation practice design, layout and construction supervision
- ◆ Technical standards and specifications
- ◆ Report of accomplishments
- ◆ Report on compliance with standards and specifications

◆ **Education Programs -**

- ◆ Tours
- ◆ News Releases
- ◆ Talks/presentations
- ◆ One on one contact with landowners

USDA, Farm Services Agency (FSA) - The CFSA provides financial incentives to establish conservation practices for erosion control, water quality benefits and wildlife through the Agricultural Conservation Program (ACP). This cost share is available under an annual program or under long-term multi-year agreement. There is also a Water Quality Incentive Program (WQIP) under the ACP. This program provides incentive payments to producers to carry out water quality management practices. In addition, CFSA administers the Conservation Reserve Program (CRP) of the 1985 Food Security Act (FSA) which offers both commodity reduction, erosion control and water quality benefits for critically eroding areas by taking land out of production for 10 years, providing cost sharing for permanent cover and making yearly rental payments. The Rural Clean Water Program (RCWP) can provide cost share monies to demonstrate water quality benefits by the adoption of conservation practices. In Delaware, the Appoquinimink Watershed has been in this program since 1980. CFSA's primary responsibility for Delaware's Nonpoint Source Management Program is to provide administration of federal conservation cost share programs. FSA provides:

◆ **Technical Assistance -**

- ◆ Administers federal conservation cost sharing
- ◆ Acreage determinations
- ◆ Production determinations/crop appraisals

◆ **Education Programs -**

- ◆ Display at Delaware State Fair
- ◆ Display at University of Delaware Farm & Home Field Day
- ◆ Tours
- ◆ New releases/newsletters
- ◆ Talks/presentations

Delaware Department of Agriculture (DDA) - The DDA is responsible for the economic growth and stability of Delaware agriculture. Their primary responsibility for Delaware's Nonpoint Source Pollution Management Program is to assure the program is reasonable, cost effective and acceptable to Delaware's agricultural community. In addition, the DDA is responsible for specific programs such as the new Nutrient Management Program, pesticide certification and forestry. The Delaware Department of Agriculture will be an important component for nonpoint source technical assistance, education and promotional activities. The DDA is expected to be the delegated agency for the AFO/CAFO NPDES Program upon approval by the EPA. DDA provides:

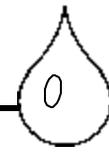
◆ **Technical Assistance -**

- ◆ Nutrient Management Certification & Licensing
- ◆ Marketing Assistance/International Trade
- ◆ Aglands Preservation Program
- ◆ Pesticide Compliance
- ◆ Poultry and Animal Health Program
- ◆ Forestry Programs

◆ **Education Programs -**

- ◆ Displays at Delaware State Fair
- ◆ Nutrient management training
- ◆ Pesticide Applicator Training
- ◆ Project Learning Tree
- ◆ Ag In the Classroom

Delaware Nutrient Management Commission (DNMC) - The DNMC consists of 15 voting members and 4 ex-officio members. The 15 voting members consist of the Director of the Division of Soil & Water Conservation of DNREC, 4 members appointed by the Governor, 3 members appointed by the President Pro Tempore of the Senate and 2 members appointed by the Senate Minority Leader, and 3 members appointed by the Speaker of the



MANAGEMENT AGENCIES FOR IMPLEMENTATION continued

House and 2 members appointed by the House Minority Leader. The DNMC will be responsible for the development, review, approval and enforcement of regulations governing the certification of individuals engaged in the business of land application of nutrients and the development of nutrient management plans. In addition, the Commission has been charged with establishing critical areas (in consultation with DNREC) for targeting of other voluntary or regulatory programs; establishing best management practices to reduce nutrient losses to the environment; developing an educational awareness program designed to voluntarily curtail the use of nutrients by persons not regulated by the law; and to consider the development of a transportation and alternative use incentive program for nutrients.

Delaware Cooperative Extension System (CES) -

The Delaware Cooperative Extension System includes both Delaware State University and the University of Delaware. The Cooperative Extension System is a public-funded, non-formal, educational system that links the education and research resources and activities of the U.S. Department of Agriculture, 74 land-grant universities and 3,150 county administrative units. As its stated mission, the cooperative extension system helps people improve their lives through an educational process that uses scientific knowledge focused on issues and needs. Extension's purpose is education; practical education for citizens to use in dealing with the critical issues that have an impact on their daily lives and the Nation's future. Nonpoint source pollution concerns appear in several categories of the extension work plan, most specifically in the water quality and sustainable agriculture plans. CES provides:

◆ **Technical Assistance -**

- ◆ Farm management programs
- ◆ Nutrient pest management consultation
- ◆ Irrigation management

◆ **Education Programs -**

- ◆ Seminars/forums/presentations
- ◆ On farm demonstration projects and tours
- ◆ Newsletters, fact sheets, etc.
- ◆ One on one consultations

State Technical Committee/Unified Watershed Assessment Team -Consists of representatives from federal, state, local, industry, and advocacy groups. This committee was established to provide guidance regarding conservation programs (i.e. state cost-share, PL-566, EQIP, and CREP) available to landowners in the state and to prioritize watershed restoration priorities. The following organizations are represented on the Team: Center for the Inland Bays; Delaware Assoc. of Conservation Districts; Delaware Council of Farm Organizations; Delaware Dept. of Agriculture; Delaware Dept. of Natural Resources & Environmental Control; Delaware Estuary Program; Delaware Farm Bureau; Delaware Forest Service; Delaware Forestry Association; Delaware Geological Survey; Delaware League of Women Voters; Delaware Nature Society; Delaware State Historic Preservation Office; Delaware Wildlands; Delmarva Poultry Industry, Inc.; DuPont Agricultural Products; Home Builders Assoc. of Delaware; Land Improvement Contractors Assoc.; Sierra Club; Southern States Cooperative; The Nature Conservancy; University of Delaware; U.S. Army Corps of Engineers; U.S. Geological Survey; U.S. Environmental Protection Agency; USDA, Farm Services Agency; USDA, Forest Service, USDA Natural Resources Conservation Service; and USDI, Fish & Wildlife Service

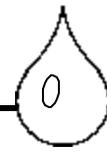
BEST MANAGEMENT PRACTICES AND/OR BEST AVAILABLE TECHNOLOGY

- ◆ USDA, Natural Resources Conservation Service Field Office Technical Guide
- ◆ Guidance Specifying Management Measures for Sources of Nonpoint Pollution In Coastal Waters (6217), January, 1993
- ◆ Delaware Guidelines for Manure Management, August, 1997
- ◆ University of Delaware, Nutrient Management Handbook for Delaware, Cooperative Bulletin No. 59, April, 1996

STATE AUTHORITY (STATUTES AND/OR REGULATIONS)

- 7 **DeL.C.**, Chapter 60 - Environmental Control Act
- 3 **DeL.C.**, Chapter 22 - Nutrient Management Act

- 3 **DeL.C.**, Chapter 12 - Delaware Pesticide Act



FEDERAL REGULATIONS

- ◆ **40 CFR**, Section 122.23 and 40 CFR Part 122, Appendix B (concentrated feeding operations)
- ◆ **Clean Water Act**, Section 319, Nonpoint Source Pollution Control
- ◆ **Coastal Zone Management Act**, Section 6217, Coastal Nonpoint Pollution Control
- ◆ Clean Water Act, Section 303(d), Total Maximum Daily Loads (TMDLs)
- ◆ **Federal Insecticide Fungicide and Rodenticide Act (FIFRA)**, Title 7 USC
- ◆ **Food Security Act (FSA)** of 1985 as Amended by Food, Agriculture, Conservation and Trade Act (FACTA-1990-PL-101-624) of 1990
- ◆ **Section 106 of the National Preservation Act**, 36 CFR, Part 800 (16 USC, Subsection 470-F)

Milestones for Implementation:

WORK ACTIVITIES	LEAD IMPLEMENTATION AND COOPERATING AGENCIES	TARGET DATE FOR COMPLETION	FUNDING SOURCES
<p>Establish the Delaware Nutrient Management Commission (DNMC) consisting of 15 voting members and 4 ex-officio members. The voting members shall consist of the Director of the Division of Soil & Water Conservation and 14 appointed members: 7 full-time farmers, 1 commercial/agricultural nutrient applicator, 1 member of the commercial nursery industry, 1 golf course/lawn care industry representative, 2 members from one or more community based environmental advocacy groups, 1 nutrient consultant, and 1 public citizen. The four ex-officio members of the DNMC will include the Secretary of the Department of Agriculture, the Secretary of the Department of Natural Resources and Environmental Control, the Secretary of the Department of Health and Social Services and the Nutrient Management Program Administrator</p> <p>(CWAP, N4)</p>	<p>Governor Carper, Delaware Senate and the Delaware House of Representatives</p>	<p>Fall, 1999</p>	<p>State General Funds</p>
<p>Hire DDA Nutrient Management Program Administrator</p>	<p>DNMC and DDA</p>	<p>August 31, 1999</p>	<p>State General Funds</p>
<p>Develop and adopt regulations to implement the State's Nutrient Management Law</p> <p>(CWAP, N4)</p>	<p>DNMC and DDA</p>	<p>July 1, 2000</p>	<p>State General Funds and private/public partnerships</p>

Milestones for Implementation:

WORK ACTIVITIES	LEAD IMPLEMENTATION AND COOPERATING AGENCIES	TARGET DATE FOR COMPLETION	FUNDING SOURCES
<p>Certify all persons that are regulated under the State's Nutrient Management Law</p>	<p>DDA and DNMC</p>	<p>January 1, 2004</p>	<p>State General Funds</p>
<p>Each commercial processor operating in the State will file a plan with the DNMC that identifies how each processor does the following: (1) assist in providing technical assistance to growers with whom it contracts on the proper management and storage of waste using approved BMPs; (2) assist in providing, continuing education programs on proper waste management; (3) conduct or fund research and demonstration programs that will contribute to improved waste management practices; (4) formulate and implement nutrient reduction strategies that effectively minimize the addition of nutrients to the environment; and (5) report annually to the DNMC on the activities it has undertaken relative to its plan.</p>	<p>DNMC, DDA and commercial processors</p>	<p>July 1, 2000</p>	<p>Private Industry Funds and State General Funds</p>
<p>Develop a list of entities and industries within the State that may be required to become certified or required to develop nutrient management plans and provide that list to the DNMC. The DNMC will randomly choose those persons that will be required to provide a nutrient management plan to the Commission in the years 2003 (20%), 2004 (20%), 2005 (20%), 2006 (20%), and 2007 (20%). Fully implement the State Nutrient Management Program by the year 2007</p>	<p>DDA w/ DNMC</p>	<p>January 1, 2000 -- Completed by 2007</p>	<p>State General Funds</p>

Milestones for Implementation:

WORK ACTIVITIES	LEAD IMPLEMENTATION AND COOPERATING AGENCIES	TARGET DATE FOR COMPLETION	FUNDING SOURCES
<p>The DNMC will work jointly with the Secretary of DNREC to delineate and identify all critical areas for resources should be directed and where incentives should be provided.</p>	<p>DNMC w/ DNREC</p>	<p>Annually</p>	<p>State General Funds</p>
<p>Prepare and submit a State NPDES Program for Confined Animal Feeding Operations in accordance with 40 CFR Part 123.21 to the Administrator of the EPA. Upon program approval, the State will give first priority to issuing statewide or watershed general permits. With the consent of the DNMC, the DDA may require individual NPDES permits for exceptionally large operations, new operations, or operations with significant environmental concerns.</p>	<p>DDA w/ DNMC</p>	<p>January 1, 2000</p>	<p>State General Funds</p>
<p>Implement the State's NPDES Program which will require each person covered by the regulations to develop a nutrient management plan that meets the requirements of the State's Nutrient Management Regulations developed by the DNMC</p>	<p>DDA w/ DNMC</p>	<p>2000</p>	<p>State General Funds</p>
<p>Prepare and submit an annual report of the activities and the environmental results that have occurred for the Governor and the General Assembly.</p>	<p>DDA w/ DNMC</p>	<p>Due by April 1 of each year</p>	<p>State General Funds</p>

Milestones for Implementation:

WORK ACTIVITIES	LEAD IMPLEMENTATION AND COOPERATING AGENCIES	TARGET DATE FOR COMPLETION	FUNDING SOURCES
<p>Provide (8) certified conservation planners to develop and implement on-farm conservation plans in priority watersheds (Delaware Bay, Chesapeake Bay and Inland BaysBasins). Tracking of efforts will be at the 14 digit HUC. The goals of the 8 conservation planners is to implement nutrient management plans and BMPs as follows:</p> <ul style="list-style-type: none"> (2) dairy manure storage systems (100) poultry manure storage structures (100) poultry manure composters (48,000 ac.) nutrient management plans (12,000 ac.) cover crops <p>Planners will define % compliance of each farm based on a rating system for BMP implementation and nutrient management plan implementation. Nutrient reductions will be tracked using the PSNT test and the number of tons of manure sent to alternative uses. (N3)</p>	<p>NPS Program, Conservation Districts and NRCS</p>	<p>ON-GOING 1999-2004</p>	<p>NPS 319, General Funds, and many other sources</p>
<p>Provide science-based training for: nutrient management plan development and implementation; composting mortality; and demonstrating new technology for litter utilization. (N2)</p>	<p>University of Delaware, CES, NPS Program, Conservation Districts and NRCS</p>	<p>1999-2004</p>	<p>NPS 319 and other sources</p>

Milestones for Implementation:

WORK ACTIVITIES	LEAD IMPLEMENTATION AND COOPERATING AGENCIES	TARGET DATE FOR COMPLETION	FUNDING SOURCES
Refine assessment methods for defining "link" between BMP effectiveness and water quality improvement. (CWAP)	DNREC, NPS Program, DCMP, and University of Delaware	2004	NPS 319, 6217, 604(b), General Funds, Source Water Protection Funds
Implement new initiatives such as the Conservation Reserve Enhancement Program to supplement achievement of water quality goals. (CWAP,N6)	DNREC, NRCS, FSA, Conservation Districts, Farm Groups and Private Sector	1999-2002	USDA, NPS 319, General Funds
Participate and support regional and inter-state initiatives that result in realistic or projected water quality improvements.	DNREC, NPS Program, USDA, DDA, University of Delaware	ON-GOING (1999-2004)	General Funds, NPS 319 and other
Implement and annually track 6217 agricultural management measures for erosion control, CAFOs, nutrient management, pesticide management, and irrigation water management in order to improve Delaware's ability to measure success.	DCMP, NPS and other federal, state, and local management agencies	ON-GOING REPORT ANNUALLY (1999-2004)	NPS 319, 6217, General Funds, and other
Facilitate development and implementation of enhanced funding mechanisms for any and all agricultural technology initiatives the State deems appropriate to improve water quality (e.g.,using State Revolving Funds (SRF) to supplement funding of feed additives to reduce nutrients, precision ag. equipment, and other science-based initiatives) (CWAP)	NPS Program, Division of Water Resources, Conservation Districts, and USDA	ON-GOING (1999-2004)	NPS 319, SRF Funds, and other sources

Aquaculture

EPA Category Number 17



NPS
DELAWARE

GOAL

The goal of this category is to cost effectively manage aquaculture activities in order to minimize adverse environmental impacts. This program will emphasize 100% implementation of BMPs and BATs through the issuance of National Pollution Discharge Elimination System (NPDES) general permits. *NOTE: Because there are*

currently no aquaculture facilities in the State, this NPS subcategory is a low priority issue. Since the last revision to the plan in 1995, there has been no interest in further development of this industry. This subcategory section was written for the 1995 revision and remains as part of the Management Plan for background information.

INTRODUCTION

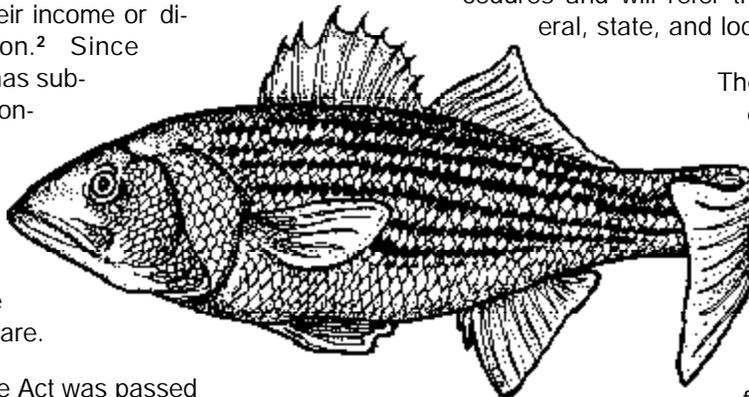
"Aquaculture" is defined as the cultivation, production or marketing of any fish, aquatic invertebrate or aquatic plant that is spawned, produced or marketed as a cultivated crop in state waters.¹

Between 1989 and 1995, over 800 citizens contacted state government and educational institutions requesting information on the potential of aquacultural production. This overwhelming response to aquaculture was partly attributable to reports of increased commercial development nationwide and governmental involvement during the last several years. Many people view aquacultural production as a means of supplementing their income or diversifying their farm operation.² Since 1995, interest in aquaculture has subsided to the point of being non-existent in Delaware. The Nonpoint Source Program chose to leave this subcategory in the Management Plan in the event that aquaculture resurfaces as a viable industry in the State of Delaware.

The Delaware Aquaculture Act was passed by the 135th General Assembly in June 1990 and was signed by Governor Castle the following month. This Law designated aquaculture as an agricultural activity and named the Department of Agriculture as the lead agency for promoting and coordinating aquaculture in Delaware. The legislation also authorized creation of the Aquaculture Advisory Council.³

Natural areas that have potential in supporting aquaculture activity in Delaware can be subdivided into the subtidal zone (subaqueous bottom) and water column in coastal and nearshore areas, tidal waters, and upland locations that often include fresh and occasionally brackish waters. Examples include the Delaware Bay, tidal creeks, Inland Bays, or coastal lagoons (Rehoboth Bay, Indian River Bay and Little Assawoman Bay), and a variety of ponds, drainage ditches, and other marginal water-retaining areas on farms throughout the state.⁴

The Department of Natural Resources and Environmental Control (DNREC) has primary responsibility for the allocation and management of these public resources. The Development Advisory Service (DAS), comprising representatives from the DNREC, Division of Public Health, Division of Historic and Cultural Affairs, Department of Agriculture, Delaware Development Office, and other agencies, was established to provide information on federal, local, and state environmental permit requirements. Depending on the aquaculture project proposed, the DAS will advise applicants of all permit requirements, standards, and procedures and will refer them to the appropriate federal, state, and local agencies.



The nature and extent of the environmental impacts of aquaculture depend largely on the location (water source and receiving body) and type of farms, as well as the production technologies utilized.⁵ Virtually every type of production system for fish and shellfish requires

some containment device such as a pond, tank, raceway, tray, cage, or net. Production systems generally are classified as open, flow-through, or closed, based on the degree of water interchange between the system and the natural environment; and extensive or intensive based on the density or concentration at which fish or other species are grown and the extent to which environmental factors are externally controlled or managed. In an extensive system, such as crawfish stocked in a pond or drainage ditch, management is minimal and animals are maintained at low densities. Much or all of the food may come from natural sources with only supplemental feeding by the culturist. Intensive systems represent the other extreme, where animals are concentrated at very high densities and the culturist must supply all the organism's food requirements through nutritionally complete feeds. Because of high stocking densities in these systems, water quality becomes



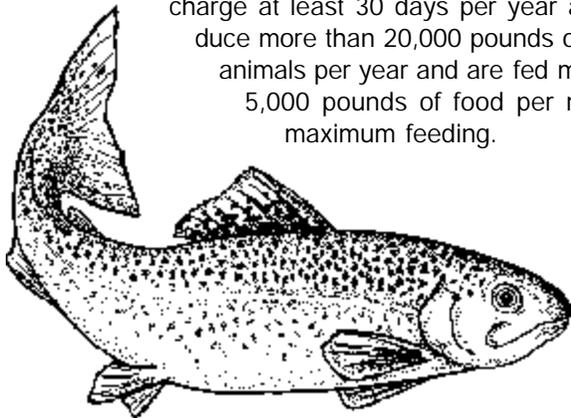
INTRODUCTION continued

critical and must be maintained either by large volumes of water flow (such as in open or flow-through systems) or by purifying and reusing the water (closed or recirculating system).⁶

It is often difficult to determine the impact of aquaculture on the environment, as the observed consequences are in many cases the cumulative effect of several factors that disturb its natural state.⁷ Available data seem to indicate that the pollutive effects of aquaculture are comparatively small and highly localized.⁸ The effects of discharge of aquaculture effluents in receiving waters are mainly the increase of suspended solids and nutrients and the fall in dissolved oxygen content.⁹ Reduced concentrations of dissolved oxygen may contribute to increased concentrations of ammonia, nitrate, and phosphate in the water column. Algal blooms, especially of toxic species produced by high levels of nutrients, can cause environmental hazards including fish kills.¹⁰ These blooms also diminish the aesthetically pleasing attributes associated with living near fresh water.

Aquaculture operations are considered point sources as defined by federal regulations 40 CFR 122.24 "Concentrated Aquatic Animal Production Facilities" and 40 CFR 122.25 "Aquaculture Projects". According to the U.S. Environmental Protection Agency Regulations, a hatchery, fish farm, or other aquaculture facility is subject to a NPDES Permit if it contains, grows, or holds aquatic animals in either of the following categories:

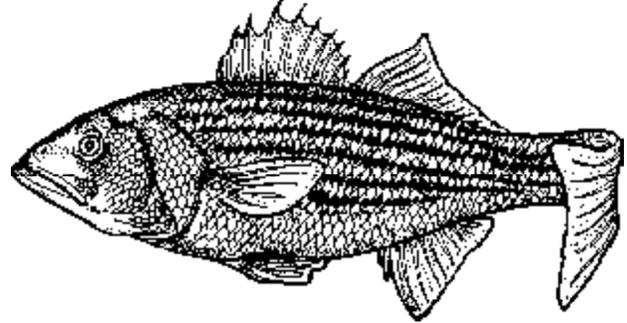
1. **Cold-water fish species**, such as salmon or trout, in ponds, raceways, or other similar structures that discharge at least 30 days per year and produce more than 20,000 pounds of aquatic animals per year and are fed more than 5,000 pounds of food per month of maximum feeding.



2. **Warm-water fish species**, such as catfish, minnows, striped bass, and other warm-water animals, in ponds, raceways, or other similar structures that discharge at least 30

days per year and produce more than 100,000 pounds of aquatic animals per year¹

¹*Federal Register (40 CFR, Chapter 1, Section 122.24).*



All NPDES dischargers must employ all reasonable and/or practicable measures to limit the pollutants in the water being discharged, including the employment of best management practices (BMPs), treatment or pollution control technology. If such "technology-based effluent limitations" fail to achieve any applicable water quality goal, the dischargers would be required to employ additional measures or controls to meet those goals (including no discharge). Aquaculture facilities that discharge into water bodies that have been designated as having exceptional recreational or ecological significance (ERES) such as Rehoboth or Indian River Bays, will have strict effluent limits placed on their discharge. Alternatives such as spray irrigation would be encouraged in this type of situation.

The State of Delaware has developed final draft NPDES general permit program regulations for the management and discharge of pollutants associated with the operation of aquaculture or aquatic animal facilities. These regulations have not been brought before the general public or taken to public hearing, and as such, they remain draft regulations. The DNREC plans to incorporate these regulations into the overall revisions to the Regulations Governing the Control of Water Pollution. It is possible that these regulations will go to hearing with a draft in the spring of 1999. Promulgation of the revised Water Pollution Regulations is likely to occur by the end of 1999. The intent of the general permit is to:

- a. Tailor regulatory requirements to categories of wastes;
- b. Streamline the permitting process;
- c. Clearly outline the "rules of the road", i.e. outline those performance standards, management measures and operating requirements which, when implemented, will ef-



INTRODUCTION continued

fectively and economically minimize the discharge of pollutants to surface and ground waters; and

d. Provide permit coverage/protection in case of complaints, inquiries or civil suits.

All dischargers of pollutants must be covered by a permit. Therefore, those aquaculturists who operate facilities that discharge to "waters of the State" must secure a permit or demonstrate that their discharge is such that it would not constitute a discharge of pollutants (the uneaten food, fish excreta and chemicals used for growth

enhancement or disease inhibition are considered "pollutants"). Those producing more than the threshold amounts specified under federal regulations must obtain a NPDES permit. To obtain a permit, a prospective aquaculturist who operates a facility that has a discharge may either apply for a permit (submit an application) or seek permit coverage under the general permit program regulations (submit a "Notice of Intent") to be covered under the general permit program regulations, and thereby agree to abide by those regulations.

MANAGEMENT AGENCIES FOR IMPLEMENTATION:

Delaware Department of Agriculture (DDA) - The DDA is responsible for the economic growth and stability of Delaware agriculture. DDA is the lead state agency for aquaculture development and is responsible for coordinating aquacultural activities in the State of Delaware. Their primary responsibility for Delaware's Nonpoint Source Pollution Management Program is to ensure the program is reasonable, cost effective and acceptable to Delaware's aquacultural community. The Delaware Department of Agriculture will be an important component for NPSP education and promotional activities.

- ◆ **Technical Assistance** - conducts commodity marketing programs. Oversees competitive grant program for alternative agriculture.
- ◆ **Education Programs** - sponsors and participates in aquaculture forums.

The Department of Natural Resources and Environmental Control (DNREC) - The DNREC manages and protects state natural resources through regulations and permits for surface and groundwater use, finfish propagation, shellfish leases, wetlands, wastewater, and solid waste.

- ◆ **Technical Assistance** - provides pond consultations for problems associated with fish populations and aquatic weeds (Div. of Fish and Wildlife). Provide environmental permit coordination through the Development Advisory Service (DAS). DAS is comprised of representatives of DNREC Division of Public Health, the Division of Historic and Cultural Affairs, the Department of Agriculture, and the Delaware Development Office, as well as other state agencies. DAS can advise potential

aquaculture applicants of all permit requirements, standards and procedures, as well as refer parties to the appropriate federal, state, and local agencies.

Delaware State University (DSU), Department of Agriculture and Natural Resources - The Department of Agriculture and Natural Resources conducts applied research in aquaculture and provides formal training (B.S. degree) in Natural Resources - Fisheries Management. Research areas include development of appropriate crawfish culture techniques for Delaware and the region as well as work with striped bass and other finfish species. Facilities include research/demonstration ponds and laboratory space.

- ◆ **Technical Assistance** - conducts locally specific aquaculture research. Beginning in spring of 1994 will have a Cooperative Extension, Aquaculture Specialist available to provide on-site technical assistance. Cooperates in preparing technical information bulletins.
- ◆ **Education Programs** - B.S. degree program as described above. Cooperates with other agencies in information workshops, etc.

University of Delaware Sea Grant Marine Advisory Service - The University of Delaware Sea Grant Marine Advisory Service (UDSGMAS) conducts educational programs and applied research in aquaculture and has established a resource center with information and other material on all aspects of the field. Other programs include business management, seafood marketing, and consumer education.

- ◆ **Technical Assistance** - operates the Delaware Aquaculture Resource Center which offers the following types of materials:



MANAGEMENT AGENCIES FOR IMPLEMENTATION: continued

- ◆ contacts for technical information and assistance in Delaware, and other neighboring states;
- ◆ extension publications, videos, and materials and/or services available from other state, regional and national programs;
- ◆ magazines, trade publications, and other periodicals;
- ◆ laboratory and technical manuals, and selected reference books;
- ◆ aquaculture equipment and supply catalogs; and
- ◆ newsletters and other information on local, regional, national, and international aquaculture associations.

The Marine Studies library carries numerous scientific journals, proceedings, hard cover text and reference books, and has CD ROM search capability of the AGRICOLA - **AGRICultural OnLine Access** and ASFA - **Aquatic Sciences and Fisheries Abstracts** database.

- ◆ **Education Programs** - organizes workshops and seminars on a variety of subject areas including business planning, site selection, water quality, production technologies, economics and marketing.

USDA, Natural Resources Conservation Service (NRCS) - The NRCS implements soil and water conservation programs in cooperation with landowners and local conservation districts.

- ◆ **Technical Assistance** - provide on-site evaluation for ponds, including soil borings, and will assist with design and lay-out for aquaculture production ponds. Conservation Districts conduct programs which may provide cost-sharing for ponds, irrigation ditches, and water-control structures.

BEST MANAGEMENT PRACTICES AND/OR BEST AVAILABLE TECHNOLOGY: _____

- ◆ USDA, Natural Resources Conservation Service Field Technical Guide, Commercial Fishponds #397 and Ponds #378.

- ◆ Proposed Best Management Practices for Aquaculture, Delaware Department of Agriculture

STATE AUTHORITY (STATUTES AND/OR REGULATIONS): _____

- ◆ **3 Del.C. Chapter 4** - Delaware Aquaculture Act
- ◆ **7 Del.C. Chapter 41** - Drainage of Lands, Tax Ditches
- ◆ **7 Del.C. Chapter 60, Section 6010** - Environmental Control
- ◆ **7 Del.C. Chapter 66** - Wetlands Act

- ◆ **7 Del.C. Chapter 45, Section 13** - Enforcement of Game and Fish Laws
- ◆ **7 Del.C. Chapter 72** - Subaqueous Lands
- ◆ **7 Del.C. Chapter 9** - Finfishing in Tidal Waters
- ◆ **16 Del.C., Section 122** - State Board of Health

FEDERAL REGULATIONS: _____

- ◆ **40 CFR**, Chapter 1, Section 122.24 and 122.25 (Clean Water Act)
- ◆ **33 USC 403** - Rivers and Harbors Act (Dredge and Fill)

- ◆ **33 USC 1344** - Section 404 - Clean Water Act (Dredge and Fill)
- ◆ **Section 106** of the National Historic Preservation Act. 36 CFR, Part 800 (16 USC, Subsection 470-F)

Milestones for Implementation:

WORK ACTIVITIES	LEAD IMPLEMENTATION AND COOPERATING AGENCIES	TARGET DATE FOR COMPLETION	FUNDING SOURCES
Finalize NPDES General Permit Program Regulations	DNREC w/DDA	1999-2000	State General Funds
Continue operation and expansion of Delaware Aquaculture Resource Center	UDSGMAS w/DDA	On-Going	Sea Grant and DDA
Continue and simplify permit facilitation	DDA w/ DNREC	On-going	State General Funds
Amend the Delaware Aquaculture Act to require registration of aquaculture facilities	DDA	1999-2000	State General Funds
Develop Aquacultural Regulations	DDA w/DNREC	2000	State General Funds
Develop Regulatory Compliance Plan - Hire compliance officer(s)	DDA, w/DNREC	2000-2001	State General Funds
Expand and improve educational materials and programs	DDA, Delaware State University and USGSMAS	On-going	State General Funds and NPS 319



NOTES

1. **Delaware Aquaculture Task Force.** July 1990. Delaware Aquaculture Task Force Final Report.
2. **Ibid.**
3. **Ibid.**
4. **University of Delaware Sea Grant College Program.** August 1991. Delaware Aquaculture Information Series Newsletter.
5. **Pillay, T. V. R.,** *Aquaculture and the Environment*, Halsted Press, New York, 1992, p. 3.
6. **Univ. of Delaware Sea Grant College Program.** May 1991. Delaware Aquaculture Information Series Newsletter.
7. **Pillay, T. V. R.,** *Aquaculture and the Environment*, Halsted Press, New York, 1992, p. 21.
8. **Ibid.**
9. **Ibid.,** p. 14.
10. **Ibid.**

Silviculture

EPA Category Number 20



NPS
DELAWARE

GOAL

The goal for silvicultural activities in Delaware is to enhance and protect surface and ground water while maintaining: 1) a healthy forest resource base; and 2) a viable forest-based industry. To achieve this goal, the program will emphasize:

- ◆ 95% compliance for implementing best management practices (BMPs) for forest management, harvesting and road construction activities;
- ◆ technical assistance to forest landowners for all

INTRODUCTION

Forest land accounts for approximately thirty percent, 360,000 acres, of Delaware's land area (USDA Forest Service, 1987), and these forests are distributed among numerous land ownership groups. Approximately 30,000 acres are publicly-owned, another 30,000 acres are managed by forest-based industries, while the remaining 300,000 acres are owned by private citizens and organizations (USDA Forest Service, 1996). Statewide, there are over 50,000 acres of privately-owned forest land certified as tree farms under the American Tree Farm System. These tree farmers are recognized for their achievement and maintenance of excellence in forest management. The Delaware Department of Agriculture (DDA) Forest Service manages over 9,000 acres of the state's publicly-owned forest lands for various multiple use objectives, including wood production.

As evidenced above, the largest portion of Delaware's forest landowners are private individuals and farmers. The long-term investments required for forest management activities range from approximately 40 to 90 years. For this reason and others, land use pressures are great on Delaware's forests. Therefore,

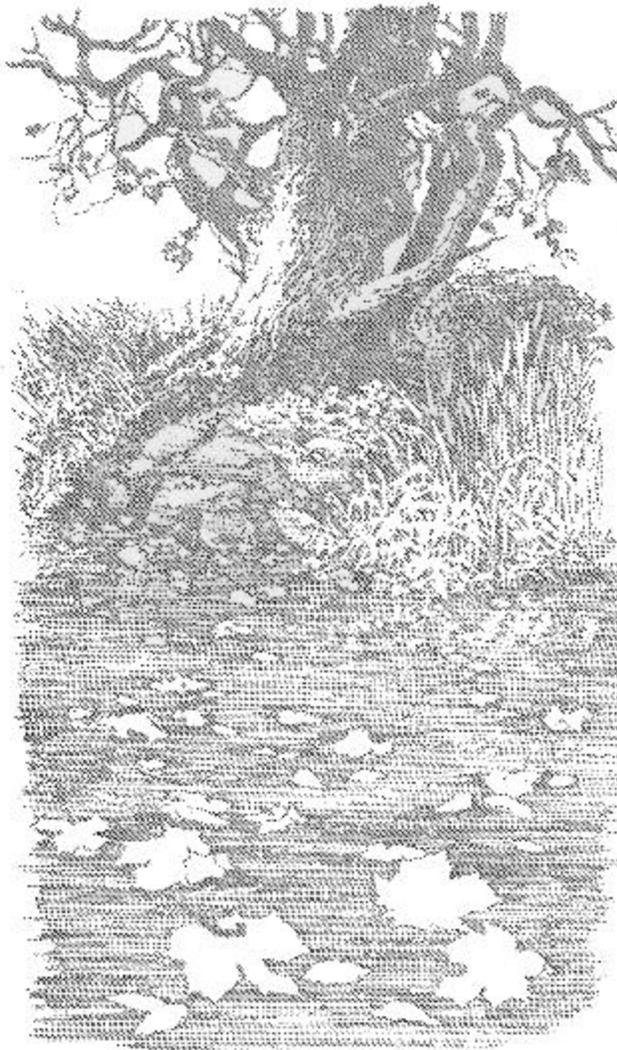
forest management activities;

- ◆ forest regeneration and management plan development to enhance water quality benefits;
- ◆ public and private partnerships;
- ◆ more intensive integration of silvicultural considerations into total agricultural management planning; and
- ◆ maintaining a wide range of incentives to landowners to encourage proper forest management

maintaining various types of incentives are needed to off-set these pressures and sustain the forest resource base. Existing incentive programs for forest landowners include the following:

◆ **Federal Income Tax Reforestation Tax Credit and Amortization** - Reforesting a harvested area or establishing a new stand of trees is an important investment for the future. The federal tax law recognizes this investment and allows for a tax credit and amortization schedule that is one of the best tax advantages for forest landowners. Landowners can claim a 10 percent investment tax credit for the first \$10,000 expended on reforestation. In addition, owners can amortize (deduct) all of the reforestation costs (up to \$10,000), minus half of the tax credit, over the next eight (8) tax years. The annual forestation amortization is a deduction to adjusted gross income and can be claimed on the line for adjustments on Form 1040 rather than on Schedule A under miscellaneous deductions. Landowners who receive cost share payments for forestation or reforestation may include the payment as normal income and then claim the tax credit and amortization.

◆ **Delaware's Commercial Forest Plantation Act** - The Commercial Forest Plantation Act provides for a 30 year property tax exemption for qualifying woodland acres.





INTRODUCTION continued

Qualifying woodlands are at least 10 acres in size, have a professionally-prepared forest management plan, and are actively managed for production of forest-based products. Applicants file an application with the DDA Forest Service. The DDA Forest Service foresters inspect the woodland to determine qualification and once approved by the State Forester, the local county assessment office is notified of the determination.

◆ **Delaware's Farmland Assessment Act** - The Farmland Assessment Act provides the option to landowners who actively farm qualifying acreage the opportunity to have their property tax assessment based on the soil productivity and current farm market conditions. This is not an exemption but a variable tax assessment. To qualify, farms must contain a minimum of 10 acres and produce at least \$1,000 of annual gross farm income unless financial evidence is produced to show annual farm income derived from lesser acreage. Qualifying woodland acreages may also be enrolled in this program. Farmland Assessment applications are available from the Delaware Department of Agriculture and county assessment offices and must be completed and filed by the last day of January to qualify for that tax year. Each county assessment office requires that woodlands enrolled in the program are to be inspected and certified as qualifying by the DDA Forest Service.

◆ **Stewardship Incentives Program** - In cooperation with the USDA Forest Service and Farm Services Agency (FSA), the DDA Forest Service administers the Stewardship Incentives Program (SIP). SIP is a cost-share program offered to non-industrial private owners who own or are willing to establish five acres or more of woodland within Delaware. The program is designed to provide owners with a long-term forest stewardship plan for all contiguous acres owned and to cover all conservation practices needed on these acres, not just woodland management needs. The foresters preparing these plans work cooperatively with other natural resource professionals and conservationists in the development of these plans. The program cost-share rates vary from 65% to 75% of practices' implementation costs, within established maximum limits. The maximum annual cost-share payment limitation is \$10,000 per federal fiscal year. Practices include: Reforestation and Afforestation; Woodland and Agroforest Improvement; Windbreak and Hedgerow Establishment; Soil and Water Conservation and Protection, such as Critical Area Planting and Fencing; Riparian and Wetland Establishment and Enhancement, such as tree and shrub planting and shore stabilization; Fisheries Habitat Establishment and Enhancement; Wildlife Habitat Establishment and Enhancement; and Forest Recreation

Establishment and Enhancement, such as trail & walkway construction. Owners interested in cost-sharing under SIP can contact the DDA Forest Service and/or their local FSA office to sign-up.

◆ **Forestry Incentives Program (FIP)** - The 1996 Farm Bill extended the Forestry Incentives Program (FIP), which was originally authorized in 1978 to cost-share up to 65 percent of the costs of tree planting, timber stand improvements, and related practices on nonindustrial private forest lands. The forest maintenance and reforestation activities cost shared through FIP provide numerous natural resource benefits, including reduced wind and soil erosion and enhanced water quality and wildlife habitat as well as helping to assure a reliable future supply of timber. FIP is administered by the U.S. Department of Agriculture's (USDA) Natural Resources Conservation Service (NRCS) with technical assistance provided by the state forestry agencies. Cost-share money is available with a limit of \$10,000 per person per year with the stipulation that no more than 65 percent of the cost may be paid. To be eligible for cost share assistance under FIP, a landowner must own between 10 and 1,000 acres of eligible forest land (a waiver is available for up to 5,000 acres) and be a private landowner of a nonindustrial forest. Individuals, groups, associations, or corporations whose stocks are not publicly traded may be eligible for FIP, provided they are not primarily engaged in the business of manufacturing forest products or providing public utility services. Available practices under FIP are: tree planting; improving a stand of forest trees; and site preparation for natural regeneration. The State forestry agency provides technical advice in developing a forest management plan and helps find approved vendors, if needed, for completing the FIP work. In addition, the State forestry agency must certify that the project has been completed satisfactorily before cost-share payments can be made.

With over 350,000 acres of forest lands, forestry remains an important factor to Delaware's environment and economy. Healthy forests provide a variety of benefits to all Delawareans. Forests not only produce the many wood products which we use every day, but healthy forests also provide wildlife habitat, recreational opportunities, cleaner air, and cleaner water. To sustain healthy forests, professional forestry assistance is required. The DDA Forest Service, in cooperation with other professional foresters and natural resource professionals, works to help private landowners better manage their forests. For example, in addition to the publicly-owned lands, approximately 60,000 acres of forest land have received professional forestry assistance, including the 50,000 acres of tree farms. This assistance typi-



INTRODUCTION continued

cally includes developing a forest management plan to help owners better achieve their goals for their forested property, as well as reforestation, timber stand improvement, and timber harvesting assistance.

Even though Delaware is quite small, silvicultural techniques vary across the State. In the Coastal Plain region of southern Delaware, many of the forests are managed for loblolly pine, while in the upper Coastal Plain and Piedmont areas of northern Delaware, the typical timber species are yellow-poplar and oak. Typical silvicultural techniques in southern Delaware include clearcutting, herbicide applications, and mechanical site preparation, while selection harvesting and timber stand improvement activities are more common in the hardwood forests of northern Delaware.

Since southern Delaware contains most of the state's forested lands and is the least populated area, most of the traditional forestry activities occur in Sussex County and southern Kent County. Forest management activities decrease as one moves northward, with the least activity occurring in New Castle County, the state's most densely populated county. Most timber harvest activities in New Castle are associated with land clearing for development.

The DDA Forest Service began to extensively track forest management activities in 1995, in conjunction with its Erosion and Sedimentation (E&S) Program for forestry practices. The statewide timber harvest for 1995 through 1998 averaged 4,500 acres annually with an additional 400 acres of thinnings per year. The average harvest size is 45 acres which equates to approximately 100 harvesting operations annually. Approximately ten percent of these harvests were associated with development activities. From 1993 through 1997, approximately 2,200 acres were reforested annually in Delaware. This total does not include the acreage, particularly hardwood forests, which reforested naturally through direct seeding or sprouting. Natural regeneration data is not completely available, but the DDA Forest Service estimates that on average, approximately 1,000 acres satisfactorily regenerate naturally each year. Thus, based on the total harvested acreage, including those harvested areas converted to other land uses, and the annual reforestation totals, approximately 75 percent of Delaware's forests are successfully reforested for timber management purposes (regenerated into either loblolly pine, red oak, white oak, or yellow-poplar or a combination of these species). While this is an excellent achievement, the DDA Forest Service strives to properly reforest an even greater percentage of forest lands through technical assistance and landowner education.

Over the last five years, the DDA Forest Service also achieved several of the milestones designated in Delaware's 1995 NPS Management Plan in order to improve the health of Delaware's forests and minimize the impact of forest management activities on water quality. On July 11, 1994, the erosion and sedimentation control responsibility for silvicultural activities was transferred to the DDA Forest Service from DNREC (Delaware Code, Title 7, Chapter 29, Subchapter VI). Formal rules and regulations for this legislation were adopted by the DDA Forest Service on July 1, 1996. Following the adoption of these rules and regulations, the DDA Forest Service sponsored workshops for landowners and loggers to explain this new program. Second, the DDA Forest Service published a comprehensive forestry Best Management Practice (BMP) Manual in September, 1995, followed by a BMP field guide in August, 1996.

Additionally, the DDA Forest Service, in cooperation with the forest industry, developed logger and landowner BMP videos in 1993. Furthermore, a BMP tracking system was developed in 1996 in conjunction with the rules and regulations for the silvicultural erosion and sediment program. Loggers and landowners notify the DDA Forest Service prior to initiating forest management activities, such as forest harvests, so that the Forest Service personnel can monitor these activities to ensure water quality protection. The DDA Forest Service has a full-time general funded position, established in July, 1996, to oversee the forestry erosion and sediment program, including site inspections, BMP tracking, and logger and landowner educational workshops. Beginning in 1998, the BMP Forester will coordinate Delaware's Master Logger Committee, comprised of loggers, landowners, and forest industry representatives. This committee will oversee a Master Logger program designed to help better educate loggers, provide master logger certification, and improve the public's perception and knowledge of forest management. The DDA Forest Service will coordinate this program in conjunction with a similar program in Maryland to provide a regional approach to this task since many of the same loggers work in both states on the Delmarva Peninsula.

In May, 1996, the U.S. Army Corps of Engineers issued a general permit for wildlife management practices within wetlands on privately-owned woodlands which are included within forest stewardship plans. Also, in 1997, the DDA Forest Service purchased a table-top model to demonstrate the importance of forestry BMPs to water quality. The activities which are needed to expand the on-going efforts of the DDA Forest Service to maximize water quality benefits from management of Delaware's forests are enumerated in the Milestone Tables which follow on page 20-7.



MANAGEMENT AGENCIES FOR IMPLEMENTATION: _____

Delaware Department of Agriculture (DDA) Forest Service - The DDA Forest Service's mission is *to conserve, protect and enhance the forest and its resources for the public through education, management, demonstration, promotion, and providing technical assistance in a timely and efficient manner.* To achieve this mission, the DDA Forest Service offers several program, at no cost, to landowners, homeowners, loggers, and municipalities. Each program's purpose is specific and independent, but they compliment each other and reflect the overall purpose of conserving, protecting, enhancing, and perpetuating Delaware's most important renewable resources -- trees.

Each of these programs help to maintain and improve the forest resource, and thus help to maintain water quality. These program are:

- ◆ biomass utilization
- ◆ forest health
- ◆ forest landowner assistance
- ◆ natural resource education
- ◆ state forest management
- ◆ urban and community forestry
- ◆ watershed protection, and
- ◆ wildland fire prevention and suppression

Technical Assistance Programs of Delaware Forest Service -

- ◆ The DDA Forest Service's **Biomass Utilization Program** strives to ensure that all wood and other biomass resources are

properly utilized and/or recycled. Staff work with the forest based industry to help achieve this goal. As an example, the DDA Forest Service maintains a directory for Delaware's primary and secondary wood industries, and help utilize Delaware's waste wood by locating alternative uses for these materials.

- ◆ The **Forest Health Program** strives to ensure that Delaware's rural and urban forests are vigorous and as free from pests as possible. Staff survey and monitor Delaware's forests for forest pests, diagnose forest health problems for landowners and homeowners, recommend treatments for forest pest problems, and publish newsletters and other forest health information.
- ◆ The DDA Forest Service's **Landowner Assistance Program** provides technical assistance to landowners with all forest management activities, such as reforestation, timber stand improvement, timber harvests, and developing forest management plans. The Forest Stewardship Program is another component of the DDA Forest Service's landowner assistance program, in cooperation with the U.S. Forest Service and the USDA Farm Services Agency. This program, in conjunction with the Stewardships Incentives Program (SIP), helps landowners manage their woodlands for a variety of objectives, including wildlife habitat, recreational opportunities, and wood products. Foresters work with landowners to develop a stewardship plan for their property to outline the activities needed to achieve their respective goals. Landowners can then use SIP cost shares to help implement the activities, such as tree planting and wildlife habitat enhancement, needed to





MANAGEMENT AGENCIES FOR IMPLEMENTATION: continued

achieve their management objectives. The DDA Forest Service also offers tree seedlings at a nominal cost to Delaware residents for afforestation, reforestation, erosion control, windbreaks, water quality, and wildlife habitat enhancement.

- ◆ Delaware's **Urban and Community Forestry Program** helps communities, cities, and towns develop community forest management plans and street tree inventories. Staff also administer the urban forestry grant program which provides matching grants to communities to plant trees, manage existing trees, and develop management plans on publicly-owned lands. DDA Forest Service foresters also review proposed developments to conserve urban forest resources, and they provide urban forestry assistance to homeowners, developers, and government planning organizations.
- ◆ Through the **Watershed Protection Program**, DDA Forest Service Staff administer the rules and regulations of the Forestry Practices Erosion and Sedimentation law and ensure compliance with Delaware's Seed Tree Law. Staff also work with loggers and landowners to ensure proper installation of Best Management Practices through on-site inspections of forest management activities and forestry operator education. The BMP Forester is now working with the forest industry and the Delaware Forestry Association to implement Delaware's logger education program, in cooperation with Maryland's Master Logger educational program, as a component of the Watershed Protection Program.
- ◆ The DDA Forest Service's **Wildland Fire Program** includes fire prevention and suppression activities. Forest Service staff respond to fire company requests to assist with suppressing wildland fire. Personnel also provide wild fire prevention educational programs to Delaware children and provide wildland fire training courses to Delaware firefighters.

Education Programs of the DDA Forest Service -

- ◆ The **Natural Resource Education Program** is an integral component of each of the DDA Forest Service's other seven programs. This program provides forestry educational activities and presentations to Delaware schools, civic clubs, communities, and organizations. These activities include fire prevention and Arbor Day activities for school children, Project Learning Tree (PLT) training for educators to use with their students, and presentations to various adult organizations.
- ◆ **State Forest Management.** Delaware also maintains and manages three state forests, one in each county, for a variety of objectives. Over 9,800 acres, including 8,800 acres of forests, are open to the public at Blackbird, Redden, and Taber state forests for forest management demonstrations, recreational opportunities, wood protection, and environmental education opportunities.

DNREC, Division of Parks and Recreation - this Division protects and manages Delaware's state parks. Its mission is to protect valuable natural and cultural resources within the state parks and to ensure the wise use of park land for outdoor recreation. The Division also provides park acquisition financial assistance to municipal and county agencies.

Management -

- ◆ Conduct forest quality surveys and identify interior forest remaining in state parks
- ◆ Analyze forest and field distribution patterns
- ◆ Develop reforestation strategy to improve interior forest quality and habitat
- ◆ Implement reforestation strategy

Technical Assistance -

- ◆ Assist municipalities and counties with parklands in determining interior forest quality.



BEST MANAGEMENT PRACTICES AND/OR BEST AVAILABLE TECHNOLOGY: _____

September, 1995 - Delaware's Forestry BMP Manual published by the DDA Forest Service, with assistance from the Delaware Forestry Association, DNREC, U.S. Forest Service, and other organizations.

August, 1996 - In conjunction with the comprehensive forestry BMP manual, a condensed BMP Field Guide was published.

COUNTY STATUTES _____

Sussex County Subdivision Buffer Ordinance: mandates the creation and/or management of 30 foot wooded buffers between agricultural lands (including managed forest lands) and new subdivisions. Administered by Sussex County, with technical assistance from the DDA Forest Service.

The New Castle County Unified Development Code (UDC), passed 12/31/97, establishes restrictions on timber harvesting in New Castle County. Most of these restrictions apply to timber harvests associated with land clearing and development activities. However, some restrictions apply to timber harvests for silvicultural activities, particularly those which remove over 30 percent of the existing canopy. These sales require a permit from the county.

STATE AUTHORITY (STATUTES AND/OR REGULATIONS) _____

7 Del.C. Chapter 29 - State Forestry Act. Provides for the protection of the waters of the State from pollution by sediment deposits resulting from silvicultural activities such as harvesting of timber, the construction of roads and trails for forest management, and the preparation of property for reforestation. Also includes the Delaware Seed Tree Law; a silvicultural regulation requiring the natural or artificial regeneration of pine and yellow-poplar woodlands which are ten acres or more, and were harvested for silvicultural purposes (i.e. will not be converted to another land use). Administered by the DDA Forest Service.

7 Del.C. Chapter 72 - Subaqueous Lands. Regulations Governing the Use of Subaqueous Lands, Adopted 7-14-69. Revised 9-2-92.

7 Del.C. Chapter 60 - Delaware Water and Air Resources Act. Provides for a program for the control of pollution of the land, water, underwater and air resources of the State to protect the public health, safety and welfare; and for the protection and conservation of the land, water, underwater and air resources of the State, for public recreational purposes, and for the conservation of wildlife and aquatic life.

FEDERAL REGULATIONS _____

Clean Water Act of 1987, Section 319 - Nonpoint Source Pollution: mandates control of non-point sources of pollution through regulatory and non-regulatory programs.

Clean Water Act of 1987, Section 404 - Dredging and Filling: silvicultural activities are exempt from permit regulation for forest management activities performed on established woodlands.

Coastal Zone Act, Section 6217 - Coastal Zone Management: mandates measurable implementation (through regulatory and voluntary mechanisms) of control of management activities which can pollute Coastal waters, including all of Delaware.

Milestones for Implementation:

WORK ACTIVITIES	LEAD IMPLEMENTATION AND COOPERATING AGENCIES	TARGET DATE FOR COMPLETION	FUNDING SOURCES
<p>Continue to Develop Logger Education Program, through a regional approach with Maryland's logger education program, to help ensure proper BMP installation and thus maintain water quality:</p> <ul style="list-style-type: none"> ◆ Develop educational material including reference manual. ◆ Three (3) formal educational program per year. ◆ Periodic one-on-one field educational "tailgate" visits with loggers as needed. ◆ Continuing educational activities and a tracking system to document logger participation. 	DDA Forest Service	<p>1999</p> <p>1999</p> <p>1999</p> <p>On-going</p>	State General Funds and NPS 319
<p>Water quality monitoring through water sampling downstream for silvicultural activities:</p> <ul style="list-style-type: none"> ◆ Develop a sampling regime to randomly test water quality downstream throughout Delaware from both active and completed forest management activities to assess BMP effectiveness for both sediment and chemical control. ◆ Publish an annual report of these findings beginning in 1999. 	DDA Forest Service	<p>1999</p> <p>1999</p>	U.S. Forest Service, NPS 319, State General Funds
<p>95% compliance rate for BMP implementation will be achieved annually for all timber harvest operations through landowner and forest industry education programs and on-site inspections.</p>	DDA Forest Service	1999-2004	U.S. Forest Service, NPS 319, State General Funds
<p>Provide an annual report to NPS/DCMP that summarizes the number of plans reviewed, sites inspected, BMPs implemented and compliance rate.</p>	DDA Forest Service	1999-2004	U.S. Forest Service, NPS 319, State General Funds

Milestones for Implementation:

WORK ACTIVITIES	LEAD IMPLEMENTATION AND COOPERATING AGENCIES	TARGET DATE FOR COMPLETION	FUNDING SOURCES
<p>Develop additional Landowner Educational Programs for Silvicultural Activities:</p> <ul style="list-style-type: none"> ◆ Media plan to better inform landowners of the importance of forest management, including BMPs. ◆ Educational and extension forest management workshops for landowners, particularly targeting those owners considering a timber harvest. ◆ On-site professional forestry assistance to landowners in targeted watersheds for water quality improvement. ◆ To determine the success of our landowner educational efforts, revisit all harvested sites, not associated with a land use change, to determine if the property was adequately reforested. 	DDA Forest Service	<p>1999</p> <p>On-going</p> <p>On-going</p> <p>Begin in 1999 and then on-going</p>	State General Funds, U.S. Forest Service, NPS 319
<p>Further develop and refine silvicultural BMP tracking system to better monitor the impact on water quality protection:</p> <ul style="list-style-type: none"> ◆ Track effectiveness of Logger Education Program by tracking the quality of the BMP implementation of loggers who receive the training versus those who have not received the training. ◆ Document the number of silvicultural BMPs installed and estimate their contribution to improved water quality. 	DDA Forest Service	<p>1999-04</p> <p>1999-04</p>	State General Funds, NPS 319 and DCMP
Develop GIS interior forest module for state parks	DNREC, Div. of Parks and Recreation	1999-02	NPS 319, State Park Revenue, 21st Century Fund, State General Funds
Reforest high priority fields for maximum forest interior benefits	DNREC, Div. of Parks and Recreation	2000-04	NPS 319, State Park Revenue, 21st Century Fund, State General Funds

Construction & Urban Runoff

EPA Category Number 30 & 40



NPS
DELAWARE

GOAL

The goal for the management of surface water runoff includes those practices to be implemented before development, during land development and construction, and continuing with post development activities. To achieve this goal, the program approach will include the following issues:

- ◆ Pre-development land use considerations;
- ◆ 100% implementation of best management practices (BMPs) for land disturbing activities and construction of residential, commercial, industrial, institutional, and public works projects; and
- ◆ Stormwater management, water quantity and water quality goals for post-development activities.

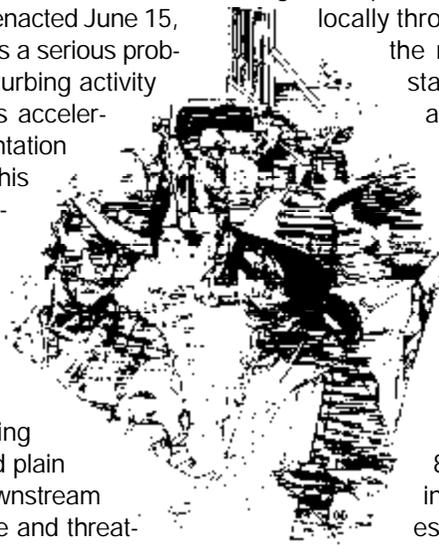
This goal can be accomplished through an economically balanced program of education, technical assistance, financial incentives, research and regulation. All management practices shall be consistent with all applicable local, county, state and federal requirements. A watershed approach shall be emphasized, utilizing best available technology (BAT) through interagency cooperation, resulting in resource protection and an improvement in surface and groundwater quality. Implementation of Pollution Control Strategies/Watershed Restoration Action Strategies will be supported in order to comply with TMDLs and to meet the State's water quality standards.

INTRODUCTION

Legislative findings of the 135th General Assembly of the Delaware State Senate contained in Senate Bill 359, an act to amend Chapter 40, Title 7, Delaware Code, enacted June 15, 1990 confirmed erosion and sedimentation as a serious problem throughout the State, and that land disturbing activity combined with creation of impervious areas accelerates the process of soil erosion and sedimentation resulting in pollution of waters of the State. This damages domestic, agricultural, industrial, recreational, fish and wildlife and other resource uses. Further, accelerated runoff increases flood flows and velocities, contributes to erosion, sedimentation, and degradation of water quality, overtaxes the carrying capacity of streams and storm sewers, greatly increases the costs of public facilities in carrying and controlling stormwater, undermines flood plain management and flood control efforts in downstream communities, reduces groundwater recharge and threatens public health, welfare and safety.

The 135th General Assembly declared that the Department of Natural Resources and Environmental Control in cooperation with conservation districts, counties, municipalities and other local governments and subdivisions of this State and other public and private entities shall administer a statewide comprehensive and coordinated erosion and sediment control and stormwater management program to conserve and protect land, water, air and other resources of the State.

This regulatory mandate must be supplemented with education and training on all levels, demonstration projects, technical assistance, research efforts, continued program funding and reaffirmation that programs to minimize the problems associated with urban runoff must be multi-dimensional in scope.



There has been a statewide Sediment and Stormwater Program in place within the DNREC since 1991, administered locally throughout the State. At any given point in time, the number of active construction sites in substantial compliance with an approved Sediment and Stormwater Plan varies widely. With close to a thousand active construction sites currently underway, DNREC actively monitors the compliance to State regulations on a regular basis. However, we do not currently keep daily statistical data on the percentage of construction sites that are in compliance. Weekly field audits are performed with the local agencies in addition to a formal program evaluation every three years. Currently, we estimate that 70-80% of construction sites are fully implementing BMPs/BAT for runoff control, although we estimate that almost 100% of these active construction sites have an approved plan. The program objective over the next five years is to increase implementation compliance from 80% to 100%.

Delaware continues to maintain a comprehensive and innovative strategy to minimize impacts from urban runoff to receiving waters. Every land disturbing activity over 5,000 square feet must submit a plan for stormwater management. Our stormwater BMPs include wet ponds, dry extended detention ponds, constructed wetlands, sand filtration systems, biofiltration and filtration practices. The percentage of land development projects utilizing a stormwater management practice would be in the 90% range. The State Sediment and Stormwater Program is in the midst of developing evaluation tools that will meet the needs of our State and Federal regulatory requirements. The Program is currently developing unique assessment tools for determining construction site compliance for erosion and sediment control. Beginning in January, 2000, we will start a statewide



INTRODUCTION con't

construction activity database that will assist the Department in meeting the goals the TMDL, NPDES, and DNREC Whole Basin planning efforts.

The successful implementation of Delaware's Sediment and Stormwater Program public partnership for implementation of the Sediment and Stormwater Program would not be possible with the public and private partnerships that DNREC has cultivated. Through the local delegation process, the conservation districts, counties, municipalities, and the Delaware Department of Transportation (DelDOT) are working with DNREC to assure that all program requirements are being met. From the inception of the State regulations, a regulatory advisory committee was convened that includes the Homebuilders Association of Delaware (HBAD), and Delaware Contractors Association (DCA).

Delaware has trained and certified over three thousand six hundred individuals in the nine years of offering formal education and training programs for the regulated industry. Many of these training sessions are hosted by HBAD, DCA, Associated Builders and Contractors (ABC), as well as private contractors.

DNREC also supports, through staff resources, local private initiatives that are underway such as the Delaware Nature Society's Soil Watch Program. This innovative program works with citizen volunteers to educate them about runoff pollution. The volunteers act as additional eyes to spot pollution violations. The Soil Watch Program also has a stewardship element where land developers may become soil stewards and pledge to go beyond the minimum local erosion and sediment control requirements.

MANAGEMENT AGENCIES FOR IMPLEMENTATION

DNREC, Division of Soil and Water Conservation -

The Division of Soil and Water Conservation is responsible for the implementation and supervision of the sediment and stormwater program which is established by Chapter 40, Title 7, Delaware Code. The Sediment and Stormwater Program is administered by the District Operations Section within the Division.

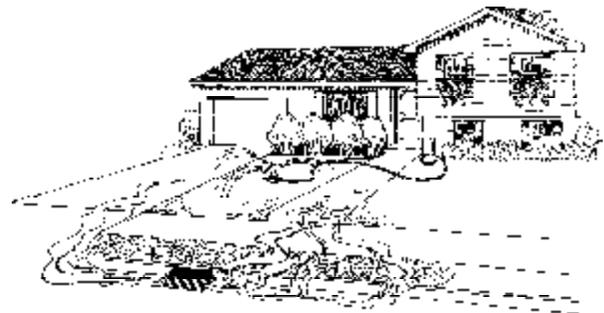
◆ **Technical Assistance** -

- ◆ Provides technical and other assistance to Conservation Districts, counties, municipalities, federal and State agencies in implementing the Sediment and Stormwater Management Program;
- ◆ Develops and publishes minimum standards, guide lines and criteria for delegation of sediment and stormwater program components and model sediment and stormwater ordinances for use by Conservation Districts, counties, State agencies, and municipalities;
- ◆ Reviews the implementation of all components of the statewide sediment and stormwater management program that have been delegated to either the Conservation Districts, counties, municipalities, or other State agencies in reviews to be accomplished at least once every three years; and
- ◆ Conducts studies and research regarding the causes, effects, and hazards of stormwater and methods to control stormwater runoff.

◆ **Education Programs** -

- ◆ Conducts and supervises educational programs with respect to sediment control and stormwater management; and
- ◆ Conducts sediment and stormwater management certification program for responsible construction personnel and certified construction reviewers.

DNREC, Pollution Prevention Program - The Pollution Prevention Program is a non-regulatory program, responsible for providing education and assistance to businesses, industry, government and citizens in identifying and implementing source reduction opportunities. The program was established in 1990 under Chapter 78, Title 7, Delaware Code. The Pollution Prevention Program is housed in the Office of the Secretary, Office of Business and Permitting Assistance. The program provides direct technical assistance, educational outreach and training programs, information searches and regulatory integration activities.





MANAGEMENT AGENCIES FOR IMPLEMENTATION continued

Sussex Conservation District - The Sussex Conservation District was organized in the spring of 1944 to coordinate the efforts of federal, state and local agencies that were responsible for conserving the natural resources of the county. Under the Delaware Law that was passed in 1978, the Conservation District approved erosion and sediment control plans for residential, commercial, industrial and institutional sites. In July 1991, the Erosion and Sediment Control Law was amended to include Stormwater Management. The Sussex Conservation District is the only District to operate under an Ordinance. The Conservation District provides technical assistance to the general public regarding erosion, sediment control and stormwater problems, construction and maintenance of drainage-ways, ponds, and water control structures. The District also provides site inspections and maintenance inspections during and after construction. They also assist designers, land-owners and contractors whenever needed.

Kent Conservation District - Since 1943, the Kent Conservation District has been an integral part of conservation practices in Kent County, Delaware. Since 1991, the District has been delegated the responsibility of administering the sediment and stormwater management program. Program responsibilities include sediment and stormwater plan review and approval, construction inspection, and post-construction inspection of permanent stormwater facilities for all new commercial, industrial, and residential construction projects within Kent County. Because of the District's role in new construction projects and sediment and stormwater management, the District is a member of Kent County's Development Advisory Committee (DAC) and Dover's DAC which meet monthly to provide feedback on proposed construction projects.

Kent Conservation District reviews all minor subdivisions to be recorded within the unincorporated areas of Kent County and makes any necessary recommendations regarding drainage, erosion and sediment control, and stormwater management. The District's Sediment and Stormwater Program also issues general permits for single family home construction within Kent County and the City of Dover. The District also provides technical assistance during construction and performs final inspection of the disturbed area to make sure it has been properly graded, seeded, and straw mulched prior to issuance of a Certificate of Occupancy.

New Castle Conservation District - The New Castle Conservation District assists the Town of Bellefonte, Town of Odessa, Delaware City, Village of Arden, City of New

Castle, Town of Townsend, Town of Newport, Town of Elsmere, Village of Ardencroft and Village of Ardentown with sediment and stormwater management plan review and inspection as a part of the State Sediment and Stormwater Management Program which is delegated to the District for these incorporated municipalities.

USDA, Natural Resources Conservation Service - The Natural Resources Conservation Service (NRCS) formerly known as the Soil Conservation Service is the technical agency within the USDA. The NRCS provides technical engineering standards and specifications as well as BMP design and layout.

Local Governments - Through a delegation process as described in Section 5 of the Delaware Sediment and Stormwater Regulations, sediment and stormwater program components may be carried out by conservation districts, counties, municipalities and State agencies that seek delegation from DNREC. Below is a listing of local governing agencies that have been granted delegation for one or more program components (plan review, construction inspection, and maintenance inspection).

State of Delaware, Department of Transportation

Division of Highway Operations

Field Services

P.O. Box 778

Dover, DE 19903

(302) 760-2188

Delegated Area: DelDOT Construction

New Castle County Department of Land Use

Engineering Section

87 Reads Way, Corporate Commons

New Castle, DE 19720

(302) 395-5470

Delegated Area: All Unincorporated Areas of New Castle Co.

New Castle Conservation District

6 Peoples Plaza

Newark, DE 19702

(302) 834-3533

Delegated Area: All Incorporated Areas of New Castle County, except Newark, Wilmington and Middletown

City of Newark, Public Works Department

220 Elkton Road

P.O. Box 390

Newark, DE 19713-2839

(302) 366-7040

Delegated Area: City of Newark



MANAGEMENT AGENCIES FOR IMPLEMENTATION continued

City of Wilmington, Department of Licensing and Inspections

800 North French St.
Wilmington, DE 19801
(302) 571-4363
Delegated Area: City of Wilmington

Town of Middletown

216 N. Broad St.
Middletown, DE 19709
(302) 378-1171
Delegated Area: Town of Middletown

Kent Conservation District

3500 S. DuPont Highway
Dover, DE 19901
(302) 697-2600
Delegated Area: Kent County

Sussex Conservation District

21 Shortly Road
Georgetown, DE 19947
(302) 856-7219
Delegated Area: Sussex County

BEST MANAGEMENT PRACTICES AND/OR BEST AVAILABLE TECHNOLOGY

- ◆ Delaware Erosion and Sediment Control Handbook dated 1989 (Currently being revised)
- ◆ Natural Resources Conservation Service Field Technical Guide
- ◆ Conservation Design Manual for Storm Water Management, dated Sept. 1997
- ◆ Design Guidance for Biofiltration, Filtration, and Bioretention
- ◆ Delaware Department of Transportation Standards and Specifications
- ◆ NRCS 378 Pond Specification

STATE AUTHORITY (STATUTES AND/OR REGULATIONS)

- ◆ **7 DeL.C. Chapter 40**
 - ◆ **Sediment and Stormwater Regulations**
effective January 23, 1991.

FEDERAL REGULATIONS

- ◆ Permit Applications Regulations for Stormwater Discharges 40 CFR Parts 122, 123 and 124
- ◆ National Pollutant Discharge Elimination System (NPDES)

Milestones for Implementation:

WORK ACTIVITIES	LEAD IMPLEMENTATION AND COOPERATING AGENCIES	TARGET DATE FOR COMPLETION	FUNDING SOURCES
Develop database for tracking sediment and stormwater management activities statewide	DNREC -DS&WC, Districts (Done in New Castle Co., On-going in Kent & Sussex)	1999 - 2000	NPS 319, DCMP, and State General Funds
Develop statewide database for completed stormwater management facilities for maintenance purposes	DNREC - DS&WC, Districts (Continuing)	1999 - 2000	State General Funds
Develop Geographic Information System (GIS) capabilities for linking database information statewide (data layers) ♦ Develop GIS map of stormwater facilities for Sussex County/Kent County	DNREC - DS&WC, NCCD, AND SCD	1999 - 2000	State General Funds, Grant Funds
Develop and Implement a non-structural approach to stormwater management that is transferable statewide in certain land development situations including a bioretention demo project.	DNREC and Brandywine Conservancy	Phase 1 and 2 Complete Final Phase 1999 - 2000	NPS 319, EPA NPDES
Host a National Sediment and Stormwater Conference for the transfer of technology with other states and municipalities	DNREC	September 1998 (completed) Repeat Event 2000	NPS 319
Assist municipalities and county governments in obtaining State Revolving Funds (low interest loans) through the Del. Water Pollution Control Revolving Fund (DWPCRF) for eligible stormwater mgmt. practices and equipment	DNREC	1999 - Ongoing	DWPCRF (State Revolving Funds)

Milestones for Implementation:

WORK ACTIVITIES	LEAD IMPLEMENTATION AND COOPERATING AGENCIES	TARGET DATE FOR COMPLETION	FUNDING SOURCES
<p>Increase awareness and public understanding of urban NPS programs and issues:</p> <ul style="list-style-type: none"> ◆ newsletters and written publications ◆ public events ◆ intergovernmental agency and civic and citizen groups 	<p>DNREC, Conservation Districts and all delegated agencies</p>	<p>On-going</p>	<p>State General Funds and District Funds</p>
<p>Implement Urban stormwater demonstration projects in priority watersheds (N6)</p>	<p>SCD, KCD, and NCCD</p>	<p>On-going</p>	<p>Unknown (Grant Funds)</p>
<p>Continue to develop the stormwater funding concept</p>	<p>DNREC</p>	<p>On-going</p>	<p>DCMP 6217, EPA</p>
<p>Evaluate physical habitat and downstream impacts of an area before, during and after construction (S3)</p>	<p>DNREC, Districts, Delegated Agencies</p>	<p>2000</p>	<p>EPA - NPS 319 Grant</p>
<p>Continue to comment on urban NPS concerns for land use planning agencies:</p> <ul style="list-style-type: none"> ◆ Delaware Advisory Service (DAS) ◆ Development Advisory Committee (DAC) Kent County ◆ Technical Advisory Committee (TAC) - Sussex County ◆ Subdivision Advisory Committee (SAC) - New Castle County 	<p>DNREC and Conservation Districts</p>	<p>On-going</p>	<p>State General Funds</p>

Milestones for Implementation:

WORK ACTIVITIES	LEAD IMPLEMENTATION AND COOPERATING AGENCIES	TARGET DATE FOR COMPLETION	FUNDING SOURCES
Develop and implement a field evaluation method that will serve to quantify the success of the erosion and sediment control efforts during construction	DNREC	1999	State General Funds
Develop funding mechanism for the maintenance of Storm Water Management (SWM) facilities in Kent County. Work with the Kent County Planning Dept. and Levy Court to develop a maintenance program in Kent County.	DNREC, Kent Conservation District, Kent County Government	1999 - 2000	State General Funds
Implement a stormwater demonstration cost-share project in the Inland Bays Watershed specifically for nutrient concerns (N6, S1)	DNREC, Sussex Conservation District	1999	State Cost Share Funds
Complete State inventory of SWM facilities on State and Federal lands	DNREC	1999	State General Funds
Transfer and update all State Sediment and Stormwater information, regulations, program guidance, and forms to the internet (CWAP)	DNREC	On-going	State General Funds
Protect riparian buffers by encouraging designers and developers to keep lots, roads, and SWM facilities out of the riparian area (S3, CWAP)	Kent Conservation District	2000	Review Fees

Milestones for Implementation:

WORK ACTIVITIES	LEAD IMPLEMENTATION AND COOPERATING AGENCIES	TARGET DATE FOR COMPLETION	FUNDING SOURCES
Continue Stormwater management pond retrofits and wetland construction efforts statewide	DNREC and Conservation Districts	On-going	NPS 319 Grant
Continue to implement the base Sediment and Stormwater Program through delegated agencies (N6, S3)	DNREC and Delegated Agencies	On-going	State General Funds, Plan Review Fees
Evaluate Local program effectiveness as required by law (tri-annual evaluation) <ul style="list-style-type: none"> ◆ plan review ◆ construction inspections ◆ maintenance inspections 	DNREC and Delegated Agencies	On-going	State General Funds, Plan Review Fees
Update the Erosion and Sediment Control Handbook <ul style="list-style-type: none"> ◆ Draft ◆ Final (1999) 	DNREC w/NRCS, Conservation Districts and Private Industry	1999	State General Funds, NPS 319
Develop new Contractor Certification Program for Sediment and Stormwater	DNREC	1999	State General Funds, NPS 319
Implement Dover Silver Lake recommendations for water quality improvements	DNREC, Kent Conservation District	1999 - 2003	State General Funds, City of Dover, Kent County

Milestones for Implementation:

WORK ACTIVITIES	LEAD IMPLEMENTATION AND COOPERATING AGENCIES	TARGET DATE FOR COMPLETION	FUNDING SOURCES
Present a series of design workshops to train consultants, engineers etc.	DNREC	On-going	Registration Fees
Continue field monitoring of on-going construction in all jurisdictions	DNREC and Delegated Agencies	On-going	State General Funds
Coordinate the Stormwater management proposal through the recordation process in conjunction with the GIS	DNREC and Conservation Districts	On-going	State General Funds
Hold workshops for homeowners in newly established neighborhoods to increase acceptance/understanding of SW Mgmt. Facilities. Explain how they work, regular maintenance, and possible long-term maintenance needs (S1)	Kent Conservation District w/ assistance from DNREC	2000	Funding Unknown
Continue to issue general permits and provide final inspections for single family home construction (S2)	Kent Conservation District	On-going	General Permit Fees
Continue to review minor subdivision plans and comment on erosion & sediment control, drainage, stormwater management, etc.	Kent Conservation District	On-going	Review Fees
Explore stormwater design strategies that address SW volume controls as a mitigation measure.	DNREC	2000	State General Funds, NPS 319

Milestones for Implementation:

WORK ACTIVITIES	LEAD IMPLEMENTATION AND COOPERATING AGENCIES	TARGET DATE FOR COMPLETION	FUNDING SOURCES
<p>Retrofits to stormwater management facilities will be prioritized and implemented if identified under Pollution Control Strategies/Watershed Restoration Action Strategies to meet TMDLs.</p>	<p>DNREC Whole Basin Management Teams, PCS/WRAS Tributary Teams</p>	<p>2000 - 2004</p>	<p>SRF, NPS 319, Other</p>
<p>Educate homeowners about pollution prevention in lawn and garden care (beneficial landscaping), targeting reducing the negative impact on riparian corridors: Offer information and classes through major home and garden centers</p>	<p>Pollution Prevention Program and Whole Basin Management Teams</p>	<p>1999 - 2000</p>	<p>EPA PPIS funds, NPS 319</p>
<p>Educate people who do their own automobile maintenance about pollution prevention, targeting reducing pollutants entering surface and groundwater. Information will be offered through auto parts stores. This activity will be linked with the DNREC Whole Basin Management effort.</p>	<p>Pollution Prevention Program</p>	<p>1999 - 2000</p>	<p>EPA PPIS funds, NPS 319</p>
<p>Develop a process to ensure full implementation of the elements of the watershed protection and existing development Management Measure (6217 Condition)</p>	<p>DNREC</p>	<p>1999</p>	<p>DCMP 6217 Funds, NPS 319, State General Funds</p>

Resource Extraction

EPACATEGORY NUMBER 50



NPS
DELAWARE

GOAL

The goal for extractive use in Delaware is to design and implement a program to regulate the excavation of clay, sand, silt, gravel, and rock and provide for the protection of groundwater. In order to protect, manage and preserve water resources, the DNREC will endeavor to implement regulations governing extractive use operations with the objective of minimizing adverse impacts to groundwater and surface water resources which could result from

an extractive use operation and to ultimately return extractive use areas to beneficial uses. **Note: this subcategory was originally written for the 1995 update of the management plan. Since that time, no action has been taken by the state to develop regulations or implement the stated milestones. This source category is a low priority for the state since local counties and municipalities have adequate jurisdiction at this time.**

INTRODUCTION

The 135th General Assembly enacted legislation in 1990 to regulate the excavation of sand, silt, gravel, and rock for the protection of groundwater. It was recognized that the extraction and processing of earth products is a necessary part of the ongoing economic development in Delaware, and the nature of this material makes it a vital component of numerous construction trades. However, the actual extraction of the material and subsequent use of the site have the potential of causing serious environmental impairment.

The DNREC was required to develop regulations in response to the legislation, and has been working with an advisory committee to promulgate regulations meeting minimum environmental goals while negatively impacting as little as possible on the industry. There are several unique aspects of the proposed regulations which are mentioned separately:

1. Groundwater pollution potential is minimized by the implementation of a water pollutant control program on site which provides for employee education and



site specific controls which address the following:

- ◆ Fuel storage and handling
- ◆ Waste oil handling and disposal
- ◆ Covering or protection of chemicals or products to prevent their introduction into surface or groundwaters.
- ◆ Control of nutrients on site, which could include but not be limited to fertilizers, manures, etc.

2. Unless an exception is approved on a case-by-case basis, no more than 25 unrestored acres may exist at any one site. In order to create new disturbed areas at sites with disturbed acreage greater than 25 acres, site restoration of previously disturbed areas must occur over an area large enough to insure that the total disturbed acreage of the previously disturbed areas and the newly disturbed areas does not exceed 25 acres.

3. Each site shall have a restoration plan to ensure revegetation of the site using practices to limit public access to the restored area and to prevent illegal dumping.

MANAGEMENT AGENCY FOR IMPLEMENTATION

DNREC, Division of Soil and Water Conservation, Sediment and Stormwater Program - The Division of Soil and Water Conservation is responsible for the implementation and supervision of the Extractive Use Program which is established by Chapter 60, Title 7, Delaware Code. The Sediment Stormwater Program is administered by the District Operations Section within the Division.

◆ Technical Assistance -

- ◆ Provides technical and other assistance to Conservation Districts, counties, or other State agencies implementing the Extractive Use Program;

- ◆ Develops and publishes minimum standards, guidelines and criteria for delegation of the Extractive Use Program and model Extractive Use Ordinances for use by Conservation Districts, counties, or other State agencies;
- ◆ Reviews the implementation of the Extractive Use Program that has been delegated to either the Conservation Districts, counties, or other State agencies in reviews to be accomplished at least once every five years; and
- ◆ Conducts studies and research regarding pollution control problems and methods to control water pollution on extractive use operations.



MANAGEMENT AGENCIES FOR IMPLEMENTAION (continued) _____

◆ **Education Programs -**

- ◆ Conduct and supervise education programs with respect to Extractive Use.

◆ **Financial Assistance -**

- ◆ Financial assistance is available from the State cost share funds and the Consolidated Farm Services Agency (formerly Agricultural Stabilization and Conservation Service), Agricultural Conservation Program (ACP) for reclamation of abandoned Extractive Use operations on farms for wildlife ponds and wildlife habitat.

BEST MANAGEMENT PRACTICES AND/OR BEST AVAILABLE TECHNOLOGY: _____

In general, practices used as BMPs are those traditionally used in erosion and sediment control for land development activities. These practices include sediment

traps and basins, diversion berms or swales, and vegetative stabilization.

STATE AUTHORITY (STATUTES AND/OR REGULATIONS): _____

- ◆ **7 DeL.C. Chapter 60**, 6002 and 6063 - Proposed Extractive Use Regulations dated February, 1993

- ◆ **7 DeL.C. Chapter 40** - Sediment and Stormwater Act

FEDERAL REGULATIONS: _____

- ◆ **Section 402 of the Clean Water Act** regulates surface water discharges from industrial sites. Extractive use operations having a surface water discharge are required to receive an NPDES stormwater permit.

- ◆ When the State regulations are finalized, it is the intent of the DNREC to issue an NPDES stormwater general permit requiring compliance with the State regulations.

Milestones for Implementation:

WORK ACTIVITIES	LEAD IMPLEMENTATION AND COOPERATING AGENCIES	TARGET DATE FOR COMPLETION	FUNDING SOURCES
Revise law to allow more local flexibility	DNREC	UNKNOWN	NA
Finalize Regulations	DNREC	UNKNOWN	NA
Hire Staff to permanently manage Extractive Use Program:			
◆ Establish position and funding source	DNREC	UNKNOWN	State General Funds
◆ Post and fill vacant position	DNREC	UNKNOWN	State General Funds
Develop guidance fact sheets for operators for non-sediment pollution control	DNREC	UNKNOWN	Unknown
Implementation of regulatory program for extractive use site operators	State Agencies, Local Government, Conservation Districts	UNKNOWN	Fees
Formally evaluate program performance by delegated agencies	DNREC	UNKNOWN	State General Funds

NOTE TO READER: THIS SUBCATEGORY (RESOURCE EXTRACTION) WAS ORIGINALLY WRITTEN FOR THE 1995 UPDATE OF THE MANAGEMENT PLAN. SINCE THAT TIME, NO ACTION HAS BEEN TAKEN BY THE STATE TO DEVELOP REGULATIONS OR IMPLEMENT THE STATED MILESTONES. THIS SOURCE CATEGORY IS A LOW PRIORITY FOR THE STATE SINCE LOCAL COUNTIES AND MUNICIPALITIES HAVE ADEQUATE JURISDICTION AT THIS TIME.

Land Disposal

EPA Category Number 60



NPS
DELAWARE

GOAL

To conserve land and water resources in an economically viable and environmentally sensitive manner, the following areas will be addressed:

- ◆ Promote beneficial re-use of waste materials;
- ◆ Educate waste producers, operators, and the public in general in methods of pollution prevention, waste identification and management, waste reduction, and water conservation;
- ◆ Identify areas where the Department of Natural Resources and Environmental Control (DNREC) can streamline the regulatory process;

- ◆ Enhance interdepartmental coordination and collaboration as well as achieve internal regulatory consistency;
- ◆ Evaluate graywater utilization;
- ◆ Identify staffing and resource requirements and seek financial assistance; and
- ◆ Establish a cross-training program for DNREC staff.

Implementation of Pollution Control Strategies/Watershed Restoration Action Strategies will be supported in order to comply with TMDLs and to meet the State's water quality standards.

INTRODUCTION

This NPS Category addresses the land disposal of wastes that degrade the State's surface and ground waters. The subcategories specifically addressed under this category include the following: 1) #61 and #62 Land Application of Sludge and Wastewater; 2) #63 Landfills; 3) #65 On-Site Wastewater Systems; and 4) #66 Hazardous Wastes. Specific information pertaining to each of the subcategories



referenced above can be found in the individual sections following this category section. Each subcategory section contains a synopsis of the pollution problems and what is currently being done to address these concerns. Also, each subcategory contains a table that outlines the objectives/milestones that management agencies will implement to reduce these sources of nonpoint source pollution.

MANAGEMENT AGENCIES FOR IMPLEMENTATION

DNREC, Division of Air and Waste Management, Waste Management Section, Hazardous Waste Management Branch - The branch is responsible for protecting public health and the environment by ensuring the state's generated hazardous waste is appropriately managed. The program also maintains a program of corrective action to address releases of hazardous constituents at the site's of permitted hazardous waste facilities.

- ◆ **Technical Assistance -**
 - ◆ Staff the Hazardous Waste Help-Line which offers regulatory information and interpretation on hazardous waste management issues including disposal of household hazardous waste;
 - ◆ Conduct on-site audits for new hazardous waste generators and provide compliance assistance;
 - ◆ Provide technical information and brochures on industry specific issues including waste minimization.
- ◆ **Education Programs -**
 - ◆ Offer educational programs for all hazardous

waste generators; and

- ◆ Provide classroom instruction at technical schools.

DNREC, Division of Air and Waste Management, Waste Management Section, Solid Waste Management Branch - This branch is responsible for issuing permits and approvals for solid waste transportation, resource recovery and waste disposal. It evaluates waste disposal which may be illegal, unauthorized or present a threat to human health or safety or to the environment. Promotes waste recycling and reuse. Assisting business, industry and homeowners in identifying measures to reduce waste is the responsibility of the Pollution Prevention Program.

- ◆ **Technical Assistance -**
 - ◆ Work with engineers, environmental consultants, industry staff, the Delaware Solid Waste Authority, developers/contractors and homeowners to implement and maintain compliance with waste regulations and the laws of Delaware.



MANAGEMENT AGENCIES FOR IMPLEMENTATION continued

◆ Education Programs -

- ◆ Conducts outreach programs on waste recycling and reuse, and provides presentations to groups on waste management issues upon request.

DNREC, Division of Water Resources, Surface Water Discharges Section, General Permits Branch & Ground Water Discharges Section, Large Wastewater Systems Branch - both branches are responsible for guiding and regulating the beneficial reuse of treated wastewater and processed sludges in a manner that will not contribute to the degradation or loss of use of any lands or waters of the State of Delaware.

◆ Technical Assistance -

- ◆ The branch provides assistance to design engineers, municipalities, developers, industrial managers, and the general public.

◆ Education Programs -

- ◆ The branch provides training and education to designers, municipalities, industrial managers, developers, operators, and the general public by conducting workshops and public hearings, by holding information meetings, and by providing classroom training; and
- ◆ Slides, overheads, videos, and printed handouts are used as training aids.

DNREC, Division of Water Resources, Underground Discharges Branch Program - On-Site Wastewater Disposal - This Branch is responsible for regulating the installation, operation and maintenance of on-site wastewater disposal systems. This program includes licensing of the private sector, as well as assisting and educating business, industry and the public.

◆ Technical Assistance -

- ◆ Technical assistance is provided by the Branch to: National On-Site Recycling Association, Small Flow Clearinghouse, and Water Pollution Control Federation.

◆ Education Programs -

- ◆ The Branch and other state agencies, as well as regional and national on-site wastewater associations provide training and education to business, industry, and the public through literature circulation, classes at schools and universities and workshops.

BEST MANAGEMENT PRACTICES AND/OR BEST AVAILABLE TECHNOLOGY: _____

- ◆ Regulations Governing the Design, Installation, and Operation of On-Site Wastewater Treatment and Disposal Systems
- ◆ Cooperative Extension Service Bulletins #126 and 127

- ◆ EPA Design Manual for On-Site Wastewater Treatment and Disposal Systems
- ◆ Guidance and Regulations Governing the Land Treatment of Wastes and its appendices
- ◆ EPA Process Design Manual - Land Application of Sewage Sludge and Domestic Septage

STATE AUTHORITY (STATUTES AND/OR REGULATIONS): _____

7 DeL.C. Chapter 60 - Environmental Control

- ◆ Delaware Regulations Governing Solid Waste, Adopted December 1988, amended 11/89, 12/89, 3/90, 1/91 and 4/91, 12/94 and 4/99 (projected).
- ◆ Delaware's Regulations Governing the Design, Installation and Operation of On-Site Wastewater Treatment and Disposal Systems, effective 1/5/85, amended 7/28/86.
- ◆ Regulations Governing the Control of Water Pol-

lution, adopted 3/15/74, amended 6/23/83.

- ◆ The Guidance and Regulations Governing the Land Treatment of Wastes, adopted 8/88, revised 9/92, amended 6/94.
- ◆ Regulations Governing Licensing Operators of Wastewater Facilities, adopted 12/28/77, revised 1/1/88.



STATE AUTHORITY (STATUTES AND/OR REGULATIONS) con't: _____

7 Del.C. Chapter 63 - Hazardous Waste Management

- ◆ Delaware Regulations Governing Hazardous Waste, adopted 10/28/80, last amended 8/21/97.
- ◆ Regulations Governing the Location of Hazardous Waste Storage, Treatment and Disposal Facilities, effective 8/1/91.

7 Del.C. Chapter 64 - Delaware Solid Waste Authority

7 Del.C. Chapter 77 - Extremely Hazardous Substances Risk Management Act

- ◆ Regulations for the Management of Extremely Hazardous Substances, adopted 9/15/89

7 Del.C. Chapter 78 - Waste Minimization/Pollution Prevention Act

FEDERAL REGULATIONS: _____

◆ **Resource Conservation and Recovery Act (RCRA)**

◆ **40 CFR, Parts 257 and 258** - Solid Waste Disposal Facility Criteria

◆ **40 CFR, Part 503** - Standards for the Use or Disposal of Sewage Sludge

◆ **40 CFR, Parts 260 through 270**

Land Application of Sludge & Wastewater

EPA Subcategory Number 61 & 62



NPS
DELAWARE

INTRODUCTION

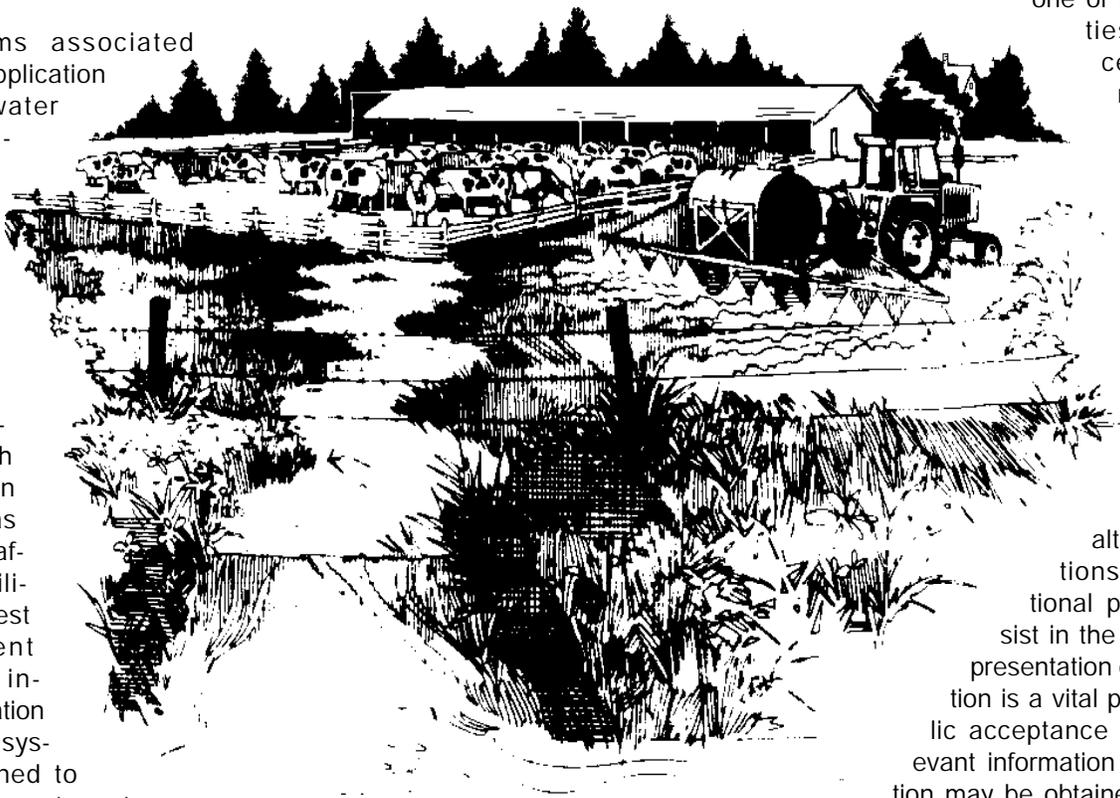
Land application of wastes includes spray irrigation, infiltration-percolation basins, and biosolids utilization. Spray irrigation of animal wastes and brine-containing wastewater from food processing operations and textile-dyeing operations have resulted in several incidents of groundwater contamination (Ritter and Chirnside, 1982). Such practices have caused elevated levels of both nitrates and sodium.

Problems associated with land application of wastewater can be reduced by thorough investigation of soils and geologic and hydrologic conditions, both on-site and in nearby areas likely to be affected. Utilization of best management practices including irrigation scheduling, systems designed to apply wastewater at proper rates, and matching application rates to plan nutrient needs will reduce and possibly alleviate groundwater quality degradation, increase crop yields, and otherwise promote beneficial reuse of treated wastewater byproducts.

The importance of a comprehensive and well-coordinated public acceptance program for the implementation of land treatment systems may be described by the old adage "an ounce of prevention is worth a pound of cure".

Good documentation exists for many fine land-treatment systems which have operated successfully for many years. Yet, public resistance may develop when new systems are proposed for individual communities unless preparatory steps are taken.

The public education and acceptance program should be one of the first activities in the process to implement a land-treatment system. Citizens should be encouraged to weigh the relative capabilities, advantages and disadvantages, and costs of alternative solutions. An educational program to assist in the collection and presentation of this information is a vital part of the public acceptance activity. Relevant information and participation may be obtained locally from citizens with high interest or appropriate expertise; technical institutes and university personnel; local representatives from agencies such as the Cooperative Extension System, the Natural Resources Conservation Service, and Conservation Districts, as well as supportive state staff for these agencies; local government planning agencies; and appropriate environmental organizations. Involvement of such resources and agency representatives can serve to coordinate and expand the program reach to involve all interested groups and concerned citizens.



Milestones for Implementation:

WORK ACTIVITIES	LEAD IMPLEMENTATION AND COOPERATING AGENCIES	TARGET DATE FOR COMPLETION	FUNDING SOURCES
Revise current regulations to include requirement of federal sludge regulations, 40 CFR Part 503.	DNREC, Division of Water Resources w/EPA and DNREC, Division of Air and Waste Management	1999	Unknown
Revise current regulations to allow for a tiered permitting approach based on size and complexity of the project.	DNREC, Division of Water Resources	1999	Unknown
Continue to work closely with the Delaware Technical and Community College (DTCC) Environmental Training Center to implement training programs geared towards persons who operate land treatment systems <ul style="list-style-type: none"> ◆ One day seminar (operator training) ◆ One semester, 2 credit course for solids handling 	DNREC, Division of Water Resources w/ DTCC Environmental Training Center	On-going	Registration Fees
Develop a database to track disposal of waste from sludge holding tanks.	DNREC, Division of Water Resources	On-going	Unknown
Research possibility of revising On-Site Regulations to allow for grey water separation and utilization.	DNREC, Division of Water Resources	On-going	Unknown
Review permit application forms and revise where necessary to make applications more understandable to applicants.	DNREC, Division of Water Resources	1998 (For Sludge)	Unknown
Revise Part V of the current Land Treatment of Wastes establishing a clearer protocol for approval to land apply source separated wastes onto agricultural lands	DNREC, Division of Water Resources and Air and Waste Management	1999	Unknown



INTRODUCTION (continued)

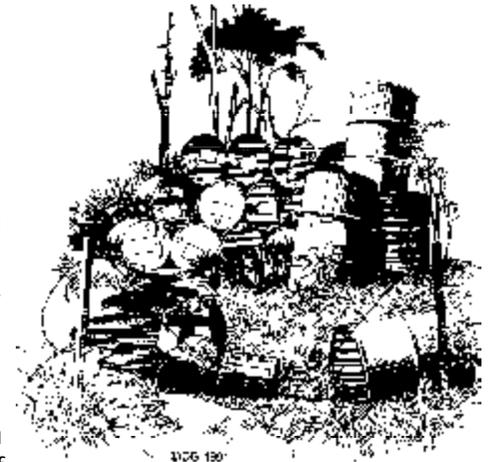
The collection and recycling of waste office paper could also be improved. Attempts to improve the recycling of paper from state offices are on-going. One of the greatest barriers to improved recycling performance is the development of markets for recycled products. Attempts are also being made to enhance markets for recyclables by expressing a preference for the purchase and use of recycled products. Continued outreach to waste generators is needed to encourage recycling and reuse of waste materials.

Delaware may be the only state without a program to manage scrap tires. Although illegal disposal of tires has largely diminished as tire retailers are utilizing haulers (consistent with programs in surrounding states) for proper disposal of old tires, some tire piles continue to grow and illegal disposal of old tires along highways and in waterways still poses a nuisance. The development of a program to eliminate the piles of scrap tires and dispose of tires recovered by voluntary clean-ups of beaches and waterways is still needed.

Landclearing debris and some construction wastes were routinely buried on sites of residential construction between the late 1960s and late 1980s. Thousands of buried debris pits occur in the yards of residences, especially in New Castle County. (Such waste was typically open-burned in the lower counties until an unequivocal prohibition on burial of such material was adopted in 1988.) This buried debris produces methane gas as it decomposes in the ground—creating the potential for explosive concentrations of gas in basements. Settlement of the land surface occurs as the buried debris decomposes, creating drainage problems and posing the potential for injuries due to collapse. Hundreds of buried debris pits were excavated during the 1990s pursuant to appeals to build-



ers, enforcement actions, environmental remediation programs, and initiatives by homeowners. The remaining pits pose the aforementioned hazards and stigmas to property values. Efforts continue to find adequate, fair and cost-effective solutions to this problem.



Illegal open dumping of wastes is a nagging problem in Delaware. Such wastes litter roadsides, Canal easement areas, powerline easements, forest and pulp wood lands, park lands, and generally anywhere a person can have a feeling of comfort that they will not get caught. These waste piles may attract vermin, create odor problems, pose fire hazards, and in some cases could have a potential ground water impact. However, the biggest problem is aesthetic and the erosion of concern about stewardship for the environment. Littered, run-down properties become magnets for other types of illegal or illicit activities, presenting problems for the local residents. The clean up of such litter often flounders on the cost of proper disposal of the waste. Funding of a citizens incentive program (covering waste tipping fees in exchange for "sweat equity" in cleaning up the wastes) would help to eliminate some of these problems and ease the social dilemmas they foster.

Milestones for Implementation:

WORK ACTIVITIES	LEAD IMPLEMENTATION AND COOPERATING AGENCIES	TARGET DATE FOR COMPLETION	FUNDING SOURCES
Develop a program that will prevent illegal dumping of scrap tires and properly dispose of the estimated 2 million scrap tires in storage piles and illegal dumps in Delaware	DNREC - Solid Waste, DSWA, DOT, Dept. of Corrections, landowners	1999 - 2002	Unknown
Develop a program to provide remedies for land clearing and construction debris buried in pits on residential lots	DNREC - Solid Waste, Delaware Home Builders, local governments, General Assembly	1999 - 2000	General Funds and sources to be identified
Administer permit programs for waste disposal, waste (resource) recovery, waste transfer and waste transportation, including monitoring and corrective action for problems.	DNREC - Solid Waste	On-going	General Funds and Fees
Support and enhance the reuse/ recycling of waste material (such as ash, reground asphalt, concrete, yard waste, appliances, tires, metals, paper, cardboard, plastics, waste oil, etc.) to reduce the amount of wastes going into landfills and illegal dumps by outreach to industries, contractors, etc.	DNREC - Solid Waste, DSWA, Haulers, DeIDOT, Delaware Contractors Assoc., and General Assembly	On-going	Unknown
Provide a means to assist landowners in the removal and proper disposal of waste which has been illegally dumped on their property.	DNREC - Solid Waste, EPO's, landowners, Haulers, Dept. of Corrections, volunteers	1999 - 2001	Penalty funds, NPS 319, other sources

Milestones for Implementation:

WORK ACTIVITIES	LEAD IMPLEMENTATION AND COOPERATING AGENCIES	TARGET DATE FOR COMPLETION	FUNDING SOURCES
Develop informational/educational brochures relating to the proper management of household waste, yard waste, tires, and recycleable materials.	DNREC - Solid Waste, Pollution Prevention, and DSWA	On-going	Unknown
Continue the program to make available composting units for residential waste on an economically attractive basis and provide information on the benefits and methods of composting residential waste to homeowners.	DNREC - Solid Waste, Pollution Prevention	On-going	Fees/NPS 319

On-Site Wastewater Systems

EPA Subcategory Number 65



NPS
DELAWARE

INTRODUCTION

The Department of Natural Resources and Environmental Control (DNREC) is the responsible agency for on-site wastewater treatment systems pursuant to the authority set forth in 7 Del. Code, Chapter 60. The actual administration and implementation of the program is carried out by the Division of Water Resources.

The Division of Water Resource's responsibility includes developing and/or evaluating emerging technologies in the field of on-site wastewater design and operation. Technical assistance and education is provided by DNREC with assistance from other agencies, such as the Division of Soil and Water Conservation, the local conservation districts, the USDA, Natural Resources Conservation System and the Delaware Cooperative Extension System through literature circulation, classes at schools and universities, and workshops.

In order to address the pollution problem identified in the early 80's, the DNREC adopted regulations in July of 1985 that required the use of on-site wastewater systems that functioned according to their performance criteria without causing the State's ground water resources to violate U.S. EPA drinking water standards on an average annual basis. These regulations require system selection and sizing to be determined using the results of site - specific soil evaluations. Density is addressed by the adoption of minimum lot sizes tied to appropriate disposal techniques, and in some cases, the use of scientific ground water and geological analyses that both assure renovation of degradable pollutants and dilution of wastes which are inadequately treated in the soil.

Computer technology has increased the reliability of on-site wastewater treatment technology in Delaware through the use of systems such as Sequence Batch Reactor (SBR). The use of SBR's and other similar treatment technologies assists the DNREC with clean-up of existing sites that have on-site wastewater problems due to too much density and limited area for a disposal system.

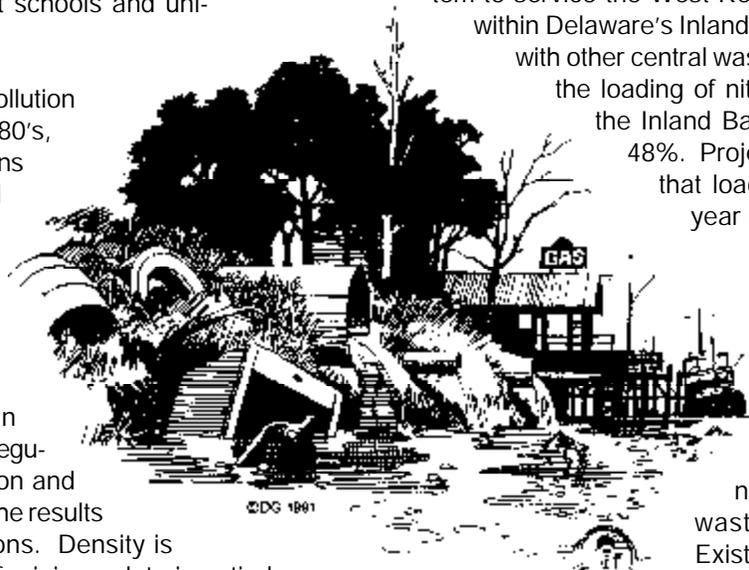
DNREC has established a compliance inspection pro-

gram for large and innovative on-site wastewater treatment and/or disposal systems. Presently, some seventy-five (75) systems are inspected at least once per year for compliance with their operating permit. Approximately twenty-five (25) new large and/or innovative systems are approved each year. Of those twenty-five (25), approximately five (5) are replacing old community or individual on-site systems. The new on-site wastewater systems reduce or eliminate the amount of pollution to the ground water.

In addition to this replacement program, the DNREC has imposed moratoriums on areas where on-site wastewater system will not provide the necessary protection to the State's ground water and surface waters. This procedure resulted in the installation of a central wastewater system to service the West Rehoboth Area which is located within Delaware's Inland Bays. This program, together with other central wastewater projects, has reduced the loading of nitrogen to ground water within the Inland Bays by 33,620 lbs per year or 48%. Projects since 1988 have reduced that loading by some 23,597 lbs per year or 40%.

DNREC plans on continuing this effort of pollution reduction through education programs in conservation, proper care, and maintenance of on-site wastewater systems, and use of innovative and alternative on-site wastewater treatment systems. Existing regulations will be revised in late 1999 to include: new technologies, results of research and better management, construction and implementation plans for on-site wastewater treatment and disposal systems. DNREC will continue to encourage use of central wastewater treatment systems especially where the concentration of on-site wastewater systems, regardless of the technology, may continue to degrade ground water and/or surface water quality.

Finally, DNREC will continue to provide funding, through the State's Revolving Loan Program, to low to moderate income families for replacement of problem on-site wastewater systems.



Milestones for Implementation:

WORK ACTIVITIES	LEAD IMPLEMENTATION AND COOPERATING AGENCIES	TARGET DATE FOR COMPLETION	FUNDING SOURCES
Eliminate 100% of all known failing septic systems	DNREC/DWR/Ground Water Discharges Section (GWDS)	1999 - 2004	Fees/General Funds/CW SRF/Grant Funds
Perform construction and compliance inspections on 100% of all large on-site wastewater systems and 70% of all small systems.	DNREC/DWR/GWDS	1999 - 2004	Fees/General Funds/Grant Funds
Complete minor revisions and reprint the Simply Septics Brochure which provides information on the siting, construction and maintenance of on-site wastewater disposal systems for public availability	DNREC/DWR/GWDS	1999	NPS Grant
Continue open meetings and workshops for licensed on-site designers, soil evaluators, contractors, and public	DNREC/DWR/GWDS	Continuous	Fees/General Funds
Update, expand and maintain on-site data management and information service for state-wide multi-user availability	DNREC/DWR/GWDS	Continuous	Fees/Grants/General Funds
<p>Programmatic Enhancements:</p> <ul style="list-style-type: none"> ◆ Encourage central wastewater in high density areas where degradation has or may be negatively impacted by individual on-site waste water disposal systems 	DNREC/DWR/GWDS	Continuous	UIC Grant/Fees

Milestones for Implementation:

WORK ACTIVITIES	LEAD IMPLEMENTATION AND COOPERATING AGENCIES	TARGET DATE FOR COMPLETION	FUNDING SOURCES
Continue to promote and expand Delaware's Septic Rehabilitation Program under the State's Revolving Loan Program.	DNREC/DWR/Underground Discharges Branch Facilities Support Branch	Continuous	SRF/NPS
Continue to support projects combining public participation and installation of innovative and alternative on-site wastewater treatment systems	DNREC/DWR/Underground Discharges Branch	Continuous	NPS 319(H) Grant
Continue to evaluate alternative technologies for the treatment of on-site commercial and residential wastewater.	DNREC/DWR/Underground Discharges Branch	Continuous	Grants/Fees/General Fund
Amend program by adding provisions to address the inspection of operating OSDS. Establish funding for inspection of operating OSDS.	DNREC, DWR	1999-2000	NPS 319, 6217, General Fund

Hazardous Wastes

EPA Subcategory Number 66



NPS
DELAWARE

INTRODUCTION

Hazardous wastes are produced as a result of current manufacturing processes that supply products we use daily; from food, clothing and shelter to health care products. Hazardous wastes may be lawfully managed in tanks and containers and in permitted units such as landfills, surface impoundments, and land treatment areas. However, when improperly managed, hazardous wastes or hazardous constituents may be released into air, soils, ground and surface waters.

It is the responsibility of the state's hazardous waste program to ensure that generators of hazardous waste properly manage the hazardous waste they generate, transport, treat or dispose of within the State of Delaware. Thus, in 1980, Delaware adopted 7 Del. C., Chapter 63, the Hazardous Waste Management Act. The statutory authority of 7 Del. C., Chapter 63 lead to the promulgation of the Delaware Regulations Governing Hazardous Waste (DRGHW), by which the state strives to protect human health and the environment. The scope of the DRGHW include all federal facilities located in the state. Proper management of hazardous waste is monitored via permitting activities for treatment, storage and disposal facilities (TSDFs), as well as transporter activities, and the incorporation of regulatory compliance assessment of sites and facilities which generate and manage hazardous wastes. Delaware is also active in RCRA corrective action, working jointly with EPA to address remediation of solid waste management units at eight current/former TSDFs.

There are no commercial hazardous waste management facilities in the state and thus commercial wastes are not imported into Delaware for treatment or disposal. Delaware has four active treatment, storage and/or disposal facilities (TSDFs). Each manages only on-site generated waste in storage units. One is also permitted to accept both on and off-site company generated hazardous wastes for incineration. None of the facilities are currently permitted to dispose of wastes in on-site hazardous waste units. DNREC has the authority to regulate and permit the physical siting,

design, construction and operation of hazardous waste disposal facilities and in August of 1991 developed a document that expands the existing regulatory criteria of hazardous waste facility siting. The Hazardous Waste Management Branch maintains a data base of generators and TSDFs statewide.

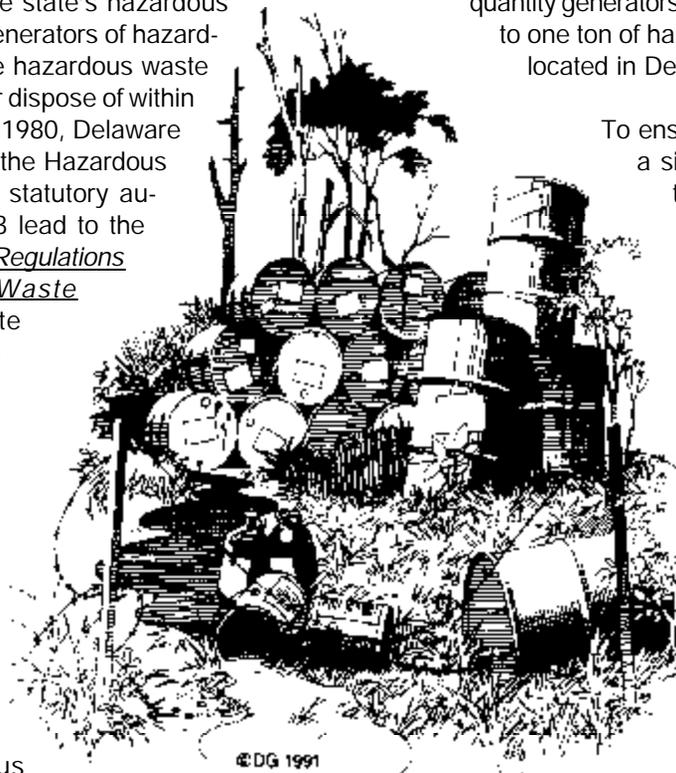
In addition to the permitted TSDFs, there are roughly 80 large quantity generators (producers of at least one ton of hazardous waste per calendar month) and over 400 small quantity generators (generators of between 220 pounds to one ton of hazardous waste per calendar month) located in Delaware.

To ensure hazardous waste generated by a site are managed properly, a cradle to grave manifest tracking system is required. The system tracks the waste from the point of generation to the ultimate point of disposal. Over the road transportation from point of origin to the disposal facility is conducted by state permitted transporters, with some railway transportation being employed as well.

The Delaware Department of Transportation (DelDOT) and the Department of Public Safety jointly enforce federal laws on hazardous waste transportation by the use of truck inspections at selected transportation sites. Delaware law allows the

state to regulate the transportation of these wastes, but there is no legislation to control the routing network throughout the state.

Current state authority includes a Delaware hazardous waste program encouraging waste minimization through education, permit requirements, enforcement and waste fees. The waste end assessment law was established to charge a fee based on the amount of hazardous wastes generated and the method of disposal, with land-disposed hazardous wastes incurring the highest fee. The fee affords a waiver for wastes reclaimed or reused under the resource recovery provision. This aids in industry awareness of effective waste minimization as an incentive tool.





INTRODUCTION (continued)

As required by the EPA and the Delaware Hazardous Waste Management Plan, the Hazardous Waste Management Branch developed a Hazardous Waste Capacity Assurance Plan (CAP) for Delaware. The CAP presents a detailed picture of how waste is managed within the State of Delaware. The CAP details Delaware's plan to ensure capacity via mechanisms such as interstate agreements, waste minimization, and siting facilities. As an extension to the plan, Delaware has undertaken a pollution prevention initiative in an attempt to decrease hazardous waste generation within the state. While in 1991 state hazardous waste generation was estimated at 20,500 tons, in 1996 22,517 tons were generated. Of this amount, approximately 88% of the hazardous wastes were exported to out-of-state disposal sites.

Delaware has regulations for the purpose of establishing requirements for the proper management of hazardous waste. These regulatory requirements also establish the basis for activities within the Hazardous Waste Management Branch. The foremost activities within the Hazardous Waste Management Branch follow.

- A. Conduct compliance assessments at hazardous waste generator sites to ensure compliance with regulatory and technical standards.
- B. Provide compliance assistance to hazardous waste generators through on-site visits, workshop and classroom instruction to encourage regulatory compliance.
- C. Enforce the provisions of the regulations and law to remedy non-compliance through informal and formal enforcement actions, as necessary

- D. Review hazardous waste transporter permit applications for completeness and technical appropriateness.
- E. Maintain equivalent regulatory authority with those of the federal program and maintain program authorization.
- F. Implement the hazardous waste permitting program via application review and the appropriateness of proposed treatment, storage and disposal methodologies and post closure monitoring.
- G. Provide adequate opportunity for public participation in permitting and legal actions.
- H. Implement a program of pollution prevention assistance to minimize hazardous waste generation within the state.
- I. Remediate past releases of hazardous waste at TSD's to protect ground water resources via implementation of the corrective action program.

Delaware's Hazardous Waste Management Branch provides for regulation of hazardous waste management activities within the state in a manner that reflects the policies established under the federal RCRA Subtitle C Program. Delaware has elected to require standards for performance on certain administrative methods which are "more stringent" than federal requirements. The scope of the Delaware HWMB activities is as broad in scope as that of the federal program.

Milestones for Implementation:

WORK ACTIVITIES	LEAD IMPLEMENTATION AND COOPERATING AGENCIES	TARGET DATE FOR COMPLETION	FUNDING SOURCES
Education of Hazardous Waste Generators through workshops and classroom instruction	DNREC/DAWM/HWMB	On-going	PPG
Conduct compliance assessments and offer compliance assistance	DNREC/DAWM/HWMB	On-going	PPG
Perform multi-program assessments (air,water,waste)	DNREC/DAWM/HWMB	On-going	PPG
Identify non-notifiers and achieve compliance	DNREC/DAWM/HWMB	On-going	PPG
Implement the hazardous waste transporter program	DNREC/DAWM/HWMB	On-going	Fees
Maintain TSDF permitting program	DNREC/DAWM/HWMB	On-going	PPG/Fees
Implement RCRA Corrective Action Program	DNREC/DAWM/HWMB	On-going	PPG
Waste end assessment program to encourage waste minimization and recycling	DNREC/DAWM/HWMB	On-going	Fees
Implement pollution prevention program to encourage utilization of best management practices and encourage waste reduction	DNREC/DAWM/HWMB	On-going	Core Grant CAP Section
Develop guidance document to encourage best management practices at salvage yards	DNREC/DAWM/HWMB DNREC/DWR/NPDES	1998	NPS Implementation Program Section 319

Hydrologic/Habitat Modification



NPS
DELAWARE

EPA Category Number 70

GOAL

The goal of this category is to manage activities which involve hydrologic/habitat modification in waters of the State in order to maintain their physical, chemical and biological integrity. This will be achieved through the planning and utilization of available best management practices (BMPs) and the development of innovative conservation measures.

It is acknowledged that often the most effective BMPs involve minimal alteration of natural systems. Implementation of Pollution Control Strategies/Watershed Restoration Action Strategies will be supported in order to comply with TMDLs and to meet the State's water quality standards.

INTRODUCTION

One form of hydromodification is channelization or channel modification. These terms (used interchangeably) describe river and stream channel engineering undertaken for the purpose of flood control, navigation, drainage improvement, and reduction of channel migration potential. Activities such as straightening, widening, deepening, or relocating existing stream channels and clearing or snagging operations fall into this category. These forms of hydromodifications typically result in more uniform channel cross sections, steeper stream gradients, and reduced average pool depths. The term flow alteration describes a category of hydromodification activities that result in either an increase or a decrease in the usual supply of fresh water to a stream, river, or estuary. Flow alterations include diversions, withdrawals, and impoundments. In rivers and streams, flow alteration can also result from undersized culverts, transportation embankments, tide gates, sluice gates, and weirs.¹



ally require regularly scheduled maintenance activities to preserve and maintain completed projects. These maintenance activities may also result in a continual disturbance of instream and riparian habitat. In some cases, there can be substantial displacement of instream habitat due to the magnitude of the changes in surface water quality, morphology and composition of the channel, stream hydraulics, and hydrology.³

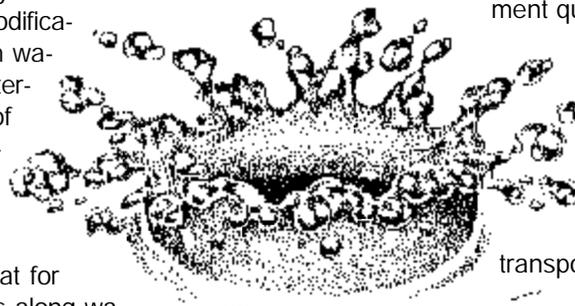
Excavation projects can result in reduced flushing, lowered dissolved oxygen levels, saltwater intrusion, loss of streamside vegetation, accelerated discharge of pollutants, and changed physical and chemical characteristics of bottom sediments in surface waters surrounding channelization or channel modification projects. Reduced flushing, in particular, can increase the deposition of finer-grained sediments and associated organic materials or other pollutants.⁴



Channel modification activities have deprived wetlands and estuarine shorelines of enriching sediments, changed the ability of natural systems to both absorb hydraulic energy and filter pollutants from surface waters, and caused interruptions in the different life stages of aquatic organisms (Sherwood et. al, 1990). Channel modification activities can also alter instream water temperature and sediment characteristics, as well as the rates and paths of sediment erosion, transport, and deposition. A frequent result of channelization and channel modification activities is a diminished suitability of instream and riparian habitat for fish and wildlife. Hardening of banks along waterways has eliminated instream and riparian habitat, decreased the quantity of organic matter entering aquatic systems, and increased the movement of NPS pollutants from the upper reaches of watersheds into coastal waters.²



The resulting changes to the distribution, amount, and timing of flows caused by flow alterations can affect a wide variety of living resources. Where tidal flow restrictors cause impoundments, there may be a loss of streamside vegetation, disruption of riparian habitat, changes in the historic plant and animal communities, and decline in sediment quality. Restricted flows can impede the movement of fish or crustaceans. Flow alteration can reduce the level of tidal flushing and the exchange rate for surface waters within coastal embayments, with resulting impacts on the quality of surface waters and on the rates and paths of sediment transport and deposition.⁵



For the purposes of this plan, the Hydrologic/Habitat Modification Category has been broken down into the following subcategory sources: 1) #71 Channelization and #74 Flow Regulation/Modification; 2) #72 Dredging; and 3) #77 Streambank Modification/Destabilization. Specific information pertaining to each of the subcategories referenced above can be found in the individual sections following this category section.

Channel modification projects undertaken in streams or rivers to straighten, enlarge, or relocate the channel usu-



MANAGEMENT AGENCIES FOR IMPLEMENTATION

DNREC, Division of Soil and Water Conservation, Drainage Section - This Section provides planning and organizational assistance for the planning, construction and maintenance of tax ditches to ensure the conservation of both agricultural and urban areas through improved water management. This Section is also responsible for maintaining the State's 2,000 miles of tax ditches. In 1989, the Section developed a model project, the Jordan Prong A Tax Ditch in northern Kent County for the implementation of BMPs and other experimental construction procedures. As designed and constructed, the project will protect and enhance valuable freshwater wetlands while providing much needed drainage for agricultural and residential areas.

◆ **Technical Assistance -**

- ◆ Conducts initial drainage investigations initiated by private landowner drainage complaints
- ◆ Assists with filing of tax ditch petitions
- ◆ Conducts detailed planning and formation of the water management system
- ◆ Conducts surveying for tax ditch design
- ◆ Finalizes tax ditch formation/legal process
- ◆ Supervises construction of tax ditches

◆ **Education Programs -**

- ◆ One-on-one contact with landowners
- ◆ Demonstration projects
- ◆ Public meetings
- ◆ Participates in tax ditch managers meeting

DNREC, Division of Soil and Water Conservation, Shoreline and Waterway Management Section - This Section provides for the improvement and maintenance of navigational channels in Delaware's waterways, the restoration of state-owned lakes and ponds, and the preservation of the state's coastline through dredging activities.

◆ **Technical Assistance -**

- ◆ BMP plan, design and implementation to constituents
- ◆ Referral to consultants

◆ **Education Programs-**

- ◆ Tours
- ◆ News releases/public meetings
- ◆ Talks/presentations to organizations
- ◆ One-on-one contact with constituents and legislators

For further information call: (302) 739-4411

DNREC, Division of Water Resources, Wetlands and Subaqueous Lands Section - This Section is charged with monitoring and preserving the health of the state's surface water quality, tidal wetlands and subaqueous lands. They also monitor stream water quality, conduct use attainability studies and develop basin management plans. The Section administers the state's wetlands regulations and subaqueous lands regulations, maintains an inventory of existing wetlands, issues wetlands/subaqueous lands permits and leases, and updates tidal wetlands maps. Provides for Section 401 water quality certifications for activities as proposed.





MANAGEMENT AGENCIES FOR IMPLEMENTATION continued

◆ **Technical Assistance -**

- ◆ Assist applicants with subaqueous land and tidal wetland application process
- ◆ Assist landowners in locating tidal wetlands on their property using State of Delaware Tidal Wetland Maps
- ◆ Advise landowners on the Army Corps of Engineers 404 and Section 10 Regulations
- ◆ Assist Tax Ditch Program in order to reduce impacts to subaqueous lands and wetlands

◆ **Education Programs -**

- ◆ Participate in public meetings/public hearings
- ◆ Talks/presentations to organizations
- ◆ One-on-one contact with constituents and legislators

DNREC, Division of Fish and Wildlife - this Division provides for the conservation and wise use of the state's fish and wildlife resources such as the protection of wild living resources and habitats.

◆ **Technical Assistance -**

- ◆ Conduct stream surveys
- ◆ Assist Tax Ditch Program to reduce impacts to fish and wildlife habitats

◆ **Education Programs -**

- ◆ Implement and oversee Adopt-A-Wetland Program in conjunction with the DNREC Wetlands Section
- ◆ Wetland activities for Delaware educators
- ◆ Field Wetland Ecosystem Educational Program (provided to every 5th grader in Delaware)
- ◆ Field and Classroom Approaches to Wetlands Education (Univ. of Del. Graduate Level Course)
- ◆ Tours/Talks/Presentations
- ◆ Demonstration Projects

For further information call: (302) 653-2882

DNREC, Division of Parks and Recreation - This Division protects and manages Delaware's State Parks. Its mission is to protect valuable natural resources within the state parks and to provide for the wise use of lands appropriate for outdoor recreation. The Division also provides park acquisition financial assistance to municipal and county agencies.

◆ **Management -**

- ◆ Improve buffers and streamside management in state parks
- ◆ Conduct analysis of streamside fields
- ◆ Determine streamside areas needing forested or vegetated buffers

- ◆ Develop a planting strategy and implement

◆ **Technical Assistance -**

- ◆ Assist municipalities and counties to determine where buffers and streamside management is needed on their parklands.

USDA, Natural Resources Conservation Service (NRCS) - The NRCS (formerly known as the Soil Conservation Service) is the lead technical agency in carrying out hydrologic modifications including impoundment construction and dug-out pond construction. These projects are for flood prevention, streambank stabilization, wildlife habitat development, wetland development, and agricultural water management systems.

◆ **Technical Assistance -**

- ◆ Best Management Practice (BMP) design, layout, and construction supervision

◆ **Education Programs -**

- ◆ Tours
- ◆ News releases/public meetings
- ◆ Talks
- ◆ One-on-one contact with landowners

Conservation Districts - The three Conservation Districts have the capability to deliver services to the individual landowner as the local people deal with water quality problems associated with nonpoint sources of pollution. They provide contractual services to facilitate environmentally balanced multi-disciplinary planning, application, and maintenance of BMPs to control erosion, sediment and improve water quality.

◆ **Technical Assistance -**

- ◆ Provide pre-construction services such as surveying, grading, and staking for tax ditch layout
- ◆ Conduct annual maintenance inspections of tax ditches three years old or older as follow-up to initial inspections conducted by the NRCS
- ◆ Make maintenance recommendations to tax ditch managers based on annual inspections

◆ **Education Programs -**

- ◆ Sponsors bi-annual tax ditch managers breakfast workshop



BEST MANAGEMENT PRACTICES (BMPs) AND/OR BEST AVAILABLE TECHNOLOGY (BAT)_____

- ◆ State of Delaware Dredging Program Best Management Practices Report
- ◆ Delaware Ponds Dredging Program Policy dated July 1984
- ◆ Natural Resources Conservation Service Technical Guide
- ◆ Tax Ditch Best Management Practices
- ◆ State of Delaware Tidal Wetland Maps
- ◆ National Wetland Inventory Maps
- ◆ Guidance Specifying Management Measures for Sources of Nonpoint Pollution in Coastal Waters (6217) dated January, 1993

STATE AUTHORITY (STATUTES AND/OR REGULATIONS):_____

- 7 **Del.C. Chapter 40** - Sediment and Stormwater Act
- 7 **Del.C. Chapter 41** - Drainage of Lands; Tax Ditches
- 7 **Del.C. Chapter 60** - Environmental Control Act
- 7 **Del.C. Chapter 66** - Wetlands Act
 - ◆ Wetlands Regulations, Adopted 12/23/76, revised 6/29/84
- 7 **Del.C. Chapter 72** - Subaqueous Lands Act
 - ◆ Regulations Governing the Use of Subaqueous Lands, Adopted 7/14/74, amended 6/23/83
- 7 **Del.C. Chapter 68** - Beach Preservation Act

FEDERAL REGULATIONS_____

33 CFR Parts 320-330

Clean Water Act of 1987, Section 404 and 401

Rivers and Harbors Act of 1899, Sections 9 and 10

NOTES_____

1. **U.S. Environmental Protection Agency**, Office of Water, Guidance Specifying Management Measures For Sources of Nonpoint Pollution in Coastal Waters, Washington, DC, Jan. 1993.
2. **Ibid.**
3. **Ibid.**
4. **Ibid.**
5. **Ibid.**



INTRODUCTION

As a coastal plain state with high water table soils, drainage/channelization has become a part of the state's infrastructure for both the rural and urban landscape. Most drainage activities are carried out by tax ditch organizations which are authorized under State law (7 Del. Code, Chapter 41) and guided by the DNREC, Division of Soil and Water Conservation. To date, over 289 individual tax ditch organizations have been formed throughout the State. These organizations range in size from the 56,000 acre Marshyhope Creek Tax Ditch to a 2 acre system in suburban Wilmington. These organizations manage over 2,000 miles of drainage ways and provide both direct and indirect benefits to about 100,000 people and about 1/2 of the state maintained roads. Projects proposed through tax ditch organizations must enter into a construction/operation/maintenance agreement with the local conservation district and the DNREC. These agreements assure that certain BMP standards are met.



Approximately 71% of the tax ditch organizations within the State are located within the Chesapeake Drainage Basin. Within the Chesapeake Basin, there are currently 206 tax ditch organizations containing approximately 1,500 miles of rights-of-way established for tax ditch management. These channels provide drainage, and flood protection for approximately 292,000 acres or 65% of the basin area. It is estimated that an additional 1,500 miles of private channels exist within this basin.



In Delaware, over 50 miles (80.5 km) per year of tax ditches are reconstructed to serve as outlets for on-farm conservation practices. Typically these projects are developed for tax ditch organizations in the coastal plain region having 10 to 15 miles (16 to 24 km) of channels to be reconstructed. Urban areas and small towns also rely on these channels for flood protection and drainage.¹ The Conservation Districts have been leading the way in balancing the need to drain farmland with the need to protect wetland areas by demonstrating new, environmentally advanced construction techniques for tax ditches. Recent channel reconstruction efforts in Delaware have demonstrated that natural resource impacts can be minimized, resulting in the re-evaluation of how channels are planned for reconstruction. A rigorous review process has been ini-



tiated for project development and implementation. This review process addresses concerns from numerous federal, state and local agencies, all of which provide comments that are incorporated into the development process and final plan.

These extensive reviews insure that environmental impacts are avoided to the maximum extent possible, and compensated for when unavoidable. Implementation of this process over the past ten (10) years has resulted in the development of a detailed list of field tested and proven environmental practices that minimize impacts. This list has now been incorporated into a guidance document entitled, "Delaware Tax Ditch Best Management Practices (BMPs)". These BMPs are routinely used by resource managers and planners on all water management projects. Below is a synopsis of a few of the most utilized BMPs:



- ◆ Minimize clearing widths
- ◆ Relocate channels around sensitive areas
- ◆ One-sided construction
- ◆ Save trees within construction zone
- ◆ Minimize construction of downstream outlets
- ◆ Install berm along wetlands with side inlet pipes at or above biological benchmarks
- ◆ Block off old channels which drain only wetland areas

Wetland impacts are now weighed against drainage benefits prior to recommending reconstruction of deteriorated channels.² Individually the steps consist first of avoidance of impacts to wetlands to the maximum extent possible, then minimizing the impacts where they cannot be avoided, and finally, compensation for unavoidable impacts by restoring previously drained wetlands, enhancing existing low value wetlands, and creating wetlands in upland areas.³ Whenever possible, the reconstruction involves less excavation of the downstream area in order to minimize impacts to receiving waters. One technique which is frequently used is to berm one side of the ditch to avoid draining adjacent wetlands, while also allowing for drainage of farm field on the other side.⁴

During the initial tax ditch planning process, the Division of Soil and Water Conservation, Drainage Section requests assistance from the DNREC Wetland Section for an evaluation of the wetland resources in the project area. Additional assistance is also provided by the USDA Natural



INTRODUCTION continued

Resource Conservation Service State Biologist in evaluating the project impacts and determining the potential for violation of the USDA Food Security Act (FSA) provisions for individual farms and properties.⁵ Other concerns which are addressed in the pre-planning stage include: riparian vegetation; wildlife; fisheries, sedimentation during construction; reestablishing vegetation; control structures for water retention; water quality; drainage benefits; and operation and future maintenance.



In 1991 and 1992, wetlands training sessions were held for equipment operators, construction managers, tax ditch planners, surveyors, construction inspectors, and design engineers and technicians involved in tax ditch projects. These sessions have significantly improved the understanding of the project staff on the construction, impacts to wetlands and why we need to conserve and manage them.⁶ Other wetland protection measures can include the installation of water control structures to allow for manipulation of the ground water elevations in adjacent wetlands. The use of water control structures to raise the water surface elevation in channels, when full drainage draw down is not needed, can reduce lateral ground water flow from a wetland into a channel, thus extending the hydro period of the wetland. These structures range in price from \$2,500 to over \$15,000 and have the added benefit of providing for sediment retention and nutrient reduction.⁷



In addition, the shallow water table in farm fields can be managed for crop availability with water control structures in tax ditches. In the early spring, water is allowed to flow freely so that fields will dry out for planting. Under dry conditions, water control structures are used to dam ditches so that the water backs up. The shallow water table in fields rises and becomes available for crop uptake.

Tax ditch water control structures have also been used to reduce nitrogen loading to surface waters. If the ditches are dammed up and fields stay saturated, anaerobic conditions will increase denitrification. Nitrogen is released to the atmosphere rather than delivered to streams. However, this has raised questions about the potential for phosphorus release under these conditions.

Sims, et.al (1996) found that water control structures installed at the outlet of a ditch system affected the nutrient interactions between ground-water and surface water and in the ditch sediments to the extent that impoundment of wa-

ter behind the structure promotes anaerobic conditions through trapping and degradation of organic matter in the ditch. It was also found to affect ground water levels in the watershed upstream of the structure. During periods of low water levels, anaerobic conditions developed in the surface water and adjacent ground water where impoundment slows ground-water discharge. These conditions promote mobility of P in ditch sediments and in the ground-water system adjacent to the ditches by releasing P from iron oxides and organic matter. During periods of high water levels, ground-water discharge to the ditch effectively flushes anaerobic water containing elevated P concentrations from the near-ditch sediments into surface water.

The Division of Soil and Water Conservation has recently become increasingly involved in David Rosgen's Geomorphologic approach to streambank restoration and channelization. As a result of the Nonpoint Source Program sponsoring the one week introductory level course, the State Drainage Engineer has completed the full five week training on Rosgen's Technology. To compliment this effort, the U.S. Fish and Wildlife Service targeted funds towards a demonstration project which employed Rosgen technology.

This demonstration project is located at the Pratt Farm (near Kenton, DE) and involves the restoration of approximately eight acres of wetlands in agricultural fields, fifteen acres of wooded wetland enhancement, 3/4 mile of unique channel construction and 1,200 feet of channel construction (Rosgen's E₆ channel) specifically utilizing the geomorphic approach. This pilot project has acquired the interest of many agency personnel throughout the northeast region of the U.S. We plan to further explore this technology and apply it to our projects as much as possible. This geomorphic approach will take special conditions and extremely cooperative landowners for its acceptance. Also, the cost for implementing Rosgen technology may be prohibitive without the aid of federal or state cost-share.



According to the 1995, NPS Assessment Report, the effects of tax ditches on sediment transport have not been documented in Delaware.

Improving drainage increases infiltration and decreases overland flow. However, if buffer strips are not properly maintained, sediment transport may be enhanced. Throughout ditch construction, sediment traps are incorporated to reduce sediment transport.



Milestones for Implementation:

WORK ACTIVITIES	LEAD IMPLEMENTATION AND COOPERATING AGENCIES	TARGET DATE FOR COMPLETION	FUNDING SOURCES
Continue to conduct research on the use of water control structures on modified channels ♦ Evaluate potential for P losses from soils and sediments (N1)	DNREC, Division of Soil and Water Conservation, Drainage Section w/CES, Univ. of Del. and NRCS	On-going	NPS 319 State General Funds
Distribute Tax Ditch BMP Handbook for the planning & construction of Tax Ditches to appropriate agencies and tax ditch community	DNREC, Division of Soil and Water Conservation, Drainage Section w/NRCS	On-going	State General Funds
Develop informational tax ditch maintenance pamphlet for tax ditch managers by extracting information from the BMP Handbook	DNREC, Division of Soil and Water Conservation, Drainage Section	1998-99	State General Funds
<p>Further increase the utilization of BMPs on tax ditch reconstruction and maintenance projects. Promote the development of new/innovative BMPs as well as conduct research on other states construction practices (technology transfer) (N1)</p> <p>Develop a process to address eroding streambanks and shorelines causing NPS problems which are not reviewed by existing authorities (6217 Condition) (S3)</p> <p>Develop a GIS streamside and buffer module for state parks</p> <p>Implement streamside and buffer planting (CWAP)</p>	<p>DNREC, Division of Soil Water Conservation, Drainage Section</p> <p>DNREC</p> <p>DNREC, Division of Parks and Recreation</p> <p>DNREC, Division of Parks and Recreation</p>	<p>On-going</p> <p>1999</p> <p>1999-2002</p> <p>2000-2004</p>	<p>NPS 319 State General Funds</p> <p>DCMP 6217 Funds, NPS 319, State General Funds, other sources</p> <p>NPS 319, State Park Revenue, 21st Century Fund</p> <p>NPS 319, State Park Revenue, 21st Century Fund</p>

Milestones for Implementation:

WORK ACTIVITIES	LEAD IMPLEMENTATION AND COOPERATING AGENCIES	TARGET DATE FOR COMPLETION	FUNDING SOURCES
<p>Conduct agricultural nutrient runoff monitoring project utilizing created wetlands to capture nutrients and sediments</p> <p>◆ Finalize and report on monitoring data (Webber) (N1)</p>	<p>DNREC, Division of Soil and Water Conservation, Drainage Section, Delaware Coastal Management Program</p>	<p>1998-99</p>	<p>NPS 319, grant funds, State General Funds</p>
<p>Provide education and conduct demonstration projects on improved methods for wetland restoration/creation in order to meet/exceed EPA and COE regulations (CWAP)</p>	<p>DNREC, Division of Soil and Water Conservation, Drainage Section w/DNREC Wetlands Section</p>	<p>On-going</p>	<p>Unknown</p>
<p>Participate on a Tax Ditch Subcommittee under the direction of the DNREC Whole Basin Coordination Team. The subcommittee purpose would be to evaluate current tax ditch construction and maintenance practices including BMPs in order to address the impaired waters identified in the 303(d) list based on habitat and biology for the establishment of TMDLs. Incorporate Rosgen fluvial morphology into the current Tax Ditch Program where economically feasible. (N1, S3)</p>	<p>Division of Soil and Water, Drainage Section, Nonpoint Source Program, U.S. Fish and Wildlife, State Division of Fish and Wildlife, and NRCS</p>	<p>On-going</p>	<p>NPS 319, grant funds, State General Funds</p>
<p>Continue research into lateral ground water flow next to tax ditched waterways and how this affects the movement of nutrients. Develop and implement new construction/management practices for nutrient removal in ditch systems. (N1)</p>	<p>DNREC, Nonpoint Source Program, Drainage Section, University of Delaware, and NRCS</p>	<p>1998-2000</p>	<p>Unknown</p>



INTRODUCTION

Dredging is the process of hydraulically or mechanically excavating bottom sediments in waterways to create or maintain navigable channels for recreational or commercial boating purposes. In Delaware, a state which operates its own dredge program, dredging takes on added significance as an effective method for: 1) beach restoration activities along the bay and ocean coastline; 2) removing unwanted sediments and aquatic vegetation from state-owned ponds and lakes; as well as, 3) controlling sediment deposits in inland waters.



In most cases, dredging involves removing sediment, whether silt, sand or gravel, from a physical, chemical and biological system in equilibrium. The major impacts of such activity are physical alteration of the bottom and resuspension of bottom sediments. The sediment is home, food and protection to a wide variety of organisms which may be commercially important themselves or food for such harvestable resources. Removal of bottom material destroys benthic organisms which inhabit the substrate. In addition, dredging causes an increase in turbidity and, in some instances, may cause the release of toxins attached to the bottom sediments.

On the basis of previous studies and over twenty years experience in the dredging field, all indications are that dredging operations conducted by the DNREC, Division of Soil and Water Conservation impose no serious or long-term damage to the estuarine environment. Recolonization of benthic fauna usually occurs within a period of several months to a year. Depths of dredged channels are generally shallow (4 to 6 feet below mean low water), so that the stream bottom still lies within the euphotic zone. Generation of suspended sediments and increased water turbidity during dredging activities is localized and temporary, and less than turbidity levels created by natural processes, such as storm events and wind stress on the shallow waters of the Inland Bays and creeks. Sediments dredged from the state's inland waters (e.g. Inland Bays estuaries, state owned ponds) have historically been clean (e.g. low levels of heavy metals, no detectable PCB's) which minimizes the pollution potential. In addition, the dredging and disposal techniques utilized by the state are considered to be the least environmentally damaging of all dredging and disposal methods. State dredging operations are conducted with hydraulic cutterhead suction dredges. In this method, material is removed with a



rotary cutter, picked up with dilution water by suction pipe, and transported through the pump and discharge line. This method produces less agitation and resuspension of bottom material than mechanical dredges, such as the clamshell dredge. Excavated material is disposed via pipeline in a confined, upland disposal facility, which significantly diminishes potential damage to the estuarine environment.

In Delaware, dredging operations, both public and private, are regulated and permitted through the DNREC and the U.S. Army Corps of Engineers. State regulations are handled through the Wetlands and Subaqueous Lands Section of the DNREC, under the Subaqueous Lands Act and the Wetlands Law. The State also issues 401 Water Quality Certification for dredging projects. Prior to the issuance of a Federal permit by the U.S. Army Corps of Engineers (Philadelphia District), a permit application and any supporting documentation must be reviewed and approved by both Federal and State resource agencies, including the U.S. Environmental Protection Agency, the National Marine Fisheries Service, the U.S. Fish and Wildlife Service, the State Division of Historic and Cultural Affairs, and the Delaware Coastal Management Program. After all comments are received, the Corps decides whether or not a permit should be issued under its regulatory statutes described in Section 10 of the Rivers and Harbors Act of 1899 (33 U.S.C. 403) and Section 404 of the Clean Water Act of 1972 (33 U.S.C. 1344). Because the potential exists for significant negative and irreversible impact, both State and Federal regulators have chosen to take a highly conservative approach where dredging is concerned. This approach demands that sufficient information be supplied to the permitting agencies which deal with dredging projects.



Milestones for Implementation:

WORK ACTIVITIES	LEAD IMPLEMENTATION AND COOPERATING AGENCIES	TARGET DATE FOR COMPLETION	FUNDING SOURCES
Work with the Army Corps of Engineers (Philadelphia and Baltimore Offices) for improved information exchange on past and future navigation projects (i.e. scheduling, description of past activities)	DNREC, Division of Soil and Water Conservation	On-going	State General Funds
Establish database to improve project evaluation capabilities	DNREC, Division of Soil and Water Conservation	On-going	State General Funds
<p>Review and update the DNREC "Inland Bays Dredging Plan" to protect important habitats</p> <ul style="list-style-type: none"> ◆ Apply most current habitat and living resource impact assessment methods ◆ Insure dredging projects reflect the best dredging technologies and methodologies to minimize adverse impacts ◆ Codify plan into DNREC "Regulations Governing the Use of Subaqueous Lands" 	DNREC, Division of Soil and Water Conservation and Division of Water Resources	1998 - 1999	State General Funds
Develop and adopt Statewide Dredging Activity Analysis and Management System	DNREC, Division of Soil and Water Conservation, Delaware Coastal Management Program	1999	Federal Grant



INTRODUCTION

The force of water flowing in a river or stream can be regarded as the main cause of erosion to a streambank. All of the eroded material is carried downstream and deposited in the channel bottom or in point bars located along the bends in the waterway. The seepage of ground water and overland flow of surface water runoff can also contribute to the erosion of streambanks and shorelines. The erosion of shorelines and streambanks is a natural process that can have either beneficial or adverse impacts on the creation and maintenance of riparian habitat. Sands and gravels that erode from streambanks and are deposited in channels are used as instream habitat during the life stages of many benthic organisms and fish. The finer-grained silts and clays derived from the erosion of shorelines and streambanks are sorted and carried as far as the quiet waters of wetlands or tidal flats, where benefits are derived from addition of the new material. There are also adverse impacts from shoreline and streambank erosion. Excessively high sediment loads can smother submerged aquatic vegetation (SAV) beds, cover shellfish beds and tidal flats, and contribute to increased levels of turbidity and nutrients.¹

Examples of some direct methods for streambank protection include stone riprap revetment, erosion control fabrics and mats, revegetation, burlap sacks, cellular concrete blocks, and bulkheads. Indirect methods include dikes, wire or board fences, gabions, and stone longitudinal dikes. The use of these practices depends on the engineering design of the structure, the availability and cost of the protecting material, the extent of bank erosion, and specific site conditions such as the flow velocity, channel

depth, inundation characteristics, and geotechnical characteristics of the bank. The use of vegetation alone or in combination with other structural practices, when appropriate, would further reduce the engineering and maintenance efforts.²

Within the DNREC, the Division of Water Resources, Wetlands and Subaqueous Lands Section regulates any activities within navigable or potentially navigable waterways throughout Delaware. This is accomplished through the Subaqueous Lands Law, 7 Del. Code, Chapter 72. All proposed projects, including streambank work, must first obtain a permit and proceed through some level of environmental review. The Tidal Wetlands Law, 7 Del. Code, Chapter 66, regulates any work which occurs in State mapped tidal wetlands including streambank work. The Wetlands and Subaqueous Lands Section also issues two General Permits for the Corps of Engineers (SPGP-18 and SPGP-20) that permit streambank work and other projects to occur as long as they have been reviewed through the State permit process.

Over the past five years, the Wetlands and Subaqueous Lands Section has incorporated a new policy/review criteria for streambank/shoreline stabilization. This review criteria requires the applicant to prove, through engineering supported reasons, that a more natural stabilization cannot be used before the use of a vertical wall (bulkhead). Riprap stone revetment and vegetative stabilization are now commonly used by landowners who have eroding streambanks/shorelines. This accomplishes the goals of reducing the sediment loading into the waterway, improving the water quality, and improving the streambank/shoreline habitat interaction for the water-land ecotone.

NOTES

1. **U.S. Environmental Protection Agency**, Office of Water, Guidance Specifying Management Measures For Sources of Nonpoint Pollution in Coastal Waters, Washington, DC, Jan. 1993.

2. **Ibid.**

Milestones for Implementation:

WORK ACTIVITIES	LEAD IMPLEMENTATION AND COOPERATING AGENCIES	TARGET DATE FOR COMPLETION	FUNDING SOURCES
Conduct demonstration projects for rip-rap/vegetative stabilization	DNREC, Division of Water Resources	On-going	Unknown
Research wooded riparian areas for streambank stabilization and water quality benefits	DNREC, Division of Soil and Water, Division of Water Resources, and NRCS	On-going	Unknown
Seek alternative methods for stream diversion (temporary & permanent) as part of construction projects	DNREC, Division of Soil and Water, DELDOT, and Conservation Districts	On-going	Unknown
Provide technical assistance to land and pond owners on water quality, habitat enhancement, pesticide use and the benefits of buffer strips, etc.	DNREC, Division of Fish and Wildlife	On-going	Federal (U.S. Fish and Wildlife Service) and State Funds
Conduct evaluation of flow modification to high level impoundments to minimize adverse effects on aquatic organisms and water quality	DNREC, Division of Fish and Wildlife	On-going since 1986	Federal (U.S. Fish and Wildlife Service) and State Funds
Develop technique updates for Open Marsh Water Management (tidal wetlands only)	DNREC, Division of Fish and Wildlife	On-going since 1979	State Funds
Reduce pesticide usage through Open Marsh Water Management (OMWM); convert to less harsh pesticides where OMWM not applicable	DNREC, Division of Fish and Wildlife	On-going since 1979	State Funds
Promote managed beaver population growth and associated dams with significant effect on water quality improvement	DNREC, Division of Fish and Wildlife	On-going	State Funds

Milestones for Implementation:

WORK ACTIVITIES	LEAD IMPLEMENTATION AND COOPERATING AGENCIES	TARGET DATE FOR COMPLETION	FUNDING SOURCES
<p>Impoundment restoration for NPS pollution: Restoration activities in coastal impoundments. Broad Dyke Marsh completed in 1995; Augustine Creek Marsh and Army Creek scheduled completion 1998. Planned: Artesian, Nonesuch Creek for 1999 (TA N6)</p>	<p>DNREC, Division of Fish and Wildlife, Mosquito Control Section; EPA and NOAA</p>	<p>1998-1999</p>	<p>NOAA and EPA</p>
<p>Evaluation and monitoring of fish habitat including effects of land use in the tidal tributaries of Delaware Bay and the Inland Bays. The Nanticoke River is scheduled to follow completion of the Inland Bays (TA S3)</p>	<p>DNREC, Division of Fish and Wildlife</p>	<p>1996-2000</p>	<p>Federal (U.S. Fish and Wildlife) and Wallop Breaux</p>

Other Sources of Nonpoint Source Pollution



NPS

DELAWARE

EPA CATEGORY NUMBER 80

GOAL

The protection of public health, welfare, and the environment is the primary emphasis of this category. Milestones within this category/subcategories will strive to achieve quantifiable net reductions of pollutant and air contaminant releases. The expected net reductions will prevent further degradation of surface and ground water as well as improve air quality.

To attain this goal, the following areas will be addressed:

- ◆ air emission reductions;
- ◆ educate and cooperate with the regulated and non-regulated community;
- ◆ a more holistic approach to protecting water resources by considering ground water and surface

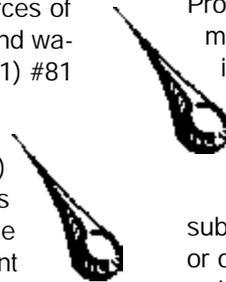
water concerns equally;

- ◆ identification, control and remediation of leaking storage tanks and hazardous substance release sites;
- ◆ clean-up of hazardous substance release sites;
- ◆ minimize impacts from accidental releases;
- ◆ improve emergency preparedness; and
- ◆ increase pollution prevention procedures for the operation and maintenance of roads, highways, and bridges.

Implementation of Pollution Control Strategies/Watershed Restoration Action Strategies will be supported in order to comply with TMDLs and to meet the State's water quality standards.

INTRODUCTION

This NPS category addresses the "other" sources of pollutants that impact the State's surface and ground waters. These subcategories include the following: 1) #81 Atmospheric Deposition; 2) #82 Waste Storage/Storage Tanks; 3) #83 Highway Maintenance and Run-off; 4) #84 Spills; 5) #85 In-Place Contaminants; 6) #86 Natural; and 7) a Subcategory on Marinas (this has no assigned EPA Subcategory #). Since the adoption of Delaware's Nonpoint Source Management



Program in 1988, many new initiatives have been implemented and program expansion has occurred. Specific information pertaining to each of the subcategories referenced above is contained in the pages following this section. Each subcategory section contains a synopsis of the pollutant problems and what is currently being done to address these concerns. Also, each subcategory contains a table that outlines the milestones or objectives that management agencies will implement to reduce these sources of nonpoint source pollution.

MANAGEMENT AGENCIES FOR IMPLEMENTATION

DNREC, Division of Air and Waste Management, Air Resources Section - This Section is responsible for controlling air pollution emissions so that the ambient air quality satisfies ambient air standards established to protect public health. In addition, they maintain emission inventories from business and industry. In 1993, the section processed 285 new industrial permits, conducted 106 inspections of facilities, and collected 124,000+/- air quality samples.

◆ Technical Assistance -

- ◆ monitors air quality
- ◆ inspects asbestos removal sites
- ◆ inspects air contaminant sources
- ◆ oversees vehicle emission testing
- ◆ generates emissions inventories
- ◆ generates State Implementation Plans (SIPs) for progress and attainment of the ozone National Ambient Air Quality Standards (NAAQS)



◆ Education Programs -

- ◆ Clean Air Program implemented thru/by DELDOT
- ◆ present lectures to school groups of various ages
- ◆ sponsor workshops and hearings on various subjects for the benefit of the public, special interest groups and affected parties within the public and private sectors.
- ◆ participates in Ozone Action Partnership to forecast high ground-level and issues an advisory to the general public, industry and media calling for Ozone Action Day
- ◆ Public Service Announcements (PSAs) on radio for ozone season ban of open burning and leaf burning ban in fall
- ◆ distributes open burning video and curriculum for school children
- ◆ distributes Open Burning brochures to the public
- ◆ open burning displays at State Fair and Coast Day
- ◆ makes the "Home Owners Guide to Open Burning" available to the general public.



MANAGEMENT AGENCIES FOR IMPLEMENTATION (continued)

DNREC, Division of Air and Waste Management, Waste Management Section - This Section is responsible for implementing the program designed to clean up the State's hazardous waste sites not considered a sufficient threat to public health or the environment to be placed on the federal "Superfund" National Priorities List. The Section also administers the State's solid and hazardous waste programs, and responds and oversees the cleanup of environmental emergencies such as spills and the release of other hazardous substances. Between 1992-93, the Section responded to 915 emergency release incidents. The Underground Storage Tank Program is also housed in this section.

◆ Technical Assistance -

- ◆ Ensure that hazardous wastes currently being generated are stored, transported, treated and disposed of in a safe manner.
- ◆ Help in the effective cleanup of the worst abandoned hazardous waste disposal sites listed on the EPA National Priorities List.
- ◆ Emergency response to spills and other releases of hazardous substances

◆ Education Programs -

- ◆ Set-up displays at events such as the Delaware State Fair and Coast Day, etc.
- ◆ Conducts informational workshops

DNREC, Division of Water Resources, Water Supply Section and Ground Water Discharges Section -

These sections are responsible for monitoring and protecting the quality of ground water supplies throughout the State and issues permits for water wells, septic systems, wastewater spray irrigation systems, and other systems associated with wastewater treatment.

◆ Technical Assistance -

- ◆ Inspects domestic wells after completion to ensure proper construction
- ◆ Pre-screen well locations to ensure that they are not installed in areas with known ground-water contamination

- ◆ Assist the public and consultants with general questions concerning ground-water quality
- ◆ Conduct investigations of areas with suspected ground-water contamination problems
- ◆ Monitor and regulate the quantity of water being extracted from confined aquifers of the State to ensure future water supply
- ◆ Comprehensive State Ground Water Protection Program development
- ◆ Wellhead Protection Program development
- ◆ Coordinate with the Delaware Department of Agriculture on the Pesticide Management Plan

◆ Education Programs -

- ◆ Visits schools to educate children and adolescents about the ground-water resources in the State
- ◆ Set-up display booths at public functions such as the State Fair, Earth Day, etc. to educate the public about ground-water
- ◆ Attend public meetings
- ◆ Distribute educational publications and pamphlets

Delaware Department of Transportation (DelDOT), Division of Highways -

◆ Technical Assistance -

- ◆ Performs maintenance reviews of existing stormwater management facilities
- ◆ Conducts roadside maintenance activities involving the application of pesticides and herbicides by trained and certified staff
- ◆ Maintains roadside grasses and vegetation to act as natural filters

◆ Education Programs -

- ◆ Requires responsible personnel to attend DNREC Sediment and Stormwater Certification Courses

BEST MANAGEMENT PRACTICES AND/OR BEST AVAILABLE TECHNOLOGY

◆ DNREC Ground Water Sampling Manual

(currently under revision)

- ◆ EPA Septic System Guidance
- ◆ EPA and DNREC Wastewater Spray Irrigation Guidance

◆ Regulations Governing Water Well Construction

◆ Monitor Well Construction Guidelines

◆ Regulations Governing the Allocation of Water

- ◆ Regulations for Licensing Water Well Contractors, Pump Installer Contractors, Well Drillers, Well Drivers, and Pump Installers



STATE AUTHORITY (STATUTES AND/OR REGULATIONS)

7 Del.C. Chapter 60 - Environmental Control Act

- ◆ Regulations Governing the Control of Air Pollution, Last Revised 1998
- ◆ Reporting of a Discharge of a Pollutant or an Air Contaminant, Effective 4/1/91

7 Del.C. Chapter 62 - Oil Pollution Liability Act

7 Del.C. Chapter 63 - Hazardous Waste Management Act

- ◆ Regulations Governing Hazardous Waste, Amended 6/19/92
- ◆ Regulations Governing the Location of Hazardous Waste Storage, Treatment and Disposal Facilities, Effective 8/1/91

7 Del.C. Chapter 67 - Motor Vehicle Emissions Act

7 Del.C. Chapter 74 - Delaware Underground Storage Tank Act

7 Del.C. Chapter 77 - Extremely Hazardous Substances Risk Management Act

- ◆ Regulations for the Management of Extremely Hazardous Substances, Adopted 9/15/89, Last Revised in 1998

7 Del.C. Chapter 91 - Delaware Hazardous Substance Cleanup Act

FEDERAL REGULATIONS

- ◆ Regulations Governing Underground Storage Tank Systems, Adopted 7/11/86, Amended 9/26/90

- ◆ Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)

- ◆ Resource Conservation and Recovery Act (RCRA)

- ◆ Superfund Amendments and Reauthorization Act (SARA)

- ◆ Clean Air Act

Atmospheric Deposition



NPS
DELAWARE

EPA Subcategory Number 81

INTRODUCTION

Pollution Deposition:

Atmospheric Deposition is a major source of nitrogen and other chemicals onto the land and water surfaces of Delaware significantly contributing to non-point source pollution. Using data from taken by the National Atmospheric Deposition Program (NADP) sites at Lewes, Delaware and Wye, Maryland regional estimated levels and loading rates can be determined. Some precipitation characteristics and annual loadings for the region are an average pH of 4.4, sulfate deposition of 17 lbs/ac, and chloride deposition of 4.4 lbs/ac. Acid rain can harm aquatic life in lakes and streams and damage vegetation. Nitrogen compounds can also affect rainwater acidity and add to the nitrate load (excess nutrients) of water bodies.

Nitrogen in the precipitation has been analyzed closely using a comparison of data from the same precipitation events for the two sites indicating a high correlation for nitrates (NO_3^-) with a correlation r^2 of 0.851. Ammonia (NH_4^+), however, did not have a high correlation with an r^2 of 0.181. This would tend to indicate that the ammonia values are highly influenced by local conditions while the concentration of nitrates in wet deposition are due to more regional influences.

An analysis done by the University of Delaware, Center for Climactic Research showed the highest concentrations of nitrogen in storms whose tracks passed just south of the Great Lakes region. Research by the University of Delaware College of Marine Studies indicates a long-term rise in the ammonia levels and predicts nitrogen from ammonia will soon equal nitrate nitrogen concentrations. A five-year average of data from Lewes, DE revealed an average ammonia concentration of 0.25 mg/l and a nitrate concentration mean of 1.5 mg/l. These values result in a nitrogen-loading rate of close to 3.5 lbs/ac from nitrates and over 2.0 lbs/ac from ammonia for a combined total of 5.5 lbs/ac of nitrogen from wet deposition.

Due to the difficulty in measurement and the wide variability in amounts of dry deposition, the accepted protocol is to measure dry deposition as equal to wet deposition. Therefore, the total estimated annual loading of nitrogen from atmospheric deposition in Delaware is over 11 lbs/ac.

For a determination of individual precipitation event deposition, an event mean concentration of nitrogen is calculated using a log-transformation of the data. The data set used includes over five hundred precipitation events. The event mean concentrations of these numbers are 1.5 mg/l of nitrates and 0.25 mg/l of ammonia. When these are bro-

ken down for their nitrogen contribution, the loading becomes 0.34 mg/l of N from nitrate and 0.20 mg/l of N from ammonia for a total event mean concentration loading of 0.54 mg/l of nitrogen in local precipitation.

In a recent central Delaware stormwater monitoring study conducted by the Delaware Coastal Management Program (DCMP), the nitrogen loading from wet deposition accounted from 20 to over 50 percent of the nitrogen in stormwater runoff depending on landuse. When only ammonia and nitrates are considered, from 60 to 98 percent of the nitrogen came from wet atmospheric deposition.

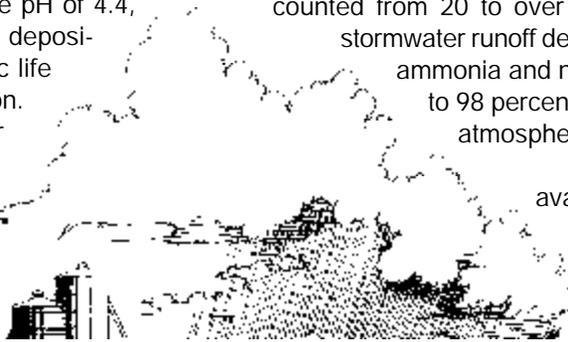
Based on the information available two problem areas arise.

1) What chemicals in the wet atmospheric deposition are influenced by local emissions and influences, what is the extent of these influences and can they be controlled? 2) Of the items in precipitation that appear to be regional in nature, where are the sources or how large is the airshed for Delaware based on different storm tracks and can we control regional influences and sources?

In order to answer these questions, and improve decision-making on the most effective NPS measures to implement, additional information is required. A local sampling network should be developed at a spatial resolution that will allow the determination of both local and regional contributions and influences on atmospheric deposition. In addition an in-depth analysis of climactic events needs to be performed to accurately develop an airshed for Delaware to determine the potential sources of pollutants that effect Delaware based on different storm tracks.

Air Quality:

Delaware has been measuring air quality for over 20 years and is required by federal statute to monitor levels of specific gases known as criteria pollutants on an hourly basis. Of all the air pollutants that are monitored and have clean air standards, only ozone occurs at levels that are above the federal standard and are classified as unhealthy. One of the primary thrusts of the Clean Air Act Amendments of 1990 is the control of ozone, which is a major constituent of "smog", and as a result, the major activity in Delaware's air program has been concentrated on ozone. One of the very important, and beneficial spin-offs of these



Atmospheric Deposition

EPA Subcategory Number 81



NPS

DELAWARE

INTRODUCTION con't

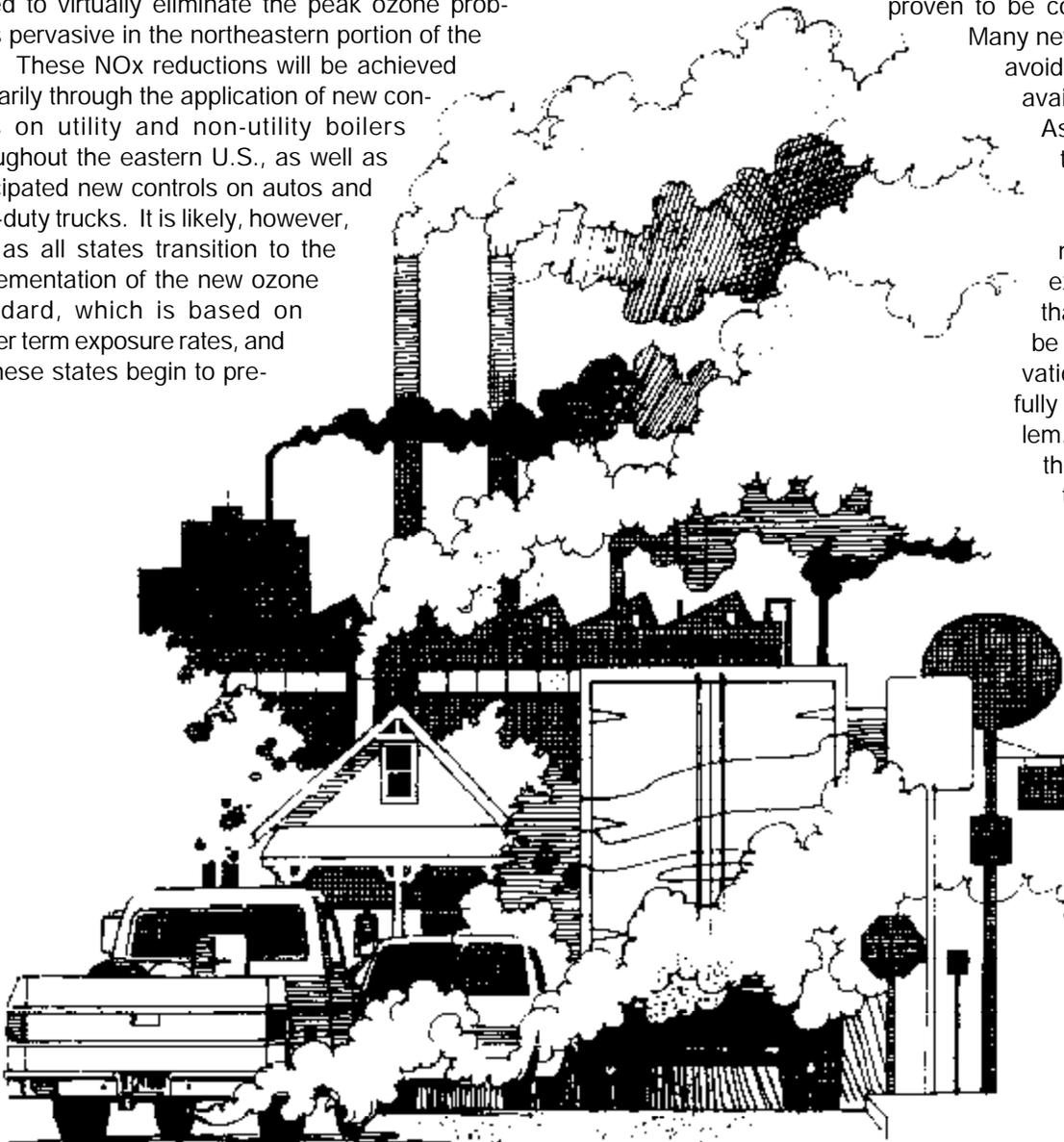
activities is the reduction in oxides of nitrogen, commonly called NO_x, which are chemicals known to be major players in the formation of ozone, and is also one of the chemicals which is integral to the formation of (nitric and/or nitrous) acidic rain.

Serious recognition of the link between NO_x and ozone came from the large regional scale analysis performed by the Ozone Transport Assessment Group (OTAG), which clearly identified NO_x as one of the primary vehicles to the creation of ozone. Significant reductions in NO_x were predicted to virtually eliminate the peak ozone problems pervasive in the northeastern portion of the U.S. These NO_x reductions will be achieved primarily through the application of new controls on utility and non-utility boilers throughout the eastern U.S., as well as anticipated new controls on autos and light-duty trucks. It is likely, however, that as all states transition to the implementation of the new ozone standard, which is based on longer term exposure rates, and as these states begin to pre-

pare their plans to achieve this new standard, even more reductions in NO_x will be required. For the short term, technology has given us a reprieve, which might be called "breathing room" (pun intended), before the next major evaluation to fully assess the impacts of the new ozone air quality standard is completed and plans to correct the problems are developed. The plan for the upper counties in Delaware is due in mid-2003. The reprieve just mentioned will at least temporarily reduce the need to consider transportation control plans and other life-style changes that have proven to be controversial in the past.

Many new ways to reduce and to avoid pollution have become available in the recent past.

As we progress towards the next phase, it is expected that even more technological improvements will be realized, but expectations are not high that technology alone will be a panacea. More innovation will be necessary to fully resolve the ozone problem. It is clear however, that the benefits of controlling the formation of ozone will greatly assist in the reduction of atmospheric deposition.



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Milestones for Implementation:

WORK ACTIVITIES	LEAD IMPLEMENTATION AND COOPERATING AGENCIES	TARGET DATE FOR COMPLETION	FUNDING SOURCES
New Source Review: requires new sources or major modifications to install Lowest Achievable Emission Rate (LAER) control technology and provide offsets of Volatile Organic Compounds (VOC) or Nitrogen Oxide (NOx)	DNREC Air Quality Management	on-going	Title V fees & Federally mandated & specified operating permit fees for major stationary sources
Emission statements: requires the compilation of all significant emissions of air pollutants from stationary (point) sources	DNREC Air Quality Management	due annually	General Fund, Title V fees, and Grant Funds
VOC Regulation: requires the reduction of VOC emissions from specific industries and operations	DNREC Air Quality Management	on-going	General Fund, Title V Fees and Grant funds
Stage 1 and 2 Gasoline Vapor Controls: requires the capture and recycling of all vapors during truck loading and off loading, delivery (stage 1) as well as vehicle fueling (stage 2)	DNREC Underground Storage Tank (UST) Branch in cooperation with Air Quality Management	on-going	other fees

VOC = Volatile Organic Compounds such as solvents and gasoline

NOx = Oxides of nitrogen which results primarily from the combustion of fuels (power plants, motor vehicles, etc.)

Milestones for Implementation:

WORK ACTIVITIES	LEAD IMPLEMENTATION AND COOPERATING AGENCIES	TARGET DATE FOR COMPLETION	FUNDING SOURCES
Small Business Technical Assistance Program: to provide resources and expertise to assist small businesses subject to title V requirements in evaluating regulations and determining actions for compliance	DNREC, Air Quality Management	on-going	Title V fees
Reasonably Available Control Technology (RACT) which does consider cost for NOx: to reduce emissions from existing sources	DNREC, Air Quality Management	on-going	General Funds, Title V fees and Grant Funds
Enhanced Vehicle Inspection and Maintenance Program	DNREC Air Quality Management & Department of Public Safety Division of Motor Vehicles	on-going	DNREC funding from court-imposed traffic violation penalties
Clean Fuel Fleet Program: to require vehicle fleets with 10 or more vehicles to purchase vehicles that operate on clean fuels. Requirement will be accomplished by the implementation of the NLEV Program (below).	DNREC Air Quality Management	phased in beginning in Model Year 1999	No Cost to State
National Low Emission Vehicle (NLEV) Program: to adopt California-type requirements to phase in manufacturers sales of low emission vehicles	DNREC Air Quality Management	phased in beginning in Model Year 1999	No Cost to State

Milestones for Implementation:

WORK ACTIVITIES	LEAD IMPLEMENTATION AND COOPERATING AGENCIES	TARGET DATE FOR COMPLETION	FUNDING SOURCES
Operating Permit Program for Major Stationary Sources: Many sources must submit new facility wide operating permit applications	DNREC Air Quality Management	on-going	Title V Fees
Environmental Planning and Community Right To Know: enforce federal laws and requirements and provide access to and coordination of database on the use and storage of hazardous substances.	DNREC Air Quality Management	on-going	General Fund
Asbestos Abatement: ensures asbestos use and removal is performed in accordance with existing requirements	DNREC Air Quality Management	on-going	General Fund and Grant Funds
Accidental Release Prevention Program: to provide oversight of storage and use, and prevent releases to other media of extremely hazardous substances.	DNREC Air Quality Management	on-going	EHS Fees
Develop a small-area network of samplers to examine and monitor the local effects of atmospheric deposition	DNREC Delaware Coastal Management Program	2000	309 Base Grant w/ possible supplemental penalty funds
Develop a state-wide network of samplers to examine and monitor the regional climatic effects on atmospheric deposition	DNREC Delaware Coastal Management Program w/ University of DE and Air Quality Management Section	2004	Unknown
Analysis of national weather patterns and deposition data to develop an airshed based on air mass tracks and to determine potential sources of pollutants	DNREC Delaware Coastal Management Program w/ University of Delaware and Air Quality Management Section	2000	Unknown

Waste Storage/Storage Tanks



NPS

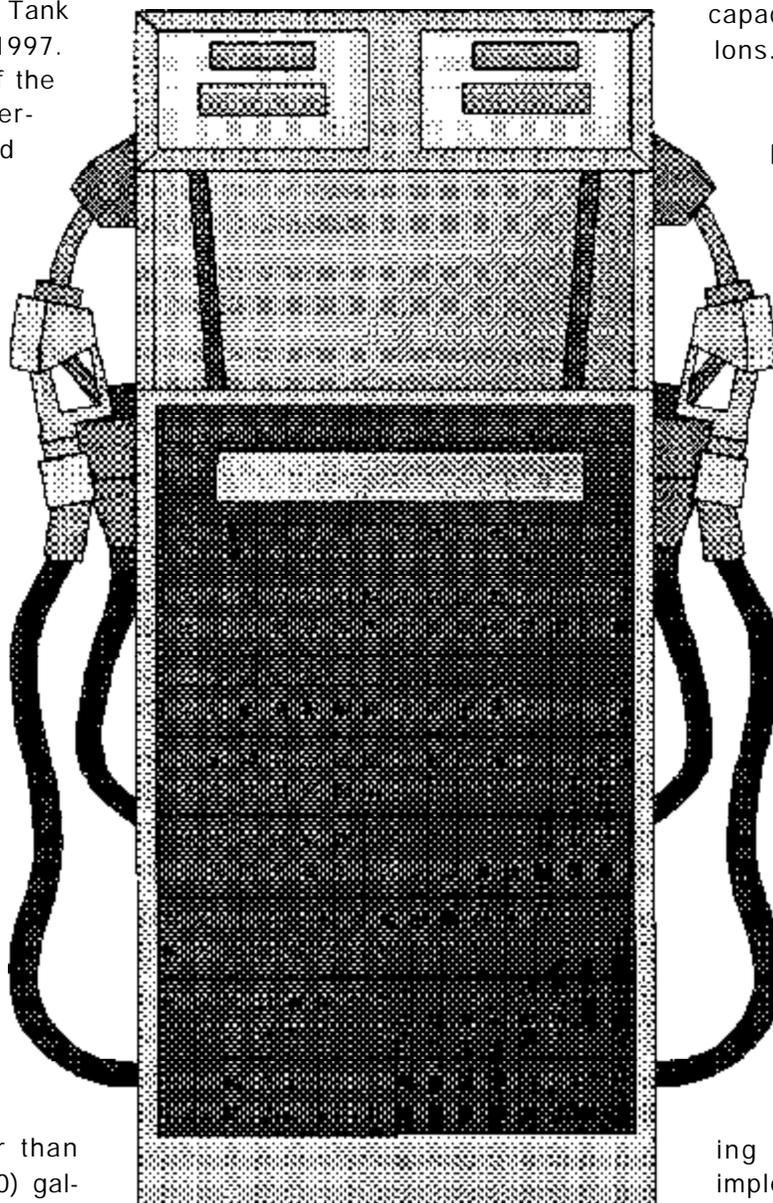
DELAWARE

EPA Subcategory Number 82

INTRODUCTION

Delaware's Underground Storage Tank (UST) Program is in the process of implementing 7 DeL. Code Chapter 60 and 74, and has identified over 2,300 Leaking Underground Storage Tank (LUST) sites as of late 1997. The areas of emphasis of the program include the oversight of investigation and clean up of LUST sites and the administration of the installation, management, abandonment, and removal of non-leaking UST facilities. Focusing on the above areas will result in the containment, control, and reduction of the contamination of the State's soils and groundwaters originating from UST facilities so that potential risks to the citizens of Delaware are minimized. Delaware's Regulations Governing Underground Storage Tank Systems (revised March 12, 1995) apply to underground storage tank (UST) systems storing petroleum and hazardous substances with a storage capacity greater than one hundred and ten (110) gallons. Certain classes of UST systems are exempted from the regulatory requirements with the exception of provi-

sions to report releases and perform corrective actions. The most familiar exemptions are agricultural/farm, non-commercial residential, and heating fuel USTs with capacities less than 1,100 gallons.



Delaware encourages proactive approaches to remediation and does not encourage passive, long-term observation of contamination as an effective solution. Preventive measures such as compliance inspections of facilities with the oldest tanks serves to educate tank owners and assist them in identifying existing leaks soon after they occur thereby reducing remediation costs and the impact on groundwater. The closure or upgrade of all bare steel UST systems by the December 1998 deadline will be a significant reduction in the threat to the State's groundwater resources. The following

table of milestones for implementation are designed to assist the State in meeting the December 1998 deadline and maintaining compliance in the years that follow.

Milestones for Implementation:

WORK ACTIVITIES	LEAD IMPLEMENTATION AND COOPERATING AGENCIES	TARGET DATE FOR COMPLETION	FUNDING SOURCES
Graphic feature in UST Newsletter portraying countdown to 1999 corrosion protection deadline.	DNREC - UST	1999	UST Grant
Present education/outreach seminars on corrosion protection methods/options for compliance with 1999 deadline.	DNREC - UST	1999	UST Grant
Present outreach seminars to real estate agents, insurance agents and banks to increase awareness of the potential impact of leaks from underground storage tanks, regulated and nonregulated.	DNREC - UST & LUST	1999 - 2002	UST Grant & LUST Trust
Target out-of-service USTs for removal or abandonment and site assessment using UST database information. program.	DNREC - UST	1999 - 2002	UST Grant
Continue LUST site investigation and remediation program.	DNREC - LUST	1999 - 1999	LUST Trust
Achieve an 80% compliance rate for operating UST's by 2005 through inspection and education efforts.	DNREC - UST	1999 - 2002	UST Grant
Implement low interest State Revolving Fund Loan Program, known as PLUS, for UST owners seeking to come into compliance with the UST regulations.	DNREC - UST	1999 - 2002	UST Grant

Highway Maintenance and Runoff

EPA CATEGORY NUMBER 83



NPS
DELAWARE

INTRODUCTION

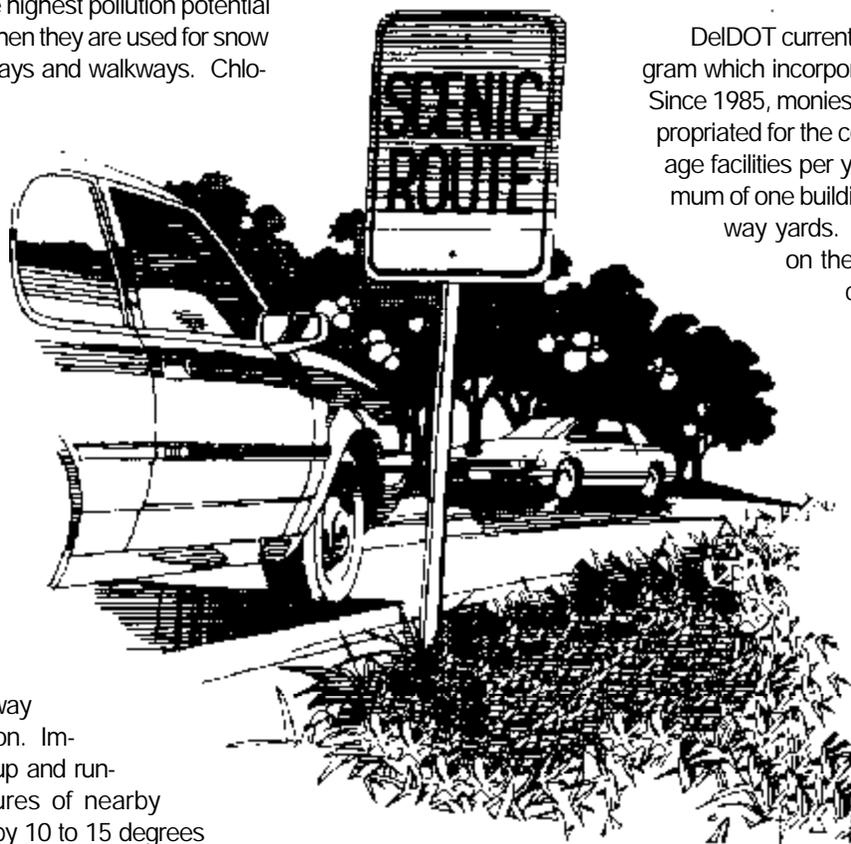
Nonpoint source pollutants can occur from transportation facilities and networks, individual vehicles and commuter services both on the land and in the air. Pollutants, such as trace metals and toxic organics originate from the friction and passage of traffic over highways and from exhausts. Acid rains enhance metallic decay, increasing the time and amount of concentration from these pollutant sources. Usage of unleaded gasoline has resulted in a reduction of trace metals found in stormwater runoff levels and the atmosphere. Other pollutants include hydrocarbon compounds that are found in oil and grease on road surfaces, parking lots and service stations (Refer to Figure 1).

Deicing salts have the highest pollution potential during the winter months when they are used for snow and ice removal on roadways and walkways. Chloride content in nearby streams is drastically increased from surface and subsurface runoff. Although impact on aquatic life is rare, this can affect drinking water. Deicing salt additives that prevent pavement cracking and surface corrosion could be toxic to humans and animals. Storage facilities for these road salts must protect them from precipitation and runoff to reduce the formation of brines.

Another type of roadway pollutant is thermal pollution. Impermeable surfaces heat up and runoff can cause temperatures of nearby stream water to increase by 10 to 15 degrees F. This may lead to oxygen deficiencies and aquatic life decline.

In Delaware, the Delaware Department of Transportation (DelDOT) has its own Sediment and Stormwater Management Program with authority delegated through the Delaware Department of Natural Resources and Environmental Control (DNREC). According to DNREC research, DelDOT is the only State High-

way agency in the country to have accepted the responsibility for self-regulation for erosion, sedimentation control, and stormwater management. DelDOT is currently in the processing of finalizing the conditions of a NPDES Stormwater permit under 40 CFR Parts 122, 123, and 124. This permit will establish a management plan to improve the quality of stormwater discharges from the municipal separate storm sewer system. It will also emphasize a watershed approach to water quality control, coordinate the efforts of existing and proposed protection programs, and establish a legislative agenda of additional legal authorities to control water quality and eliminate illicit connections at state and local levels.



DelDOT currently has a road-salt storage program which incorporates covers for deicing salts. Since 1985, monies have been budgeted and appropriated for the construction of one or two storage facilities per year. To date, there is a minimum of one building in each of the county highway yards. Delaware has also cut back on the use of salt by mixing it with clean sand and has installed several experimental ground sensing units on salt-spreading trucks which release salt according to vehicle speed. They have also purchased vacuuming equipment for the removal of dirt and debris from streets, gutters, and catch basins with the intent of enhancing the protection of receiving waters.

DelDOT supports strong environmental programs and achieves a high level of cooperation and compliance in their operations. The Location and Environmental Studies Section employs environmental engineers, biologists, botanists, archaeologists, and historians, and through this Section, brings the regulatory agencies into the project development process to meet the needs and concerns to the extent possible of all interested parties.

Highway Runoff Constituents & Their Primary Sources

FIGURE 1

Constituents	Primary Sources
Particulates	Pavement wear, vehicles, atmosphere, maintenance
Nitrogen, Phosphorous	Atmosphere, roadside fertilizer application
Lead	Leaded gasoline (auto exhaust), tire wear (lead oxide filler material, lubricating oil and grease, bearing wear)
Zinc	Tire wear (filler material), motor oil (stabilizing additives), grease
Iron	Auto body rust, steel highway structures (guard rails, etc.), moving engine parts
Copper	Metal plating, bearing and bushing wear, moving engine parts, brake lining wear, fungicides and insecticides
Cadmium	Tire wear (filler material), insecticide application
Chromium	Metal plating, moving engine parts, brake lining wear
Nickel	Diesel fuel and gasoline (exhaust), lubricating oil, metal plating, bushing wear, brake lining wear, asphalt paving
Manganese	Moving engine parts
Cyanide	Anticake compound (ferric ferrocyanide, sodium ferrocyanide, yellow prussiate of soda) used to keep deicing salt granular
Sodium, Calcium, Chloride	Deicing salts
Sulphate	Roadway beds, fuel, deicing salts
Petroleum	Spills, leaks or blow-by of motor lubricants, antifreeze and hydraulic fluids, asphalt surface leachate
Polychlorinated Biphenyls (PCB)	Spraying of highway rights-of-way, background atmospheric deposition, PCB catalyst in synthetic tires

Source: U.S. DOT, Report No. FHWA/RD-84/057-060, June 1987

Milestones for Implementation:

WORK ACTIVITIES	LEAD IMPLEMENTATION AND COOPERATING AGENCIES	TARGET DATE FOR COMPLETION	FUNDING SOURCES
Update statewide database of completed stormwater management facilities that have been constructed and will be maintained by DeIDOT	Field Services, Lead IRM, cooperating agencies	1999 to 2004	State General Funds
Develop Geographic Information System (GIS) data layers linking stormwater management facilities with state roads. Update as new facilities are constructed.	IRM, Lead Field Services, cooperating agencies	1999 to 2004	State General Funds
Develop Erosion and Sediment Control and Stormwater Management Design Guide for designers of highway and bridges	Field Services	1999 to 2000	State General Funds
Promote use of constructed wetlands for stormwater quantity and quality management	Field Services, Lead Project Development, cooperating agencies	1999 and beyond	State General Funds
Develop Right of Way Vegetation Management Manual	DeIDOT Horticulture Advisory Committee	1999	State General Funds and others
Promote use of native plants in highway Right of Ways	Field Services, Co-lead Delaware Transportation Institute U of D, Co-lead	1999 to 2004	State General Funds and others
Conduct research on the effects of reduced maintenance and other infiltration enhancement practices in roadsides and medians on stormwater quantity and quality.	Field Services, Co-lead Delaware Transportation Institute, U of D, Co-lead	2000 to 2004	State General Funds and others
Increase public awareness and understanding of the effect of various methods of maintenance of roadsides and medians on stormwater quantity and quality	Field Services, Co-lead Delaware Transportation Institute, UD, Co-lead	2000 to 2004	State General Funds and others
Conduct an assessment of the significance of urban stormwater discharges in the Inland Bays Watershed.	Delaware Transportation Institute, UD, Co-lead Field Services, Co-lead	1999 to 2001	State General Funds and others

Milestones for Implementation:

WORK ACTIVITIES	LEAD IMPLEMENTATION AND COOPERATING AGENCIES	TARGET DATE FOR COMPLETION	FUNDING SOURCES
Conduct evaluation of the DE Sand Filter for effectiveness, maintenance needs, and design modifications	Delaware Transportation Institute, UD, Co-lead Field Services, Co-Lead	2001 to 2001	State General Funds and Others
Present technical information during post construction workshops on proper installation of temporary and permanent erosion and sediment controls and stormwater management.	Field Services	1999 to 2004	State General Funds
Promote the use of grass instead of riprap in roadside ditches and streams	Field Services, Co-Lead Project Develop, Cooperating Field Services	1999 to 2004	State General Funds
Develop standard details and specifications of new erosion and sediment controls and stormwater management measures	Field Services	1999 to 2004	State General Funds
Conduct maintenance inspections and repair of completed stormwater management facilities	Field Services	1999 to 2004	State General Funds



INTRODUCTION

The Division of Air and Waste Management's Environmental Response Branch (ERB) is comprised of five program priorities: 1) Environmental Response; 2) Pre-Planning; 3) Medical Monitoring; 4) Training; and 5) Public Outreach. Each priority will be briefly described below in order of its importance.

Environmental Response:

The primary mission of the ERB is to provide rapid, comprehensive response to emergency and non-emergency environmental incidents for the protection of human health, welfare, and the environment. The (ERB) is tasked with managing the incident site including the establishment and direction of technical matters such as site health and safety issues, containment and control of the release, the need for additional resources, the accumulation and evaluation of information, and interaction with support agencies. Also, the ERB is responsible for directing and coordinating activities related to scientific evaluations, including interpretation of monitoring results, planning control and remedial actions, and the development of sampling plans.

ERB personnel represent the core of Delaware's State Emergency Response Team (SERT). DNREC's SERT is comprised of a mix of engineers, scientists, hydrologists, and environmental protection officers (EPO's) who provide response to environmental incidents 24 hours a day, seven days a week on a rotational basis. Response to incidents during normal working hours is provided by four full-time scientific personnel and several EPO's. After-hours and weekend/holiday responses are handled by a three member on-call group comprised of both scientific and enforcement personnel.

The Environmental Response function encompasses five core response areas. These areas are responses to petroleum, non-petroleum, infectious waste, radiological, and miscellaneous. The ERB responded to approximately 450 incidents for the calendar year of 1998 with 60% of the incidents involving petroleum and 60% occurring in New Castle County.

Pre-Planning:

It is the ERB's responsibility to adequately plan and prepare for environmental response incidents within and near Delaware so that all resources that the State, Federal Government, and spiller have may be utilized in an organized and expeditious manner to minimize the impact of a release.

The pre-planning function of the ERB currently involves the development of standard operating procedures, policies, checklists, response plans, memoranda of agreement, training, guidance documents, resource lists and maps. An extensive amount of time and effort is being expended by DNREC in the development of an oil spill response plan for the Delaware River and Bay. Working in conjunction with Federal, State, and local governments along with oil spill contractors and industry, oil spill response plans are being finalized and tested to protect the precious resources of the State of Delaware. The ERB is also working with Local Emergency Planning Committees, the Delaware City Community Awareness and Emergency Response Group, the Seaford Mutual Assistant Group, and assists when requested with private industry.



Medical Monitoring:

The ERB manages the Division of Air and Waste Management's (DAWM) Medical Monitoring Program to ensure that all employees actually or potentially involved in hazardous materials activities are medically qualified to perform their assigned job functions as required by federal law and the Division of Air and Waste Management's medical monitoring policy.

The ERB Supervisor manages the program, maintains all records and coordinates all aspects of the program with the employees, their supervisors and the contractor. Examinations are required when a new employee joins the DAWM, annually (or more frequently based on actual or potential exposures or symptoms), and when the employee terminates service with the DAWM. The contractor's phy-



INTRODUCTION (continued)

sician must evaluate each participant in terms of whether they can perform their assigned duties and whether they can wear respiratory protection equipment. Each Branch or Section funds examinations for their staff. By law, all records must be maintained by the State for thirty years after the employee leaves the DAWM. Over one hundred DAWM employees participate in this program.

Responder Training:

Responder training is performed to ensure all Environmental Response Branch personnel, which includes the after-hours Environmental Response Team, are fully trained and qualified to perform assigned tasks in accordance with the Environmental Protection Agency, U.S. Coast Guard and the National Fire Protection Association rules, regula-

tions and guidance. The ERB conducts some training in-house and also coordinates training for responders by other organizations.

Public Outreach/Education:

The mission of the ERB's public outreach/education program is to educate the citizens and industry of the State of Delaware concerning various aspects of environmental incidents, including reporting requirements, general response operations, health and safety guidelines, coordination with other agencies, short and long-term impacts, waste disposal and site restoration.

Milestones for Implementation:

WORK ACTIVITIES	LEAD IMPLEMENTATION AND COOPERATING AGENCIES	TARGET DATE FOR COMPLETION	FUNDING SOURCES
<p>General oil and hazardous substance spill response preparedness and training</p> <ul style="list-style-type: none"> ◆ Establish, adopt and implement formal responder training program for various levels of involvement and types of material. Upgrade equipment and supplies ◆ Continue training through established levels and increase response capabilities ◆ Finish basic training programs and begin refresher and specialized training. Upgrade response capabilities ◆ Continue to upgrade training and equipment needs 	<p>DNREC ERB</p>	<p>On-going</p> <p>On-going</p> <p>On-going</p> <p>On-going</p>	<p>Limited State funds available, US DOT Training Grant may provide a portion</p>

Milestones for Implementation:

WORK ACTIVITIES	LEAD IMPLEMENTATION AND COOPERATING AGENCIES	TARGET DATE FOR COMPLETION	FUNDING SOURCES
<p>Delaware Oil Spill Contingency Plan</p> <ul style="list-style-type: none"> ◆ Update sensitive receptors (Environmental, socio economic, cultural), train (technical and health and safety) DNREC personnel from each Division. Begin GIS mapping. Exercise portions of plan ◆ Complete mapping of shoreline types and locate priority protection areas, etc. Exercise DNREC collective response ◆ Upgrade and exercise plan in relation to external organizations. Provide refresher training and train new staff. Improve response capability and equipment. ◆ Annual upgrades and improvements. Field and specialty exercises. Provide refresher training and train new staff. Improve response capability and equipment 	<p>DNREC - DAWM ERB w/ all other Divisions</p>	<p>1999</p> <p>1999</p> <p>2000</p> <p>2000-2002</p>	<p>Individual program funds, other sources as available</p>

In-Place Contaminants

EPA Subcategory Number 85



NPS
DELAWARE

INTRODUCTION

The Delaware Department of Natural Resources and Environmental Control (DNREC), Division of Air and Waste Management, Superfund Branch, is involved in the process of remediating hazardous substance release sites in Delaware. The Branch works with two Superfund Programs — the federal and the state. Under the federal program, the Branch provides a support agency role to the Environmental Protection Agency (EPA), in the cleanup of sites. Under the state program, DNREC has the authority and responsibility to cleanup or require cleanup of hazardous substance release sites in Delaware.

The Federal Superfund Program:

The U.S. Environmental Protection Agency (EPA) is responsible for administering the federal Superfund Program known as the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA). CERCLA was enacted by Congress in 1980. The law provided a unique solution to the problem of lack of authority to respond to past problems of hazardous substance releases (e.g., Love Canal in New York and Valley of the Drums in Kentucky). Under CERCLA, a Hazardous Response Trust Fund of \$1.6 billion was established; hence the term "Superfund". Monies from the Fund could be used for the long-term cleanup of hazardous waste sites. CERCLA was amended in 1986 by the Superfund Amendment and Reauthorization Act (SARA) and the Fund was increased to \$8.5 billion. In October of 1990, SARA was further extended to September 30, 1994 with an additional \$5.1 billion. It is now due for reauthorization in 1994.

The EPA ranks sites on its National Priority List (NPL) based on the risks they pose to public health or welfare, and/or the environment. A computer model is used to score sites and only those sites having a score of 28.5 or more are added to the NPL.

Currently, Delaware has 19 sites that are on EPA's NPL for remediation. Cleanup is complete at two of the 19 sites, and cleanup is under way at three of the sites. The remaining sites are still in the investigation of remedial design stages.

The State Superfund Program:

The Delaware Hazardous Substance Cleanup Act (HSCA), 7 Del. C., Chapter 91, was passed by the Delaware General Assembly in July of 1990. This statute gives the DNREC, Superfund Branch, the ability to assure cleanup of facilities with a release or a threat of release of hazardous substances. The main objective of HSCA is to enable DNREC to address those sites not remediated under the Federal Superfund Program. DNREC has identified approximately 280 sites in Delaware as potential hazardous substance release sites, of which 112 have been identified as posing a risk to public health or welfare, and/or the environment. Since the federal Superfund Program addresses only 19 of these 112 sites, HSCA (the State Superfund Program) will take action at the remaining 93 sites. The statute authorizes DNREC to conduct or oversee investigations and remedial activities at these 93 sites.

The program is funded by levying a 0.9% tax on all taxable gross receipts from the sale of petroleum or petroleum products, with the exception of crude oil. It attempts to identify all parties potentially responsible for causing a release of hazardous substances into the environment. The State Superfund Program requires potentially responsible parties to pay for the costs associated with investigating, and if necessary, remediating a site. If a potentially responsible party cannot be identified or is unable to pay for the cleanup, monies from the Fund will be utilized to perform the cleanup at the site.

The Delaware Regulations Governing Hazardous Substance Cleanup

The HSCA requires the Secretary of the DNREC to promulgate regulations in order to establish procedures governing site cleanups. The Delaware Regulations Governing Hazardous Substance Cleanup were promulgated by DNREC on January 12, 1993. These regulations describe the entire cleanup process, from the identification of a site to its final cleanup. These regulations are currently being amended.





INTRODUCTION (continued)

Any facility with a release or imminent threat of release may go through one or more of the following steps:

- ◆ **Facility Identification:** Facilities will be identified using the existing reporting requirements for release of hazardous substances under 7 Del. C., Chapter 60, Section 28, and through additional mechanisms, such as complaints from the public, and reports from other state agencies or parties.
- ◆ **Initial Investigation:** The purpose of an initial investigation is to determine if a release or imminent threat of release of hazardous substances may have occurred that warrants further action, such as a field visit and examination of existing records.
- ◆ **Facility Evaluation:** The Department will conduct a facility evaluation to confirm the release or imminent threat of release of hazardous substances at a facility, and develop information to evaluate threat to public health or welfare or the environment.
- ◆ **Identification and Notification of Potentially Responsible Parties (PRPs):** The Department shall initiate actions to identify the potentially responsible parties associated with a facility where a release or imminent threat of release of hazardous substances has been confirmed.
- ◆ **Priority List:** The Department will prepare a list of facilities needing further action.
- ◆ **Negotiations with Potentially Responsible Parties:** The Department may require the potentially responsible parties to perform response actions by issuing a letter inviting negotiations towards preparation of a consent decree. If the potentially responsible parties and DNREC fail to enter into a consent decree, the Secretary may issue an administrative order after a hearing. However, the Department may at any time carry out a response action at a facility if the potentially responsible parties have not carried out the response action in a timely manner or if no potentially responsible parties can be identified.
- ◆ **Remedial Investigation:** A remedial investigation may be conducted at a facility to define the risks to public health or welfare and the environment, and the extent of the problem requiring remediation. This is usually the first phase of a response action at a facility pursuant to a consent decree or an administra-

tive order. This step involves extensive field sampling of the different media and analyses of the samples.

- ◆ **Feasibility Study:** A feasibility study follows a remedial investigation at a facility, and identifies the remedial alternatives appropriate to the site.
- ◆ **Plan of Remedial Action:** The Department shall issue a proposed plan of remedial action, outlining the proposed remedial action, chosen from among the alternatives, for public comment. After review and consideration of the comments received, the Department shall issue a final plan of remedial action.
- ◆ **Remediation:** Based on the final plan of remedial action, the selected remedy is implemented at a facility. This process consists of distinct phases:
 - Remedial Design** - this phase consists of preparation of design reports and construction plans and specifications.
 - Remedial Action** - this refers to the actual implementation of the remedy in accordance with the construction plans and specifications.
 - Operation and Maintenance (O&M) and Compliance Monitoring** - O&M involves actions to maintain the effectiveness of the remedial action, whereas compliance monitoring verifies the attainment of cleanup levels and the long-term effectiveness of the remedial action.
- ◆ **Interim Action:** The Department may require or conduct an interim action at any time before the selection of a remedy to prevent, minimize or mitigate harm to public health or welfare and/or the environment.

Voluntary Cleanup Program

The Voluntary Cleanup Program (VCP) is being implemented under the authority of Hazardous Substance Cleanup Act (HSCA) 7 Del. C. Chapter 91. Under HSCA, persons not otherwise responsible for the contamination at a property are eligible for future liability protection when they voluntarily undertake and complete response actions approved by the Secretary of the Department. The VCP has been developed to assist the business community in cleaning up property contaminated by hazardous substance release.



INTRODUCTION (continued)

Because of the potential for liability as an owner of property contaminated with hazardous substances, property owners and other participants in property transactions (buyers, developers and their financial institutions) frequently need to determine if the property they are interested in is contaminated. For this reason, participants in property transactions often request SIRB's assessment of technical issues that are part of the investigation and cleanup of property. Property owners not currently interested in selling or developing property may also voluntarily investigate and clean up property with the assistance from the VCP. Property owners may request assistance from the VCP in anticipation of future property transactions, to obtain financing or simply to avoid the high transaction costs associated with investigating and cleaning up property under the Superfund enforcement process.

The key functions of the VCP are to set standards for a site investigation, to provide review of the adequacy and completeness of site investigations and to approve cleanup plans to address identified contamination. By obtaining VCP approval of investigation and cleanup plans, landowners, lenders, and potential developers can be reasonably confident of the extent of environmental problems on the property, can determine the most appropriate cleanup action and can calculate the cost of cleanup measures needed to satisfy VCP requirements. The voluntary investigation and cleanup process provides the information needed to make sensible financial decisions about developing or transferring contaminated or potentially contaminated property.

Parties seeking assistance under the VCP are expected to adhere to certain standards in the investigation of contamination on a property, the evaluation and recommendation of response actions, and the level of cleanup attained. Parties entering into the VCP may choose to conduct the investigation and evaluation of response alternatives on their own, before they seek the Department's assistance in oversight of the cleanup activities. All the information gathered and evaluation performed must be submitted along with the work plan under the VCP Agreement.

Brownfields Program

Brownfields are industrial or commercial properties which have been abandoned or under-utilized as a result of hazardous substance contamination. While these properties have an enormous potential for economic development, they have failed to attract the private market because of the liability associated with the brownfields and the potential costs involved with cleanup. While developers' fears of liability may be allayed through their participation in the Voluntary Cleanup Program, site acquisition, cleanup and redevelopment may still be delayed because of financial shortfalls. The Brownfields program provides incentives to the business community to purchase clean up and redevelop abandoned and industrial commercial sites.

Amendments to HSCA in 1995 eliminated liability concerns of prospective purchasers and developers who undertake the cleanup of contaminated properties with DNREC oversight, provided streamlined cleanup agreements and created greater flexibility to facilitate cleanups. A grant was established under the administration of the Delaware Economic Development Office to offset a portion of the costs associated with these properties. Under the Brownfields Assistance Program, matching grants will be made available to conduct investigations of properties meeting certain criteria. Funds must be used to conduct investigations of vacant, unoccupied or under-utilized sites, which are suspected, of contamination due to prior commercial or industrial use. These properties must possess the ability to maintain, expand or diversify business or industry within the state and/or maintain or increase the state tax base. Financing will not be available for routine environmental assessments, which are deemed a normal and ordinary part of real estate transactions. The Brownfields Program also provides for tax credits to businesses for cleanup and redevelopment in a brownfield and provides reduction in gross receipts tax for qualified businesses engaged in brownfield redevelopment.

Milestones for Implementation:

WORK ACTIVITIES	LEAD IMPLEMENTATION AND COOPERATING AGENCIES	TARGET DATE FOR COMPLETION	FUNDING SOURCES
Continue facility evaluations, remedial investigations and remedial actions at remaining sites on HSCA list (non-NPL sites).	DNREC Site Investigation & Restoration Branch	2003	HSCA
Provide continued guidance and oversight at all Voluntary Cleanup sites.	Same as above	2003	HSCA
Complete assessments and cleanups at sites in areas designated as Brownfields.	Same as above	2003	HSCA
Continue support agency role to EPA for CERCLA (NPL) sites.	SIRB, other DNREC Divisions, EPA, NOAA, DOI	2003	EPA site-specific cooperative agreements



INTRODUCTION

Ground water in Delaware is an abundant source of high quality, low cost drinking water for domestic needs. Each year more than 30 billion gallons of water is withdrawn from ground water sources. The domestic needs of approximately two-thirds of the State's populations are met with ground water provided by both public and private wells. Most of the water used for agriculture, Delaware's largest industry, and self-supplied industrial use is also derived from ground water sources.

Ground water in Delaware is a relatively vulnerable resource due to the State's shallow water table and high soil permeability. Contamination by human activities has made ground water unfit for consumption without treatment in certain locales in the State. Contaminants in ground water originate from sources such as domestic septic-systems, landfills, underground storage tanks, agriculture applications of fertilizers and pesticides, chemical spills and leaks, and many other sources and activities (See Table 1). As population and industrialization of the State continues, the standards of purity of ground water are more frequently exceeded over a larger area of the State. Fortunately, these areas still represent a very small proportion of the State's total ground water resources at this time.

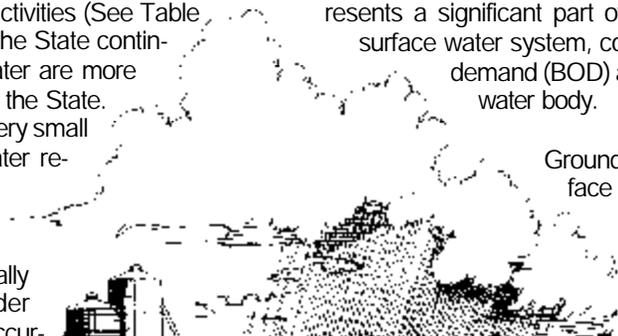
Salt water intrusion and high iron content in ground water are the only naturally occurring contaminants that may render ground water undrinkable. However, the occurrences of these contaminants are highly localized. Generally, the development of ground water as a drinking water source is less costly than surface water because it does not require storage reservoirs or treatment. In addition, production wells can be located near demand centers which reduces the need for extensive transmission lines.

In Delaware, annual precipitation ranges from 30 to 58 inches and averages 44 inches. The annual precipitation usually exceeds the evapotranspiration rate by 12 to 18 inches in every season except summer. In the summer when temperatures are high and plants are most active, virtually all of the precipitation is evapotranspired or runs off before being absorbed into the soil. As a result of the increased plant usage of water in the summer, very little water is left to recharge Delaware's ground-water resources and thus, the water table falls between the months of April and October. Ground water levels tend to rise during the late fall and winter.

The amount of water which percolates into the ground and later appears as stream base flow averages 10 to 12 inches annually. The volume of water that this represents is 500,000 to 600,000 gallons per square mile per day. Ground water that is captured by pumping wells is taken at the expense of stream flow. In late summer, stream flow often declines to only 100,000 gallons per day per square mile.

By maintaining base flow, ground water is recognized as the primary supplier of water to streams. By allowing streams to maintain flow, even during time of low rainfall, ground water is responsible for supporting aquatic ecosystems and wildlife populations.

The quality of ground-water discharges to surface water bodies is important to maintaining the overall water quality in the surface water body. Ground water will carry dissolved constituents as it flows through the ground water system (aquifer) and ultimately into the receiving surface waterbody. Various biological, geochemical, and other attenuation and alteration mechanisms may modify these dissolved constituents as they travel along the ground water flow path. A common contaminant which is carried with the ground water is nitrate. In recent studies in the Inland Bays Watershed, this source of nitrate contamination represents a significant part of the overall nutrient loading into a surface water system, contributing to high biological oxygen demand (BOD) and eutrophication within the surface water body.



Ground water flow is much slower than surface water and the flow path from when rainfall enters the ground-water system (recharge) to where ground water seeps into a surface water body (discharge) may be quite long. Ground water flow from recharge to discharge may take weeks, de-

cadecades, or longer. Consequently, once ground water in a recharge area becomes contaminated, the transport, and ultimate discharge of the contaminated ground water to a surface water body will occur over a very long period of time. Contaminants which enter the ground-water flow system now may not appear for a decade in a surface water body and, because of the mixing that occurs within the aquifer, discharges to surface water will occur for a considerable time period.

Delaware has begun to identify groundwater priorities as part of the 305(b) Report and has done so in detail in the 1996 and 1998 reports. Additional priorities for groundwater quality problems relating to NPS sources are found within the 305(b) Report.

A major focus over the past several years has been the completion of ground-water recharge-potential maps for the entire State. Funding for mapping of ground-water recharge-potential began in 1990 using 319 funding and later using CWA 106 and DWSRF funding. Mapping is scheduled for completion in 2001 for the entire State but most critical areas were completed by 1998. New Castle County revised their water resource protection ordinance using recharge-potential mapping methodology developed by the



INTRODUCTION con't

Delaware Geological Survey (DGS) in 1990. Excellent recharge designations are thus protected by the NCC ordinance. Elsewhere, existing authorities in various state regulations afford excellent recharge-potential areas special protection. In addition, recharge areas are being considered as part of the Delaware Comprehensive State Groundwater Protection Program CSGWPP, Whole Basin Management, and Source Water Protection Programs and as a priority setting mechanism for NPS Programs.

Table 1 is extracted from the 1998 Delaware Water Quality Report (305b) and lists the major sources (both point and nonpoint) of ground water contaminants. Those ranking high include animal feedlots (including chicken houses), fertilizer application, saltwater intrusion, septic tanks, underground storage tanks, and

hazardous waste sites. Since these sources (except saltwater intrusion) can occur anywhere within a ground water recharge area, the associated contaminants may be localized or may be introduced into a longer ground-water flow path. In the case of nonpoint source pollutants, the likelihood of contaminant introduction into shallow, intermediate, and long flow systems is great since larger land areas are typically involved. The USGS's National Water Quality Assessment on the Delmarva Peninsula illustrated how nitrates and pesticides move within these flow systems.

The contaminants of most concern in Delaware are also ranked. Table 2 (also from the 1998 Delaware Water Quality 305(b) Report) lists the contaminants of greatest concern in Delaware.

Table 1. Major Sources of Ground Water Contamination



CONTAMINANT SOURCE	TEN HIGHEST-PRIORITY SOURCES (X)	RELATIVE PRIORITY	FACTORS CONSIDERED IN SELECTING A CONTAMINANT SOURCE (1)	CONTAMINANTS (2)
Agricultural Activities				
Agricultural chemical facilities		NA	NA	1,2,5
Animal feedlots (including poultry)	X	HIGH	A,C,D,F,G	5,8
Drainage wells		—	NOT ALLOWED IN STATE	—
Fertilizer applications	X	HIGH	C,D,F	5
Irrigation practices (return flow)		LOW	NO INFORMATION	—
Pesticide application		MEDIUM	G	1,2
Storage and Treatment Activities				
Land application		MEDIUM	D,H	9
Material stockpiles		LOW	D,H	9
Storage tanks (above ground)		LOW	G,H	4
Storage tanks (underground)	X	HIGH	A,B,C,D,F,H	4
Surface impoundments		LOW	C,D,H	5
Waste piles		LOW	A,D	9
Waste tailings		NA	NA	—
Disposal Activities				
Deep injection wells (heat pump)		LOW	A	9
Landfills		MEDIUM	D,G,H	3,7
Septic Systems	X	HIGH	A,B,C,D,F,H	5,8
Shallow injection wells		LOW	A	9
Other				
Hazardous waste generators	—	—	SEE HAZARDOUS WASTE SITES	—
Hazardous waste sites (RCRA)	X	HIGH	A,B,E,G,H	3,8
Industrial facilities	—	—	SEE HAZARDOUS WASTE SITES	—
Material transfer operations	—	—	SEE HAZARDOUS WASTE SITES	1,2,3,4,7
Mining and mine drainage		NA	NA	—
Pipelines and sewer lines		MEDIUM	G	5
Salt storage and road salting		LOW	A,B,D	6
Salt Water intrusion	X	HIGH	B,E,F,G	6
Spills		VARIABLE	G	9
Transportation of Materials	—	—	SEE HAZARDOUS WASTE SITES	—
Urban runoff		LOW	C,E	9
Federal or State Superfund	X	HIGH	F,G,H	3,4,7

(1) Factors used in selecting sources

- A- Human health and/or environmental risk (toxicity)
- B- Size of population at risk
- C- Location of sources relative to drinking water
- D- Number and/or size of contaminant sources
- E- Hydrogeologic sensitivity
- F- State findings, other findings
- G- High priority in localized areas of the State
- H- Regulated activity
- Data not available or not applicable

(2) Contaminant Classes

- 1- Inorganic pesticides
- 2- Organic pesticides
- 3- Halogenated solvents
- 4- Petroleum compounds
- 5- Nitrate
- 6- Salinity/brine
- 7- Metals
- 8- Bacteria
- 9- Variable

Table 2. Ground Water Contaminants



CONTAMINANT CATEGORY	CHECK	RELATIVE PRIORITY	FACTORS ^a
ORGANIC CONTAMINANTS			
Pesticides*		Medium	1,2,4,5,7
Petroleum Compounds (primarily BTEX)	☞	High	1,2,4
Other Organic Chemicals:			
Volatile	☞	High	1,2,4
Semi-volatile		Medium	4,5
Miscellaneous		--	No Information
MICROBIAL CONTAMINANTS			
Bacteria	☞	High	1,2,3,4
Protozoa		--	No Information
Viruses		--	No Information
Inorganic Contaminants			
Pesticides		Low	
Other Agricultural Chemicals		Low	
Nitrates	☞	High	1,2,3,7
Fluorides		NA	
Brine/Salinity	☞	High	3,5,6,7
Metals		Medium	5
Arsenic		Low	1
Naturally-occurring Iron		Medium	1,4
Radionuclides		NA	

^a Factors for Establishing Relative Priority

- | | |
|---|---|
| (1) number of sources | (5) high priority in localized areas of the State |
| (2) location of sources relative to drinking water | (6) hydrogeologic sensitivity |
| (3) size of population at risk | (7) report findings |
| (4) risk posed to human health and environment from released substances | (8) regulated activity |

*Pesticides of concern in Delaware: Atrazine, Alachlor, Cyanazine, Metolochlor and Simazine

Milestones for Implementation:

WORK ACTIVITIES	LEAD IMPLEMENTATION AND COOPERATING AGENCIES	TARGET DATE FOR COMPLETION	FUNDING SOURCES
<p>Delaware Comprehensive Ground Water Protection Program:</p> <ul style="list-style-type: none"> ◆ Development ◆ Assessment of Gaps ◆ Multi - Year Plan/Core CSGWPP Submittal ◆ Multi-Year Plan/Addressing Program Gaps 	<p>DNREC w/DGS, DDA and DPH</p>	<p>FY 98</p> <p>FY 1993 - 1999</p> <p>FY 1999 - 2000</p> <p>FY 1999 - 2001</p>	<p>General Funds, GW 106 Fed. Funds/PPG</p> <p>General Funds, GW 106 Fed. Funds/PPG</p> <p>GW 106 Fed. Funds/PPG</p> <p>GW 106 Fed. Funds/PPG</p>
<p>Delaware Source Water** and Wellhead Protection Programs:</p> <ul style="list-style-type: none"> ◆ Development of existing authorities approach ◆ Mapping/delineation source identification ◆ Susceptibility Assessments ◆ Source Water Assessment Plan Submittal to EPA for approval 	<p>DNREC, DGS, USGS, WRA, DPH, EPA, Citizen and Technical Advisory Committee</p>	<p>FY 1998 - 2002</p> <p>FY 1998 - 2002</p> <p>FY 1998 - 2002</p> <p>February, 1999</p>	<p>General Funds, GW 106 Fed. Funds</p> <p>General Funds, GW 106 Fed. Funds, DWSRF Funds</p> <p>General Funds, GW 106 Fed. Funds/PPG, SDWA-DWSRF*</p> <p>SDWA-DWSRF*</p>

* Safe Drinking Water Act (SDWA) Amendments of 1996 provided funding for source water protection efforts under the FY 1997 Drinking Water State Revolving Fund (DWSRF). The grant was awarded in September 1998 and work began in November 1998.

**The new Source Water Assessment Program includes both ground water and surface water sources of drinking water.

Milestones for Implementation:

WORK ACTIVITIES	LEAD IMPLEMENTATION AND COOPERATING AGENCIES	TARGET DATE FOR COMPLETION	FUNDING SOURCES
<p>Assessment of Delaware's Ground Water Resources:</p> <ul style="list-style-type: none"> ◆ Hydrology and geologic mapping ◆ Ambient ground-water monitoring ◆ Recharge mapping: state-wide mapping 	<p>DNREC and DGS</p> <p>DGS</p> <p>DNREC, DGS</p> <p>DNREC, DGS</p>	<p>On-Going</p> <p>Pending</p> <p>FY 1992 - 2001</p>	<p>General Funds, GW 106 Fed. Funds, NPS 319 Funds</p> <p>State Funds</p> <p>Pending</p> <p>General Funds, NPS, 106 Funds/PPG, FY97 DWSRF</p>
<p>Inventory of Existing and Potential Pollutant Sources:</p> <ul style="list-style-type: none"> ◆ Mapping and GIS ◆ Global Positioning System (GPS) Accuracy 	<p>DNREC (DWR, DAWM, DSWC)</p> <p>DNREC, DGS and Counties</p> <p>DNREC, DGS and Counties</p>	<p>On-Going</p> <p>On-Going</p>	<p>Federal and State</p> <p>Numerous programs</p>
<p>Delaware Pesticide Management Plans:</p> <ul style="list-style-type: none"> ◆ State Management Plan Development (waiting on final concurrence from EPA - 2nd draft submitted Jan. 1997) ◆ Pesticide-Specific Management Plan (pending EPA pesticide listing - waiting on final ruling) 	<p>DDA w/DNREC, and DPH</p> <p>DDA w/DNREC, and DPH</p> <p>DDA w/DNREC, and DPH</p>	<p>Pending</p> <p>(Pending EPA Requirements)</p>	<p>Federal Insecticide Fungicide Rodenticide Act (FIFRA) Funds</p> <p>FIFRA Funds, State General Funds, Fees</p>



GOAL

To minimize adverse habitat and water quality impacts that result from the improper siting and design of marinas

and increase the use of pollution prevention practices during the construction and operation of marinas.

INTRODUCTION

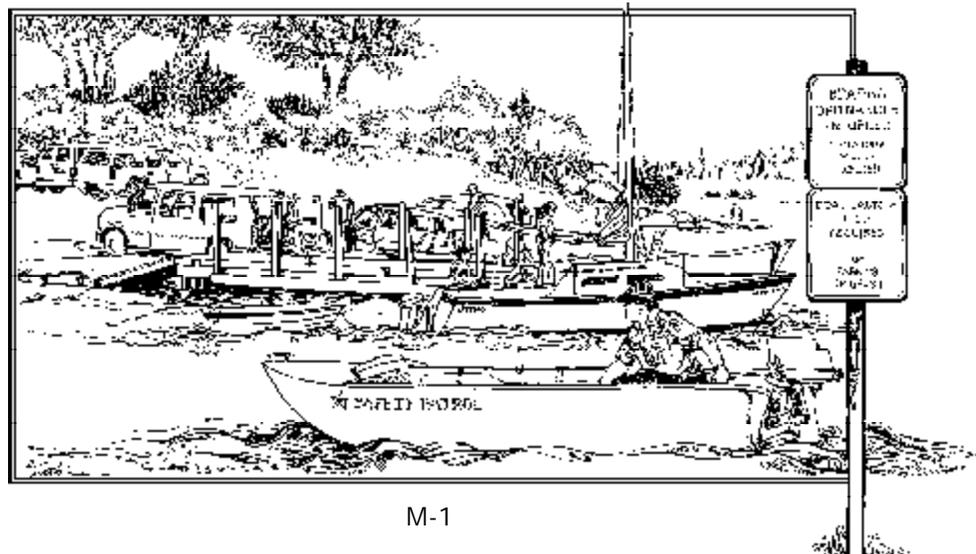
The Department of Natural Resources and Environmental Control's Marina Program has been instituted to achieve three goals. First, to apply strict environmental controls over the siting, design, construction and operation of new marinas. Second, to allow the upgrading of existing facilities in ways which can benefit the environment by imposing reasonable restrictions that would effectively discourage adverse environmental impacts. Third, to provide for the safe and environmentally sound operation of existing marinas.

To achieve these goals the Department adopted comprehensive Marina Regulations in March, 1990 that require permits for the construction of all new marinas and alterations to existing marinas. The Regulations also require that every marina in the State develop and implement a Department-approved Operations and Maintenance Plan to address such items as water quality management, handling and storage of materials and wastes, requirements for vessel sewage pumpout, emergency operations (including spill prevention and control), shoreline structures maintenance, and rules and regulations for marina users.

For the purposes of regulation, a marina is defined as any public, recreational, commercial or private facility that is on or adjacent to the water and contains 5 or more slips, or any vessel maintenance or repair yard that is on or adjacent to the water, or any public or commercial boat ramp. There are approximately 100 marinas in the State that meet this definition.

Marinas have the potential for numerous adverse environmental impacts. Since marinas are typically located at the land-water interface, improper siting creates the potential for degradation or destruction of important wetland, intertidal and shallow water habitat. These areas are often critically important in mitigating the adverse effects of non-point source pollutants on a waterbody. Improper siting may also create the need for frequent maintenance dredging to maintain navigable access. This disrupts benthic habitat and re-suspends bottom sediments and the pollutants associated with those sediments. Improperly designed marinas may also flush poorly, resulting in low dissolved oxygen concentrations and the accumulation of toxic substances in the basin.

Other potential threats include the discharge of pollutants from boats and upland run-off from marina parking and boat maintenance areas. Sewage, trash, oil and grease, anti-freeze, solvents, anti-fouling bottom paints, wood preservatives, and all manner of fiberglass, wood and chrome cleaners and polishes have been identified as elements of the boating community's waste stream. Marinas can thus be considered to be locally important sources of pathogenic microorganisms, nutrients, toxic pollutants, and oxygen-demanding substances. The relative contribution of pollutants from marinas has not been quantified but has the potential to be significant in areas of high boating density and in shallow, poorly flushed estuaries such as Delaware's Inland Bays.



M-1



MANAGEMENT AGENCY FOR IMPLEMENTATION

DNREC, Division of Water Resources, Wetlands and Subaqueous Lands Section - This section is responsible for administering the State's Wetlands, Subaqueous Lands, Marina, and 401 Water Quality Certification Programs.

◆ **Technical Assistance-**

- ◆ Reviews marina projects as well as projects that include any activity in State-regulated wetlands or subaqueous lands. If the project complies with regulatory requirements, permits are issued to place reasonable limits on the activity so that adverse environmental impacts are minimized.
- ◆ Reviews Operations and Maintenance (O&M) Plans for every marina in the State. Issues ap-

provals for plans that comply with the Marina Regulations.

- ◆ Issues 401 Water Quality Certifications for projects under federal jurisdiction to ensure that the project will comply with the State's Surface Water Quality Standards.

◆ **Education Programs -**

- ◆ The Division of Fish and Wildlife offers Boater Education programs to the public as well as distributes materials that cover boating safety as well as environmental education on the effects of boating.

BEST MANAGEMENT PRACTICES AND/OR BEST AVAILABLE TECHNOLOGY

- ◆ Marina Guidebook (August, 1990)
- ◆ O&M Plan Guidance Manual
- ◆ 6217 Management Measures for Marinas (Chapter 5, January, 1993)

- ◆ Best Management Practices for Delaware Boat Maintenance Facilities (May, 1997)

STATE AUTHORITY (STATUTES AND/OR REGULATIONS)

- 7 **Del. C.**, Chapter 19 - Shellfish Act
- 7 **Del. C.**, Chapter 60 - Environmental Control Act
 - ◆ Marina Regulations
 - ◆ Surface Water Quality Standards

- 7 **Del. C.**, Chapter 66 - Wetlands Act
 - ◆ Wetlands Regulations
- 7 **Del. C.**, Chapter 72 - Subaqueous Lands Act
 - ◆ Regulations Governing the Use of Subaqueous Lands

FEDERAL REGULATIONS

- ◆ Section 10 of the Rivers and Harbors Act
- ◆ Section 404 of the Clean Water Act

Milestones for Implementation:

WORK ACTIVITIES	LEAD IMPLEMENTATION AND COOPERATING AGENCIES	TARGET DATE FOR COMPLETION	FUNDING SOURCES
<p>Develop a demonstration project to include retrofitting 3 existing marina maintenance/repair yards with proper pollution prevention technologies. Projects will include:</p> <ul style="list-style-type: none"> ◆ pre and post water quality monitoring ◆ videos to document pre and post practices and construction/ installation of technologies. <p>For example -- Indian River State Park Marina (improvements would be accomplished during major marina refurbishment)</p>	<p>DNREC w/county conservation districts and/or local stormwater planning approval agency</p>	<p>1999 - 2004</p>	<p>Unknown</p>
<p>Install vessel sewage pumpout/dump stations statewide and provide funding for their operation and maintenance in accordance with a strategic plan to be developed by the DNREC</p>	<p>DNREC w/College of Marine Studies</p>	<p>1999-2004</p>	<p>Federal grant through Clean Vessel Act Program</p>