

I. Executive Summary/ Overview

A. The 305(b) Process

Section 305(b) of the Federal Clean Water Act (CWA) requires each state to assess the health of their surface waters and submit biennial reports describing the water quality conditions to the USEPA. Section 305(b) also requires EPA to summarize the reports submitted by the states and convey the information to Congress and the public in a National Water Quality Inventory Report to Congress on a biennial schedule. This 305(b) process is the principal means by which EPA, Congress and the public evaluate water quality, the progress made in maintaining and restoring water quality, and the extent to which problems remain.

B. Water Quality Assessments

Section 305(b) of the CWA requires that states assess their water quality for attainment of the fishable and swimmable goals of the CWA. The state is to measure attainment of the CWA goals by determining how well the waters support their designated uses. For the purpose of this report, assessments are made on the following individual designated uses: aquatic life, swimming, drinking water, fish consumption and shellfishing. The data used to generate the information for this 2000 report are generally from 1997 and 1998, however, some data collected during 1999 and 2000 were available in time for incorporation as well.

Waterbodies, or segment of waterbodies, are evaluated to determine the level of use support attainment by comparing water quality data with the appropriate criteria for each designated use. One of the following four levels of use support attainment is assigned to the waterbody or water segment: fully supporting, fully supporting but threatened, partially supporting, or not supporting. Due to a potential terminology conflict associated with the

application of the fully supporting but threatened category, this category was only applied to the assessment for one waterbody, a drinking water reservoir, at the request of the Department of Health. Assessments to determine use support can be either "monitored assessments" based on recent monitoring data or "evaluated assessments" based on qualitative information or monitoring information which is more than 5 years old. In situations where the water quality information is more than 10 years old, the waterbody is generally considered not assessed.

In the assessments, the pollutants and other stressors (causes) that contribute to the actual or threatened impairment of designated uses in a waterbody or waterbody segment are listed if information allows. In addition, the sources, or activities, facilities, or conditions that contribute, or may contribute pollutants or stressors resulting in impairment of designated uses in a waterbody, are also listed if information is available. In general, the actual sources of impairment are not determined until a TMDL (Total Maximum Daily Load) is conducted on the waterbody. As such, most of the sources noted in this report are just potential sources. Common causes of non-support include toxics, pathogens and nutrients. Major sources include municipal and industrial discharges, CSOs, and nonpoint sources such as stormwater runoff and failed septic systems.

Please note that refinements in the state's total waters and individual waterbody size estimates continued with this report. More accurate RIGIS estimates at a scale of 1:24,000 have been incorporated into the 2000 assessment database and report. In addition, more waterbodies (lakes and rivers) have been added to the assessment database.

As noted in Section III.C., the methodology utilized for determination of use support status has been slightly modified for this report. Much data used in previous assessments is now more than ten years old or was originally only based on Best Professional Judgement (BPJ). Some of these areas are considered "not assessed" for this report. This will give a more accurate

representation of the waters in the state for which we have data and the areas where monitoring is needed. In addition, a process of extrapolating an assessment from a monitored site to an upstream or downstream site, as appropriate, was more fully initiated with this report. This may have led to considering several previously “not assessed” sites to now assessed but with evaluated data.

C. River Assessments

Approximately 47% (649 miles) of the 1,383 river miles (total river miles at 1:24,000 scale) in Rhode Island have been assessed for this report. The unassessed waters in general include the many small headwater streams and rivers of the state. Of the river miles assessed (649 miles), 82% (533 miles) are considered monitored while 18% (116 miles) are considered evaluated.

Approximately 66.5% (432 miles) of the state's rivers and streams assessed fully support all of their designated uses. Approximately 33.5% (217 miles) of the river miles assessed are considered impaired for one or more uses.

Data was available to assess 574 river miles for swimming use support. The data showed that 76% (434 miles) fully support the swimming use, and approximately 24% (140 miles) are considered impaired for swimming use. Data was available to assess 626.5 river miles for aquatic life use support. The data showed that 73% (460 miles) of the river miles assessed fully support aquatic life needs. Just over 26% (166 miles) are considered impaired for aquatic life uses.

Data was available to assess 6.25 river miles for fish consumption use support. This represents the portion of the Woonasquatucket River from below Smithfield to the confluence with the Moshassuck River where the RIDOH has issued a no fish

consumption advisory. This 6.25 river miles is considered impaired for fish consumption use.

The most significant causes of non-support for rivers and streams are biodiversity impacts, pathogens, heavy metals (especially Cu and Pb), and nutrients. In the majority of cases there is not enough data to link the causes of non-support to actual sources of the pollutant. Potential sources of non-support are, however, noted to include point sources (CSOs, municipal and industrial discharges), nonpoint sources (urban runoff/storm sewers), and natural sources (wildlife and waterfowl).

Forty-eight (48) rivers reviewed for this report are located within Drinking Water Supply systems. These 48 rivers represent 167 river miles. Almost all of these rivers are considered unassessed for drinking water use. This is because the Department of Health only requires water quality data, to evaluate the source water, to be collected from the terminal reservoir of the system. The terminal reservoir is the location of the intake pumps. In general, sampling conducted elsewhere in the system has been determined by the DOH to be too limited in scope to use in conducting a drinking water use assessment.

D. Lake Assessments

Seventy-six percent (16,555 acres) of the 21,796 acres of lakes in Rhode Island have been assessed for this report. Of the lakes assessed, approximately 63% (10,424 acres) are considered monitored and approximately 37% (6,130 acres) are considered evaluated.

Approximately 83% (13,742 acres) of lake acres assessed fully support all designated uses and less than 1% (5 acres) assessed fully support all designated uses but are considered threatened. Approximately 17% of lake acres assessed (2,808 acres) do not support their uses and are considered impaired for one or more uses.

Data was available to assess 14,493 lake acres for swimming use support. The data indicated that most lake acres fully support their swimming use (95%, 13,792 lake acres). Approximately 5% (701 acres) of lake acres assessed are considered impaired for the swimming use.

Data was available to assess 15,367 lake acres for aquatic life use support. Approximately 83% of the lake acres assessed (12,776 acres) fully support aquatic life needs. Approximately 17% (2,591 acres) of lake acres assessed are impaired for aquatic life uses.

Data was available to assess one lake, Quidnick Reservoir (175 acres), for fish consumption use. The RI Department of Health has issued an advisory against eating bass from this reservoir. The 175 acres are considered impaired for fish consumption use.

Forty-one (41) lakes assessed are used as drinking water supply sources. This represents 7,741 acres associated with the drinking water supply systems. Of these 7,741 acres, 5,662 acres (73%) are considered assessed for drinking water use for this report. The remaining 2,079 lake acres, or 27% were considered not assessed for drinking water use support. In general these 2,079 acres represent portions of the drinking water supply system that are upstream of the terminal reservoir. The terminal reservoir is the location within the drinking water supply system where the Department of Health requires the water samples to be collected. Some of these upstream waters are not monitored or have only limited monitoring and are, therefore, considered unassessed for this report. Ninety-nine percent (5,601 acres) of the drinking water supply lake acres assessed were found to be fully supporting, and less than 1% (5 acres) of the lake acres assessed fully support drinking water uses but are threatened. Approximately 1% (56 acres) of drinking water supply lake acres assessed are considered impaired for the drinking water use.

For lakes and ponds, the major causes of non-support are high bacteria and nutrient levels and low dissolved oxygen. Another major cause of non-support in terms of total acreage effected, is from metals. Major sources of non-support in lakes and ponds are mainly from nonpoint source impacts such as urban and stormwater runoff.

Trophic classifications are provided for 163 lakes, covering a surface area of 18,096 acres. Of these, 87 are publicly-owned lakes/ponds which cover a surface area of 9,038 acres. Eight of the publicly-owned lakes are classified as eutrophic, 31 are considered to be within the mesotrophic range and 16 are considered to be oligotrophic. The rest of the public lakes fall between several trophic classifications. These classifications are based on recent (1997 & 1998) Watershed Watch volunteer monitoring data.

E. Estuarine and Coastal Shoreline Assessments

All of the 151 square miles of estuarine waters were reviewed for this report. Over 99% (150.87 square miles) of the estuarine waters have enough data to be considered assessed for this report. Of those assessed areas, 99% (149 square miles) are considered monitored and approximately 1% (1.6 square miles) are considered evaluated. It is important to note that the large percent of estuarine waters considered assessed (99%, 149 square miles) are, to a large degree, only monitored for pathogens by the RIDEM Shellfish Monitoring Program. Therefore, the majority of Rhode Island's estuarine waters have current monitoring data for pathogens to assess for swimming and shellfishing use support status. Recent dissolved oxygen surveys have been conducted throughout the Bay. While the data is limited it has been used to assess for aquatic life use support status.

Almost 69% (103.5 square miles) of the estuarine waters fully support *all* assessed uses. Approximately 31% (47 square miles) of the estuarine waters assessed are considered impaired for one or more uses.

Data was available to assess 127.6 square miles of estuarine waters for swimming use. Most estuarine waters assessed support their swimming uses (93%, 140 square miles). Approximately 7% (10.3 square miles) of the estuarine waters assessed are considered impaired for the swimming use due to violations of fecal coliform criteria.

Data was available to assess 149.25 square miles of estuarine waters for aquatic life use. The majority of estuarine waters assessed fully support aquatic life needs (73%, 109 square miles). Approximately 27% (40 square miles) are impaired for aquatic life uses.

The estuarine waters classified as SA and SA{b} are designated for shellfishing uses. This represents approximately 128 square miles of SA and SA{b} waters which were reviewed for their shellfishing use support status. The majority of class SA and SA{b} waters (75%, 96 square miles) fully support the shellfishing use. Partial support of the shellfishing use occurs in approximately 17% (22 square miles) of the estuarine waters. In general, this 22 square miles encompasses areas with a seasonal or conditional shellfish closure associated with it. Approximately 8% (10 square miles) of the Class SA and SA{b} estuarine waters are permanently closed to shellfishing and are considered not supporting the shellfishing use.

The major impacts on designated uses for the estuarine waters of Rhode Island are due to bacterial contamination, low dissolved oxygen and nutrient enrichment. The major sources of bacterial contamination are due to combined sewer overflows (CSOs). CSOs, urban runoff and point source discharges are sources of the nutrient enrichment and low dissolved oxygen problem in the Upper Bay and coves. This water quality

problem, while not fully characterized, indicates that nutrients are linked to adverse impacts of reduced dissolved oxygen levels.

Rhode Island has 78.62 coastal shoreline miles. The coastal shoreline is defined as a line along the coast from Westerly to Point Judith, up to the mouth of the Narrow (Pettaquamscutt) River, across to Beavertail on Jamestown, across to Brenton Point in Newport and along the Newport coast to Sachuest Point, across to Sakonnet Point in Little Compton and along the coast in Little Compton to the Rhode Island/Massachusetts border. Bacteria data was available to assess the entire coastal shoreline for swimming and shellfishing use support status. All 78.62 miles were assessed as fully supporting both swimming and shellfishing uses.

F. Wetlands

Freshwater and coastal wetlands encompass approximately 18.4% of Rhode Island's landscape (127,721 acres). There are approximately 111,893 acres of freshwater and 15,828 acres of estuarine and marine wetland and deepwater habitats in the State, excluding the waters of the Narragansett Bay and the Pawcatuck River estuary (RIGIS 1988). Rhode Island's wetlands have been regulated and protected by state and federal statutes for nearly 30 years. The U.S. Army Corps of Engineers, with the assistance of the other federal resource protection agencies, namely, the U.S. Environmental Protection Agency, the U.S. Fish and Wildlife Service and the National Marine Fisheries Service, implement Section 404 of the Clean Water Act (33 U.S.C. 1341 and 1344) and Section 10 of the Rivers and Harbors Act of 1899 (33 U.S.C. 403). Since 1971, the Department of Environmental Management (DEM) has implemented the Rhode Island Freshwater

Wetlands Act (R.I.G.L. 2-1-18 et seq), and the Coastal Resources Management Council has been the designated agency for implementation of the federal Coastal Zone Management Act. DEM also implements Section 401 of the federal Clean Water Act. These statutes and accompanying regulations consistently require that applicants avoid and minimize alteration of freshwater and coastal wetlands.

Rhode Island does not have statewide data on historic freshwater or coastal wetland loss. Historic losses can be attributed predominantly to urbanization, transportation projects and residential development. Data generated by DEM since 1998 indicates that the extent of permitted freshwater wetland loss is kept to a minimum through DEM's wetland regulatory programs. Federal, state, and local partners have recently teamed to develop proactive wetland and habitat restoration plans and projects.

The State of Rhode Island and federal and local partners are collaborating on other proactive wetland protection initiatives: coastal wetland inventory, wetland acquisition planning, vernal pool identification and protection, and data and mapping improvements. Rhode Island does currently monitor the ecological health of wetlands but does participate on the New England Wetland Bioassessment Work Group.

G. Plan for Achieving Comprehensive Assessments

The Department of Environmental Management's Office of Water Resources (OWR) has committed to the development of a watershed approach that will guide OWR with respect to future work toward surface water pollution abatement. However, an OWR assessment of state water resource protection programs identified gaps in baseline monitoring, inadequate data management and assessment programs as significant deficiencies which jeopardize the integrity of the watershed-based approach

and achievement of comprehensive assessments. Recognizing inadequate data management as an inefficiency and obstacle to improved performance, reporting capabilities and comprehensive assessments, OWR has completed a number of key steps to improve data management and thus facilitate the comprehensive assessment goals. These data management improvements have substantially facilitated the 305(b) assessment process and allowed for easier identification of ambient monitoring gaps and improved assessment and mapping capabilities. In working towards Comprehensive Assessment of the State's waters, OWR has initiated the process of developing a state-wide monitoring strategy. The strategy includes targeted and probability-based monitoring designs to address the data gaps and comprehensive monitoring goals.

H. Water Pollution Control Program

The RI Watershed Approach is a creative management strategy which emphasizes community-based planning and implementation. Though DEM helped initiate the development of Rhode Island's Watershed Approach, it is much more than a DEM endeavor, involving non-profit organizations, universities, the private sector, and state, federal, and local government in a collaborative process. The RI Watershed Approach is a new way of doing business based on the realities of geography and community rather than bureaucratic or political boundaries. The intent is to assist and empower communities to more effectively preserve, protect, and restore RI's natural resources. It begins with scientific assessments of the State's watersheds, but relies on decision making by watershed stakeholders to effect change. The Watershed Approach provides a flexible framework for mobilizing the interests, concerns, and creative energy of everyone who lives, works, and plays in the watershed to address community-based management

objectives. Simply put, the RI Watershed Approach is a strategy for comprehensive, community-based management of the State's environment.

The Standards Section of the Office of Water Resources (OWR) implements the state's Water Quality Standards Program. The Water Quality Standards Program is responsible for ensuring compliance with the Federal Clean Water Act (CWA). The purpose of this program is to restore, preserve, and enhance the water quality of Rhode Island waters, to maintain existing uses and to protect the waters from pollutants so that the waters shall, where possible, be fishable and swimmable, and be available for all designated uses and thus assure protection for the public health welfare, and the environment. These objectives are implemented through the water quality standards which are a fundamental element of the state's Water Quality Regulations. The water quality standards are developed to define water quality goals for the state's waters by deciding what their uses will be (designated uses) and by setting criteria necessary to protect those uses. In addition to establishing water quality goals for state waters, surface water quality standards also serve as the regulatory basis for the establishment of water-quality-based treatment controls and strategies beyond technology-based controls.

The OWR is delegated to administer the National Pollutant Discharge Elimination System (NPDES) program which is implemented by the OWR as the Rhode Island Pollutant Discharge Elimination System, known as the RIPDES Program. This is the backbone of the state's water pollution control strategy, which includes developing and enforcing permit limitations for municipal and industrial wastewaters, stormwater, and combined sewer overflows discharged directly to the waters of the state (RIPDES Program) as well as industrial wastewaters discharged to municipally-owned treatment

facilities (the Pretreatment Program). The RIPDES program currently oversees permit development and compliance for 19 major municipal and 6 major industrial discharges in addition to over 100 minor discharges. The Pretreatment Program is necessary to prevent industrial discharges from interfering with the operation of municipal wastewater treatment facilities and/or causing the facility to violate its discharge limits. OWR provides oversight of 15 approved local pretreatment programs administered by publicly owned wastewater treatment facilities. The OWR administers the Water Quality Certification Program, required by Section 401 of the Clean Water Act. This program ensures that certain types of projects do not adversely impact the quality of the state's water resources.

The Operation and Maintenance Section within the OWR conducts operation and maintenance inspections and compliance evaluations at all major and minor municipal facilities to ensure conformance with permit requirements. The Operation and Maintenance staff also issue Orders of Approval for operation and maintenance manuals and review operation failures that result in permit violations. Review and approvals of wastewater facility plans, engineering reports and engineering plans and specifications for WWTF improvements, sanitary sewer systems and marine sewage pumpout facilities are conducted by the OWR staff. The Operation and Maintenance Section is also responsible for issuing approvals for the disposal, utilization, and transportation of wastewater sludge and performing inspections to ensure that the sludge is being managed in the manner approved.

The Financial Assistance Program within the OWR consists of administering and/or assisting in the oversight of financial assistance programs aimed at assisting communities and others in achieving water quality protection goals. This program

encompasses a number of financial assistance programs for the construction upgrade of wastewater collection systems and treatment facilities, including the State Revolving Loan Program, Non-Governmental Bond Fund Program, the Interceptor Bond Program and the Pawtuxet River Water Quality Bond Fund Program. The OWR also provides technical assistance and general support for the Rhode Island Aqua Fund Program.

I. Nonpoint Source Pollution Management Program

The RIDEM's Nonpoint Source Pollution Management Program was established in accordance with Section 319 of the Water Quality Act of 1987. This non-regulatory program was previously administered by the Department's Office of Environmental Coordination. Pursuant to the Department's reorganization in 1996, the Nonpoint Source Program was integrated into the Watershed Approach and is now administered by the OWR. This Program implements the Nonpoint Source Management Plan with the goals of mitigating existing and preventing subsequent nonpoint source pollution.

The Program is involved in a number of activities. In particular, over the past year key activities have included: (1) Septic System Maintenance Policy Forum; (2) Wetlands policy and programmatic streamlining initiatives; (3) support of TMDLs; (4) support of improved land management and (5) solicitation of community projects through a competitive granting process.

In 1999, for the first time in several years, the NPS program issued a competitive solicitation for grant proposals using incremental 319(h) funding (i.e., Clean Water Action Plan funding). This process is being repeated in FY2000 and for as many subsequent years as the budget will allow. In response to the NPS-RFP, DEM received 26 proposals for a total of \$1,955,814 and funded 17 projects, totaling \$885,854.

J. Cost/Benefit Assessment

A true cost/benefit assessment for the OWR is, at best, difficult to obtain. This is due to the complexities involved in evaluating the economic value of incremental improvements in water quality. Efforts have been made to compare the biennial 305(b) water quality assessments in an attempt to determine changes and/or trends in water quality over time. However, this has been unsuccessful due to changes in the evaluation protocols and the lack of a direct correlation between water quality improvements, environmental/natural resource improvements, and the associated economic impacts and valuations of these improvements. Nonetheless, some estimates of the costs and benefits of improvements in water quality and water resources are available.

Since the inception of the Clean Water Act in 1972, a total of \$544,930,525 in federal and state grant and loan funds have been awarded to water pollution abatement projects resulting in water quality benefits. Those projects funded include: six new secondary treatment facilities and sewer systems; nine plant upgrades to secondary treatment; eight expansion and/or upgrades of existing secondary plants; three plant upgrades to advanced treatment (ongoing); a sludge composting facility; numerous sewer system expansions; and two landfill closures.

These expenditures have resulted in significant gains in water pollution control as well as improved water quality conditions. Between 1984 and 1994, statewide pollutant loadings from WWTFs have been reduced 76% for BODs and 60% for total suspended solids. A recent report covering 1998 and 1999 reported that 12 WWTFs had no violations of conventional pollutant permit limits, while 4 plants had two or fewer violations, and only 3 plants had more than three violations. Benefits from improvements in water quality and water resources can be inferred from a recent state Travel and

Tourism Research Report generated by the University of Rhode Island for the Department of Economic Development. This report indicated that the number of visitors to Rhode Island in recent years increased at a rate that is nearly double the national average. Narragansett Bay's public beaches host nearly 4 million visitors throughout an average year, while its waters support more than a million recreational fishing trips. The tourism industry set an all time record of \$2.65 billion for sales revenue in 1999. The report further noted that the number of tourism-related businesses and jobs have increased as well. In 1999, 5,152 businesses contributed to 35,092 jobs and more than \$559 million in wages.

K. Water Quality Monitoring Programs

The Office of Water Resources' (OWR) surface water monitoring program is designed to gather state-wide baseline data in addition to targeted monitoring information. The data is used in establishing and reviewing the state's water quality standards, to measure progress toward achieving the state and federal water quality goals, and to supply information for use in development of permit limits for wastewater discharges and total maximum daily loads (TMDLs). Current surface water monitoring programs include activities conducted by the OWR staff as well as monitoring carried out by other agencies/organizations under contracts with OWR. The surface water monitoring program consists of targeted and probability based station sites, intensive surveys, special studies, and volunteer monitoring programs. The Shellfish Growing Area Monitoring Program collects samples from 17 separate shellfish growing areas and analyzes for fecal coliform. Shoreline surveys are conducted to determine shellfish classification for the growing areas and to locate potential and actual bacterial sources.

OWR has contracted with the USGS to conduct riverine monitoring at 7 stations in Rhode Island. Biological monitoring, utilizing artificial substrates is conducted at 6 river stations in close proximity to the USGS fixed river stations. The USEPA Rapid Bioassessment Protocols are followed for macroinvertebrate sampling at 45 stream sites around the state. Twenty-five of these 45 stations are also monitored for various conventional and toxic pollutants. The OWR is involved in watershed monitoring projects on over 30 waterbodies. These projects are in accordance with the Department's initiation of a Watershed Approach and total maximum daily load (TMDL) development. Surface water monitoring activities are also conducted by many Citizens Monitoring groups. These groups supply the OWR with supplemental water quality data for numerous rivers, lakes, ponds and estuarine waters of the state.

L. Public Health/Aquatic Life Concerns

Fish consumption advisories are in effect for all fish from the Woonasquatucket River below Smithfield due to dioxin, PCB and mercury contamination, and for bass from the Quidnick Reservoir due to mercury contamination. The Department of Health has also issued an advisory to limit the consumption of saltwater striped bass and bluefish and swordfish and shark to one meal per month.

During 1998 and 1999, 12 fish kill events occurred in Rhode Island waters however none of these events were linked to toxic pollutants. Low dissolved oxygen was determined to be the most predominant cause of these fish kills.

National sediment criteria have not yet been established and there are no numerical sediment criteria in Rhode Island's Water Quality Regulations. Consequently, sediments are not routinely sampled as part of the state's ambient monitoring program.

Sediments are evaluated under two programs in OWR: dredging and disposal, and ecological risk assessments. Both of these areas of sediment assessment are addressed in relation to programs carried out by the RIDEM Office of Waste Management.

In 1998 there was an improvement in the shellfish harvesting status for 9 acres and new restriction imposed on 524 acres. In 1999 there was an improvement in the shellfish harvesting status for 18 acres and no new restrictions were imposed. In 1998, Conditional Area A was closed for 244.5 days and Conditional Area B was closed for 123 days. Greenwich Bay was closed for 201 days and Mt. Hope/Kickamuit were closed for 210.5 days.

No bathing beaches were closed in Rhode Island during 1998 and 1999 due to toxic impacts. Eleven beaches were closed in 1998 and seven beaches were closed in 1999 due to elevated levels of fecal coliform. Most of the beaches closed in 1998 were due to heavy rains which occurred over the course of a single day in June and caused over 175 million gallons of sewage to be discharged into Narragansett Bay. The beach closures were generally of less than a week in duration and in many cases for a single day. There were no closures of surface drinking waters during 1998 and 1999 due to water quality problems in the surface water supply.

M. Groundwater

Groundwater is a locally abundant and widely used resource in Rhode Island. Approximately 26% of the state's population is supplied with drinking water from public and private wells (Solley et al 1998). Groundwater resources are expected to meet a substantial part of the state's future water supply needs. Groundwater quality in most parts of the state is suitable for human consumption and other uses without treatment.

Furthermore, protection of groundwater quality is important to protect surface water quality, since during dry periods, water in streams is derived almost entirely from groundwater.

Rhode Island's groundwater resources are extremely vulnerable to contamination because of the generally shallow depth to groundwater, aquifer permeability, and the absence of any subsurface confining layers. Preventing groundwater pollution must be a priority if the long-term quality of the State's groundwater resources is to be protected.

Over 100 different contaminants have been detected in Rhode Island groundwater, with the most common being petroleum products, organic solvents, nitrate and historically the pesticide aldicarb (Temik). Contaminant sources include leaking underground fuel storage tanks, hazardous and industrial waste disposal sites, illegal or improper waste disposal, chemical and oil spills, landfills, septic systems, road salt storage and application practices, and fertilizer and pesticide applications. Most groundwater contamination problems occur on a localized basis originating from a specific source. No public wells serving community systems or non-transient non-community systems were discontinued from service due to pollution from human activities during this reporting period (July 1995 – June 1999).

The Department of Environmental Management (DEM) is continuing to implement and refine a comprehensive groundwater protection program in response to legislative mandates and in response to the need to prevent further degradation of the state's valuable groundwater resources.

Below are the key findings of the 2000 review of groundwater quality in Rhode Island:

* Groundwater remains an important component of the total volume of freshwater used in Rhode Island. The US Geological Survey estimates that 27 million gallons per day of groundwater were withdrawn in 1995. This constitutes 20% of the total freshwater used in the state. Approximately 26% of the state's population obtains its drinking water from groundwater sources.

* Groundwater in Rhode Island is generally free of pollutants, and in over 90% of the state it is considered suitable for drinking water use and other uses without treatment. No public wells serving community systems or non-transient non-community systems were discontinued from service during this reporting period (July 1995 – June 1999) due to pollution from human activities.

* The most frequently detected contaminants in public wells in RI, excluding compounds which are naturally occurring, are MTBE, a gasoline additive, and the widely used chemical solvents (e.g., trichloroethene, trichloroethane and tetrachloroethane). Nitrate is also a concern as it is often detected at concentrations far above natural background levels.

* A review of water quality data from community and non-transient non-community public wells indicates the vast majority of wells withdraw from a clean groundwater resource. On an annual basis, 87% to 89% of the wells had nitrate concentrations less than 3 mg/l, with five wells slightly exceeding the standard of 10 ppm. The annual percentage of wells with sodium levels less than 20 mg/l was 79%, and only three wells exceeded the advisory of 100 mg/l. Metals and pesticides were not detected in groundwater in concentrations that were of concern.

* Public well data does indicate that groundwater resources are vulnerable to contamination by volatile organic compounds (VOCs). Between 15% and 30% of the

wells tested during this reporting period detected VOCs. However, only two non-transient non-community water supply wells were found to be above a drinking water standard.

* The leading cause of new groundwater contamination incidents reported to DEM continues to be the release of petroleum products stored in underground storage tanks.

N. Special State Concerns

Over the past ten years, the focus of state water pollution concerns has gradually shifted from specific discharges or "point" sources to the diversity of pollution sources categorized as "non-point" sources. Following a public investment of \$285 million in federal funds and \$66 million in state funds for construction of wastewater treatment systems, the majority of the larger direct dischargers into Rhode Island waters, which are municipal wastewater plants, are now operating reliably with respect to conventional treatment. Well established programs to regulate direct discharges and industrial pretreatment have been generally effective in controlling and often reducing toxic pollutant loadings to surface waters. Continued vigilance and effective enforcement within these programs is needed to ensure the long-term protection of water quality.

While wastewater treatment has significantly improved over the past decade, water quality degradation due to combined sewer overflows (CSOs) remains a longstanding major concern. CSOs continue to cause bacterial contamination of the Upper Narragansett Bay. In addition, DEM has more recently determined that both CSOs and treated discharges are contributing to a nutrient enrichment problem in the

Upper Bay. This water quality problem, while not fully characterized, indicates that nutrients are linked to adverse impacts of reduced dissolved oxygen levels.

In addition to controlling point sources of pollution, it is now recognized that maintaining or restoring state waters to their desired condition (fishable, swimmable or drinkable, as appropriate) requires that non-point sources of pollution be addressed. Data available to date indicate that the most serious non-point pollution concerns with respect to surface water appear to be septic systems, stormwater discharges and erosion. These sources have adversely affected both the coastal ponds region, other coastal embayments and inland freshwater lakes and ponds, including drinking water reservoirs. The pollutants of concern are bacteria, nutrients and sediments, respectively. Among nonpoint sources, addressing septic system concerns continues to be a priority. DEM has instituted a number of reforms to the regulatory process including soil-based siting, licensing of designers and process for approving specific innovative and alternative technologies. Additionally, DEM is actively supporting the development of local wastewater management programs which serve a vital role in promoting proper maintenance of ISDSs.

To promote restoration of water quality, DEM has initiated projects, known as Total Maximum Daily Loads (TMDLs) which characterize water pollution problems and recommend abatement action in targeted watersheds. This important new initiative involves local stakeholders throughout the process. DEM is giving priority in the distribution of 319 grants to TMDL implementation projects.

On an agency-wide basis, DEM is also promoting watershed-based approaches to resource protection and management. The goal of working on a watershed basis is to foster greater collaboration and coordination among all stakeholders to enhance

protection or restoration efforts. The approach is currently being piloted in two areas.

An additional state concern is the lack of water quality data for portions of the state's waters. DEM is developing a comprehensive monitoring plan which will recommend actions to eliminate data gaps. Additional resources will be needed to support a comprehensive baseline monitoring program. To support better data management, the DEM is also pursuing a number of improvements to computer systems including GIS capabilities.