

NEW HAMPSHIRE NONPOINT SOURCE MANAGEMENT PROGRAM PLAN

AUGUST 26, 2014



PREPARED BY:

Watershed Management Bureau
Watershed Assistance Section

COVER PHOTOS BY NHDES STAFF AND 319 GRANTEES (FROM TOP TO BOTTOM):

NHDES Coastal Scientist sampling on Great Bay.

Acton Wakefield Watersheds Alliance Youth Conservation Corp installs a rubber razor.

Children find starfish at Hampton Beach State Park, Hampton, NH.

319 Grantees and partners install a tree box filter in the Hodgson Brook Watershed.

Rain garden installation with Soak Up the Rain NH in Greenland, NH.

Child fishing on New Hampshire pond.

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NEW HAMPSHIRE

NONPOINT SOURCE MANAGEMENT PROGRAM PLAN

STATE OF NEW HAMPSHIRE
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AUGUST 26, 2014

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ACRONYMS

ACRONYM	DEFINITION
ACEC	American Council of Engineering Companies
AoT	Alteration of Terrain
AU	Assessment Unit
AUID	Assessment Unit Identification
ARM	Aquatic Resource Mitigation
BMP	Best Management Practice
CALM	Consolidated Assessment and Listing Methodology
CSPA	Comprehensive Shoreland Protection Act
CWA	Clean Water Act
CWNS	Clean Watershed Needs Survey
CWSRF	Clean Water State Revolving Fund
CZMA	Coastal Zone Management Act
DBE	Disadvantaged Business Enterprise
DAMF	New Hampshire Department of Agriculture, Markets, and Food
DES	New Hampshire Department of Environmental Services
DES P2	DES Pollution Prevention Program
DOT	New Hampshire Department of Transportation
EMD	Environmental Monitoring Database
EPA	Environmental Protection Agency
FEH	Fluvial Erosion Hazard
GBNNPSS	Great Bay Nitrogen NonPoint Source Study
GIS	Global Information Systems
GRTS	Grants Tracking and Reporting System
GSDI	Granite State Designers and Installers
HUC	Hydrologic Unit Code
IPM	Integrated Pest Management
LAC	Local Advisory Committee
LID	Low Impact Development
LCHIP	Land and Community Heritage Investment Program
LLMP	Lakes Lay Monitoring Program
MBE	Minority Owned Business
MOA	Memorandum of Agreement
MS4	Municipal Separate Storm Sewer System
MTRS	Measures Tracking and Reporting System
NEIWCC	New England Interstate Water Pollution Control Commission
NHACD	New Hampshire Association of Conservation Districts
NHBOA	New Hampshire Building Officials Association
NHCP	New Hampshire Coastal Program

NHD	National Hydrography Dataset
NHGS	New Hampshire Geological Survey
NHHOA	New Hampshire Health Official Association
NHMA	New Hampshire Municipal Association
NOAA	National Oceanic and Atmospheric Administration
NPDES	National Pollutant Discharge Elimination System
NPS	Nonpoint Source
NROC	Natural Resource Outreach Coalition
OCRM	Ocean and Coastal Resource Management
PDA	Pease Development Authority
PPA	Performance Partnership Agreement
PPG	Performance Partnership Grant
NRCS	Natural Resource Conservation Service
PPST	Protection Potential Screening Tool
PREP	Piscataqua Region Estuaries Partnership
QAPP	Quality Assurance Project Plan
REPP	Regional Environmental Planning Program
RFP	Request for Proposal
RMPP	Rivers Management and Protection Program
RPC	Regional Planning Commission
RPST	Recovery Potential Screening Tool
RSA	Revised Statutes Annotated (i.e., NH State Laws)
SNHRPC	Southern New Hampshire Regional Planning Commission
SOAK	Soak up the Rain New Hampshire Program abbreviation
SSPP	Site Specific Project Plan
SRF	State Revolving Fund
SWA	Southeast Watershed Alliance
SWQPA	Shoreland Water Quality Protection Act
TMDL	Total Maximum Daily Load
TSP	Technical Service Provider
UNH	University of New Hampshire
UNH CE	University of New Hampshire Cooperative Extension
UNH T2	University of New Hampshire Technology Transfer program
USACE	United States Army Corp of Engineers
USDA	United States Department of Agriculture
USFS	United States Forest Service
VLAP	Volunteer Lake Assessment Program
VRAP	Volunteer River Assessment Program
WAS	Watershed Assistance Section
WMB	Watershed Management Bureau
WMNF	White Mountain National Forest
WQS	Water Quality Standards

NONPOINT SOURCE MANAGEMENT PROGRAM OVERVIEW

NONPOINT SOURCE PROGRAM GOALS

The mission of the New Hampshire Department of Environmental Services (DES) is to help sustain a high quality of life for all citizens by protecting and restoring the environment and public health in New Hampshire. New Hampshire's Nonpoint Source (NPS) Program contributes to that mission through its goal of protecting and restoring clean water in the state's rivers, lakes, estuaries, and other waters from the negative impacts of nonpoint source pollution. Specifically, the NPS Program works toward improving land management practices such that water quality in impaired watersheds is restored and water quality in healthy watersheds is not degraded.

The goals of this updated plan are to:

- Inform residents and NPS partners about the causes and impacts of NPS pollution in New Hampshire.
- Set priorities for addressing NPS pollution sources in New Hampshire.
- Identify long term goals for protecting and restoring waters and watersheds from NPS pollution.
- Establish specific, short-term objectives and measurable milestones to be accomplished over the next 5 years to work toward attaining long term NPS program goals.

NONPOINT SOURCE PROGRAM UPDATE

The 2014 New Hampshire Nonpoint Source Management Program Plan (Plan) serves as a non-regulatory road map to address NPS pollution problems and to guide communication, outreach, planning, and NPS implementation projects over the next five years. The Plan documents the updates to New Hampshire's NPS Program since the 1999 program update. It outlines New Hampshire's approach to addressing NPS pollution during years 2015 through 2019. Background information and control measures for NPS pollutant source categories have been updated to reflect changes in programs, projects, and regulations. A new section, titled Clean Watersheds, has been added, which describes New Hampshire's approach to prioritizing where, geographically, to focus limited resources for implementation of restoration and protection projects. Goals, objectives, and measurable milestones, with a schedule for completion, have been updated, and are detailed throughout the plan in nine tables (see Tables 7-14 and 17).

INTRODUCTION

New Hampshire's Nonpoint Source Management Program was developed in response to the 1987 Clean Water Act, Section 319 provisions to address water quality problems caused by pollution from nonpoint sources (NPS). Unlike point source pollution, which comes from pipes or other easily identifiable sources, NPS pollution comes from many different sources that are spread across that landscape and are often difficult to identify and quantify.

NPS pollution contributes to over 90% of the water pollution problems in New Hampshire (DES, 2012a). Statewide management of NPS problems relies on a mix of regulatory and voluntary programs that focus on protecting clean water where it currently exists, and restoring it where development and other environmental stressors have made the water unsuitable for fishing, swimming, or other uses. Impacts from nonpoint sources continue to contribute to declining surface water quality. Major sources of NPS pollution in New Hampshire include developed lands, septic systems, landscape and turf management activities, road maintenance activities, habitat and hydrologic modification, and agriculture. The problems caused by these sources are compounded by the changing climatic conditions that the state is currently facing.

New Hampshire has been getting warmer and wetter over the last century, and the rate of change has increased over the last four decades. Annual precipitation has already increased 5 to 20 percent and is projected to increase 12 to 20 percent by the end of the century. Larger increases are expected for winter and spring, raising the concerns of rapid snowmelt, high peak stream flows, and flood risk. Extreme precipitation events have also increased, the impact of which is evident in the several large floods that have occurred across New Hampshire over the last decade. These extreme events are expected to occur more frequently. Of most concern is the projected increase in storm events that drop more than four inches of precipitation in forty-eight hours (Wake, 2011, 2014). Existing stormwater infrastructure is simply not designed to accommodate these increases in precipitation or the associated increase in runoff and pollution. Adaptation strategies to build community resiliency and reduce the impacts of these changes will be essential to achieving continued success of the NPS Program in New Hampshire.

While there is more work to be done to address impacts of NPS pollution, successful programs in New Hampshire have reduced pollution to New Hampshire's surface waters. For example, since 2000, restoration activities funded under the Watershed Assistance Grants Program with federal Section 319 funds have led to documented water quality improvements and removal of six designated use impairments.

It is essential that resources and funding for NPS programs continue in order to maintain and achieve additional success in protecting and restoring water quality in New Hampshire. The work of our partner organizations and individuals is equally important to achieving NPS Program goals. The NPS Program, described in this Plan, identifies goals, objectives, and measurable milestones to reduce the water quality impacts of major NPS Pollutant Categories, and sets a schedule for planning and implementation over the next five years.

WHO IMPLEMENTS THE NPS MANAGEMENT PROGRAM?

The NPS Program is formally managed by the Watershed Assistance Section (WAS) in the Watershed Management Bureau (WMB) at the NH Department of Environmental Services; however, NHDES is just one of many players working to keep the state's waters clean. Clean water is everyone's responsibility. It will take a concerted effort to achieve clean water over the long term. Individual homeowners, businesses, municipalities, non-governmental organizations, and state and federal agencies all have a role to play in protecting and restoring clean water.

DESCRIPTION OF PROGRAM COMPONENTS – EPA KEY COMPONENTS

Updated EPA guidance (http://water.epa.gov/polwaste/nps/upload/key_components_2012.pdf) characterizes the essential components of an effective state NPS management program. Table 1 indicates how the eight key components are incorporated into this Plan.

Table 1. Location of EPA NPS Program Key Components.

EPA NPS PROGRAM KEY COMPONENT DESCRIPTION AND LOCATION IN PLAN	
1	The state program contains explicit short- and long-term goals, objectives and strategies to restore and protect surface water and ground water, as appropriate. PAGE 15-68: New Hampshire's Nonpoint Source Program
2	The state strengthens its working partnerships and linkages to appropriate state, interstate, tribal, regional, and local entities (including conservation districts), private sector groups, citizens groups, and federal agencies. PAGE 15: Partnerships and Public Participation PAGE 25: Statewide Programs to Address Priority NPS Pollutant Categories
3	The state uses a combination of statewide programs and on-the-ground projects to achieve water quality benefits; efforts are well-integrated with other relevant state and federal programs. PAGE 4-8: New Hampshire's Watershed Management Framework PAGE 15-68: New Hampshire's Nonpoint Source Program
4	The state program describes how resources will be allocated between abating known water quality impairments from NPS pollution and protecting threatened and high quality waters from present and future NPS impacts. PAGE 9-14: Clean Watersheds
5	The state program identifies waters and watersheds impaired by NPS pollution as well as priority unimpaired waters for protection. The state establishes a process to assign priority and progressively address identified watersheds by conducting more detailed watershed assessments, developing and implementing watershed-based plans PAGE 9-14: Clean Watersheds
6	The state implements all program components required by section 319(b) of the Clean Water Act, and establishes strategic approaches and adaptive management to achieve and maintain water quality standards as quickly as practicable. The state reviews and upgrades program components as appropriate. The state program includes a mix of regulatory, non-regulatory, financial and technical assistance, as needed. PAGE 4-7: New Hampshire's Watershed Management Framework PAGE 15-68: New Hampshire's Nonpoint Source Program
7	The state manages and implements its NPS program efficiently and effectively, including financial management. PAGE 15: Funding PAGE 18: 319 Program
8	The state reviews and evaluates its NPS management program using environmental and functional measures of success, and revises its NPS management program at least every five years. PAGE 68: NPS Program Evaluation

NEW HAMPSHIRE’S WATERSHED MANAGEMENT FRAMEWORK

The Watershed Management Bureau (WMB) uses an integrated approach to achieve clean water goals. Both regulatory and non-regulatory programs work together within the WMB to integrate science, policy, planning, and education to address nonpoint source pollution, stormwater, and exotic species. There are over 20 programs and activities within the WMB that form the basis for watershed management in New Hampshire.

The NPS Program utilizes the data and assessments from WMB programs that make up the Watershed Management Framework (Figure 1) to prioritize the development and implementation of watershed plans, coordinate on Total Maximum Daily Load (TMDL) implementation, and develop and provide additional NPS resources and assistance.

NEW HAMPSHIRE’S WATER QUALITY STANDARDS

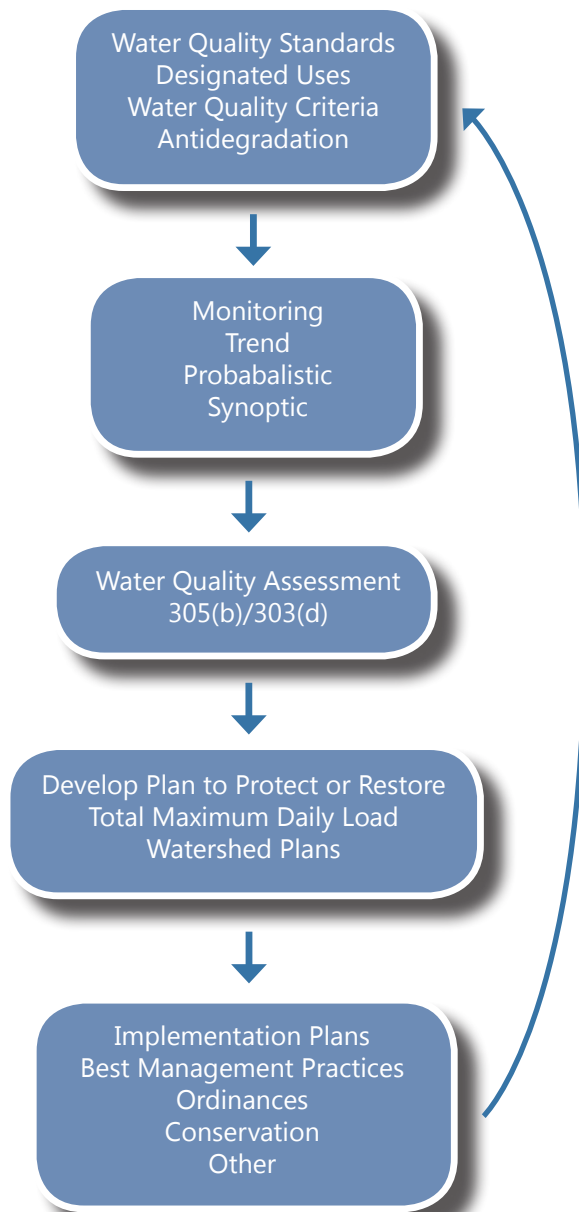
Water quality standards are used to protect the state's surface waters. Standards consist of three parts:

1. Designated Uses, such as fishing or swimming;
2. Numerical or Narrative Criteria to protect the designated uses; and
3. An Antidegradation Policy, which maintains existing high quality water that exceeds the criteria.

Criteria are established by statute (RSA 485-A:8) and Administrative Rules (Env-Wq 1700). Surface waters are routinely sampled to assess compliance relative to water quality standards as part of the Surface Water Quality Assessments 305(b) and 303(d) Program.

The Water Quality Standards Advisory Committee (WQSAC) was established in the fall of 2000 to assist the agency in drafting revised water quality regulations. The purpose of the committee is to facilitate public input, solicit advice, and provide a forum for the discussion of focused issues. Membership in the WQSAC is open to any stakeholder and all WQSAC meetings are open to public participation.

Figure 1. DES Watershed Management Framework.



WATER QUALITY MONITORING

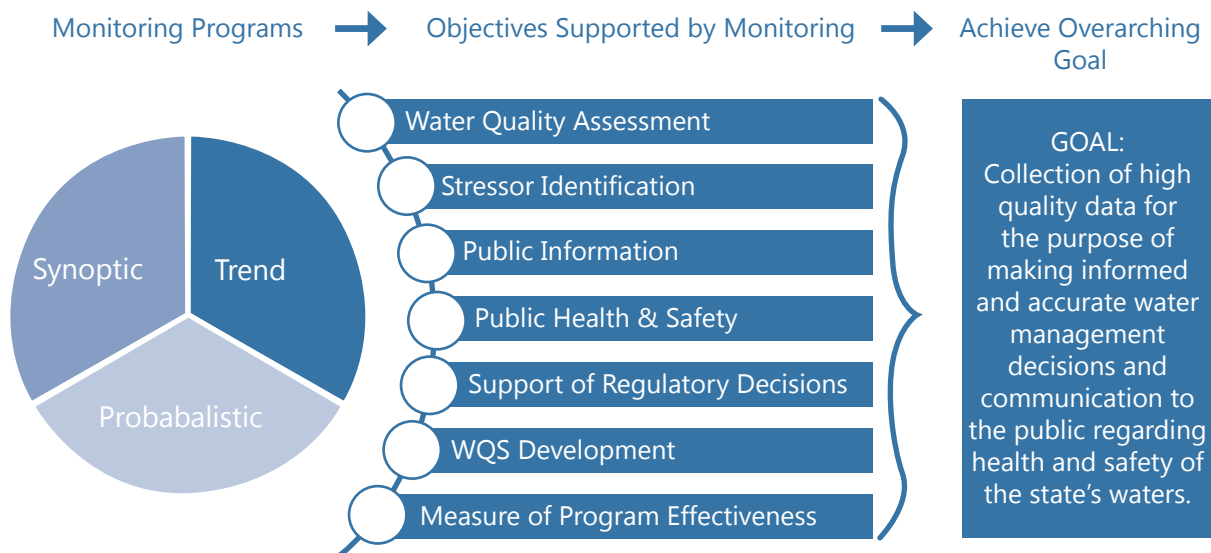
The Watershed Management Bureau is responsible for many active water quality monitoring programs, including volunteer programs that utilize citizen science to gather over 100,000 data points annually. In addition to the data collected through DES programs, the WMB utilizes data from other programs and organizations. Data is stored in the DES Environmental Monitoring Database (EMD) and used to complete Surface Water Quality Assessments.

In 2013, the WMB Water Monitoring Strategy was completed. The strategy covers a 10-year time frame (2014 - 2024) and is designed to fulfill the dual purpose of satisfying the requirements of the 2003 EPA guidance document, *Elements of a State Water Monitoring and Assessment Program* (EPA-841-B-03-003), and serving as a "manual" to DES in implementing surface water monitoring programs. The latter was recognized by DES staff as an important need in order to maximize program efficiency and accountability.

The primary outcome of the strategy is the generation of high quality data that can be used to meet a variety of surface water management objectives. To this end, the revised strategy is organized around a basic conceptual model (Figure 2). The strategy is based on the goal of the collection and usage of water quality data for water management decisions and communication of waterbody conditions to the public.

At the center of the model are three primary monitoring program design components (probability, trend, and synoptic). **Probability-based water quality surveys** will allow DES to report on the overall status through intensive sampling of a subset of randomly chosen sample locations within each waterbody type (lakes, rivers, wetlands, coastal waters). **Trend-based monitoring** will track the trajectory of important water quality indicators over time through repetitive

Figure 2. Watershed Management Bureau Water Monitoring Strategy conceptual model.



sampling at fixed monitoring stations. **Synoptic monitoring** will promote the generation of statewide data using a standardized rotational watershed approach to maintain current records of water quality conditions from infrequently sampled waters. Collectively, the strategy makes efficient use of limited monitoring resources to sample New Hampshire's surface waters, analyze data, and provide timely reporting.

SURFACE WATER QUALITY ASSESSMENTS

New Hampshire's rigorous surface water quality assessment process identifies whether or not surface waters in the state support their designated uses. A formal list of impaired surface waters in New Hampshire is documented on the state's 303(d) list; however, New Hampshire does not have a formal list of high quality waters. With so few waters being fully assessed, and in the absence of a documented impairment, it is assumed that water quality standards are achieved and therefore eligible for protection activities. In many cases, a stream or lake assessment unit may be impaired for one parameter, but have generally high quality for other parameters or uses.

The Federal Water Pollution Control Act, commonly called the Clean Water Act (CWA), requires each state to submit two surface water quality documents to the US Environmental Protection Agency (EPA) every two years.

1. Section 305(b) of the CWA requires submittal of a report (commonly called the "305(b) Report"), that describes the quality of its surface waters and an analysis of the extent to which waters provide for the protection and propagation of a balanced population of shellfish, fish, and wildlife, and allow recreational activities in and on the water.
2. Section 303(d) of the CWA requires the submittal of a report (commonly called the "303(d) List"), that includes surface waters that are:
 - a. Impaired or threatened by a pollutant or pollutant(s);
 - b. Not expected to meet water quality standards within a reasonable time even after application of best available technology standards for point sources or best management practices for nonpoint sources; and,
 - c. Require development and implementation of a comprehensive water quality study (a Total Maximum Daily Load (TMDL) study) which is designed to meet water quality standards.

The DES Surface Water Quality Assessment Program produces an Integrated Surface Water Quality Report every two years, containing the "305(b) Report" and the "303(d) List". The Integrated Report, available at <http://des.nh.gov/organization/divisions/water/wmb/swqa/index.htm> contains five categories of waters described below. While all categories are included in the Integrated Report, categories 4 and 5 represent all impaired waters, with category 5 representing the "303(d) Listed" waters requiring a TMDL. Categories include:

Category 1: Attaining all designated uses and no use is threatened.

- Category 2: Attaining some of the designated uses; no use is threatened; and insufficient or no data and information is available to determine if the remaining uses are attained or threatened (i.e., more data is needed to assess some of the uses).
- Category 3: Insufficient or no data and information are available to determine if any designated use is attained, impaired, or threatened (i.e., more monitoring is needed to assess any use).
- Category 4: Impaired or threatened for one or more designated uses but does not require development of a TMDL because;
 - 4a: A TMDL has been completed, or
 - 4b: Other pollution control requirements are reasonably expected to result in attainment of the water quality standard in the near future, or
 - 4c: The impairment is not caused by a pollutant.
- Category 5: Impaired or threatened for one or more designated uses by a pollutant(s), and requires a TMDL (this is the 303(d) List).

The Consolidated Assessment and Listing Methodology (CALM), available at <http://des.nh.gov/organization/divisions/water/wmb/swqa/documents/calm.pdf>, describes, in detail, the process used to make surface water quality attainment decisions for 305(b) reporting and 303(d) listing purposes. The term "listing" refers to the process of placing (or listing) a water on the Section 303(d) List of impaired waters. The CALM also includes descriptions and definitions of the many terms used in the presentation of assessment results; consequently, reviewing the CALM prior to reviewing the assessments helps to better understand and interpret assessment results.

It is important to understand that assessment methodologies are dynamic and change as new information and assessment techniques become available. This is why the CALM is updated every two years. Such changes can also impact monitoring strategies designed to determine if waterbodies are attaining water quality standards. Periodic updates of the methodology should result in even more accurate and reliable assessments and, therefore, better management of water resources in the future.

TOTAL MAXIMUM DAILY LOAD (TMDL) STUDIES AND WATERSHED BASED PLANS

Under the federal Clean Water Act, DES must develop Total Maximum Daily Load (TMDL) studies for waterbodies impaired by a pollutant. A TMDL refers to a detailed plan that identifies the pollutant reductions needed to meet New Hampshire's water quality standards for a particular waterbody and develops a restoration strategy to implement those reductions. The general process by which TMDLs are developed includes identifying the problem pollutant, establishing the water quality goals or target values needed to achieve water quality standards, identifying the specific sources contributing the pollutant of concern, and assigning a specific load allocation to each of the sources. Follow-up monitoring is needed to ensure that the TMDL results in the attainment of the water quality standard. More information on the TMDL Program in New

Hampshire can be found at <http://des.nh.gov/organization/divisions/water/wmb/tmdl/>.

A watershed management plan is a tool for managing existing and future watershed conditions, including land use planning and potential impacts on surface water quality. Plans identify existing pollution contributions and sources, help establish water quality goals, estimate the reductions or limits of pollutants needed to meet water quality goals, and identify the actions needed, regulatory or non-regulatory, to achieve pollutant reductions. Watershed management plans prioritize recommended actions based on cost/benefit analysis, and set an implementation time line. They also describe potential sources of funding that may be available to carry out components of the plan.

New Hampshire's NPS Program developed guidance for the development of watershed based plans in New Hampshire (available at http://des.nh.gov/organization/divisions/water/wmb/was/documents/wmp_dvlp_guidance.pdf) to promote the development and implementation of plans designed to address EPA's key elements for watershed management planning. A list of completed watershed based plans in New Hampshire is available at http://des.nh.gov/organization/divisions/water/wmb/was/watershed_based_plans.htm. More information on how the NPS Program prioritizes development and implementation of watershed based plans is described in the Clean Watersheds section of this Plan on page 9.

CLEAN WATERSHEDS

Restoration of NPS-impaired waters remains the primary goal of the 319 program; however, only a small percentage of waters in New Hampshire have sufficient data to determine whether or not a water quality impairment exists. As of 2012, about 35% of lakes and 25% of rivers had enough data to be assessed for the Aquatic Life designated use, and about 15% of lakes and rivers had enough data to be assessed for the Swimming designated use. With the majority of lakes and rivers unassessed and therefore without a formal high quality or impairment determination, New Hampshire's nonpoint source program balances funding of both protection and restoration activities. In the absence of a formal impairment, NH's NPS program recognizes that there are still important water quality benefits to be gained from implementing protection projects that prevent further degradation or protect high quality water where it exists.

This section describes the process of prioritizing restoration and protection activities to achieve clean watersheds in New Hampshire. Specific goals, objectives, and milestones related to clean watershed prioritization are described in Table 7.

PRIORITY AREAS FOR NONPOINT SOURCE MANAGEMENT ACTIVITIES

In 2013, DES completed a priority analysis, using the Recovery Potential Screening Tool (RPST) developed by EPA, to identify geographic areas of the state where the Department should focus limited resources among large numbers of waters in need of restoration or protection.

The RPST uses the ecological, stressor, and social characteristics of each watershed to identify those places with the greatest likelihood for restoring or maintaining water quality. Representative indicator metrics (shown in Tables 2 and 5) were selected by DES and used to calculate a specific recoverability or protection score for each watershed. Depending on the score, each watershed was assigned low, medium, or high recovery or protection potential.

The restoration and protection priorities and rationale are described in their respective sections below. A complete description of the prioritization activity using the RPST, including the geographic scope, assessment unit and HUC 12 watershed delineation, indicator metrics used, data gathering, sources, ranking, and mapping results is described in the *Priority Areas for Nonpoint Source Management Activities in New Hampshire: DES Methodology for Prioritizing Water Quality Restoration and Protection Activities using the Recovery Potential Screening Tool (RPST)* in Appendix A.

Priority watersheds identified in the NPS Plan may also serve as the basis for decision-making with respect to priorities for monitoring, TMDL development and implementation, and potentially SRF funding for NPS projects.

PRIORITIES FOR RESTORATION ACTIVITIES

In New Hampshire, impairments are made at the assessment unit (AU) level. An AU is the basic unit of record for conducting and reporting the results of all water quality assessments. To provide a finer level of detail for the recoverability analysis, DES delineated the watershed boundary of each AU, which includes every stream segment, lake, pond, impoundment, or estuary in the state. The recoverability analysis for restoration activities included all AU watersheds that have one or more nonpoint source-related impairments. DES determined that nonpoint source-related impairments include those parameters listed in Table 2. The recoverability analysis calculated recovery scores based upon the ecological, stressor, and social metrics in Table 3.

Table 2. Nonpoint source-related impairments.

NONPOINT SOURCE IMPAIRMENT NAME
AMMONIA (UN-IONIZED)
BOD, BIOCHEMICAL OXYGEN DEMAND
BENTHIC-MACROINVERTEBRATE BIOASSESSMENTS (STREAMS)
CHLORIDE
CHLOROPHYLL-A
CYANOBACTERIA HEPATOTOXIC MICROCYSTINS
DISSOLVED OXYGEN SATURATION
ENTEROCOCCUS
ESCHERICHIA COLI
EXCESS ALGAL GROWTH
FISHES BIOASSESSMENTS (STREAMS)
HABITAT ASSESSMENT (STREAMS) LOW FLOW ALTERATIONS
AMMONIA (TOTAL)
OTHER FLOW REGIME ALTERATIONS
OXYGEN, DISSOLVED
SEDIMENTATION/SILTATION
FECAL COLIFORM
TOTAL SUSPENDED SOLIDS (TSS)
TURBIDITY
NITROGEN (TOTAL)
PHOSPHORUS (TOTAL)

RIVERS

New Hampshire has nearly 17,000 stream and river miles that flow through the state. Priority for restoration activities is given to those river AU watersheds that have completed EPA-approved watershed restoration plans, or that ranked medium or high priority in the RPST analysis and meet the following river priority criteria:

1. The waterbody has a committed organization, association, or other group associated with it;
2. The waterbody has an established water quality monitoring program; and,
3. The organization has regular interaction with water quality professionals.

The river priority criteria can be met by participating in the NHDES Volunteer River Assessment (VRAP) Program (<http://des.nh.gov/organization/divisions/water/wmb/vrap/index.htm>). See Appendix B for the River Watersheds Recovery Potential Ranking and Appendix D for associated maps.

LAKES

New Hampshire has over 800 lakes and ponds greater than 10 acres in size. The priority for

restoration activities is given to those lake watersheds that have completed EPA-approved watershed restoration plans, or that ranked medium or high priority in the RPST analysis and meet the following lake priority criteria:

1. The waterbody has a committed organization, association, or other group associated with it;
2. The waterbody has an established water quality monitoring program; and,
3. The organization has regular interaction with limnology professionals.

The lake priority criteria can be met by participating in the NHDES Volunteer Lake Assessment (VLAP) Program (<http://des.nh.gov/organization/divisions/water/wmb/vlap/>) or the University of New Hampshire Lakes Lay Monitoring Program (UNH LLMP) (<http://cfb.unh.edu/programs/LLMP/nhllmp.htm>). See Appendix C for the Priority Lake Watersheds Recovery Potential Ranking and Appendix D for associated maps.

Table 3. Recoverability metrics.

ECOLOGICAL METRICS	STRESSOR METRICS	SOCIAL METRICS
WATERSHED SIZE MAINTENANCE OF % NATURAL COVER STRAHLER STREAM ORDER $\leq 3^*$ WATERSHED %: INSTATE AREA STREAM MILES UNIMPAIRED LAKE ACRES UNIMPAIRED NATURAL COVER FOREST WETLANDS NATURAL SERVICES NETWORK ACTIVE RIVER AREA %: NATURAL COVER FOREST WETLANDS	WATERSHED AQUATIC BARRIERS CORRIDOR ROAD CROSSING DENSITY NUMBER OF 303(D) LISTED CAUSES WATERSHED %: IMPERVIOUS AREA AGRICULTURE PASTURE DEVELOPED INCREASE IN DEVELOPED CLASSES ACTIVE RIVER AREA %: IMPERVIOUS AREA AGRICULTURE PASTURE DEVELOPED	WATERSHED SIZE APPROVED TMDL EXISTENCE WATERSHED-BASED PLAN EXISTENCE JURISDICTIONAL COMPLEXITY WATERSHED POPULATION # DRINKING WATER INTAKES ASSESSMENT UNIT CLASS WATERSHED %: PROTECTED LAND STREAM MILES ASSESSED LAKE ACRES ASSESSED
* STRAHLER STREAM ORDER ≤ 3 WAS NOT INCLUDED IN THE ECOLOGICAL METRICS FOR THE LAKES RESTORATION PRIORITY ASSESSMENT.		

BEACHES

New Hampshire has nearly 400 freshwater and coastal beaches. Priority for restoration activities is given to the nearly 150 public bathing beaches with documented allowable bacteria loadings and associated reductions needed to meet water quality standards, as reported in one of the EPA-approved Total Maximum Daily Load (TMDL) studies available on the DES website at <http://des.nh.gov/organization/divisions/water/wmb/tmdl/categories/publications.htm>. The list of priority beaches is included in Appendix E. Beach TMDLs include the following:

- *Final Report Total Maximum Daily Load (TMDL) Report for 44 Bacteria Impaired Waters in New*

Hampshire. NHDES. September 2013.

- *Final Report Total Maximum Daily Load (TMDL) Report for 58 Bacteria Impaired Waters in New Hampshire*. NHDES. August 2011.
- *Final Report New Hampshire Statewide Total Maximum Daily Load (TMDL) for Bacteria Impaired Waters*. FB Environmental for NHDES. September 2010.
- *Total Maximum Daily Load (TMDL) Study for Bacteria in Mill Pond Town Beach, Washington, NH*. NHDES. September 2006.
- *Total Maximum Daily Load (TMDL) Study for Bacteria in Sand Dam Village Pond Town Beach, Troy, NH*. NHDES. September 2006.
- *Total Maximum Daily Load (TMDL) Study for Bacteria in Hampton/Seabrook Harbor*. NHDES. May 2004.

ESTUARIES

The Great Bay and Hampton-Seabrook estuaries are the largest, distinct estuarine systems in New Hampshire. The Great Bay Estuary begins at the confluence of the Piscataqua River with the Atlantic Ocean and extends to the head-of-tide dams on the Winnicut, Squamscott, Lamprey, Oyster, Bellamy, Cocheco, Salmon Falls, and Great Works Rivers. The Great Bay estuary covers approximately 13,440 acres (21 square miles). The Hampton-Seabrook Estuary starts at the confluence of the Hampton River with the Atlantic Ocean and extends to the head-of-tide on the Taylor, Blackwater, Browns, and Hampton Falls Rivers. The Hampton-Seabrook Harbor Estuary covers approximately 1,227 acres (1.9 square miles). Other estuaries of importance include Little Bay, Little Harbor, and Rye Harbor, as well as portions of their tidal tributaries. Because of their environmental, cultural, and economic significance, DES has assigned high priority to all of the state's estuaries and their tidal tributaries.

DAMS AND BARRIERS

Under New Hampshire RSA 482:2, II and Env-Wr 101.12, a dam is any artificial barrier that impounds or diverts water and has a height of 6 feet or more, or is located at the outlet of a great pond, or is an artificial barrier which impounds liquid industrial or liquid commercial wastes, or septage or sewage, regardless of height or storage.

New Hampshire has more than 4,800 active and inactive dams in the state and countless unregistered dams and artificial barriers that impede stream flow and fish passage. Many of these barriers no longer provide a valuable function and instead, contribute to water quality or habitat impairments. Selective barrier removal can restore a river to a healthier, free-flowing condition and can remove barrier-related impairments to water quality and habitat.

Priority dams and barriers for removal must meet the following criteria:

1. The structure impounds or diverts water;
2. The waterbody for which it is located must be on New Hampshire's 303(d) list, as impaired for at least one of the following parameters:
 - Chlorophyll-a

- Dissolved oxygen saturation
 - Dissolved oxygen
 - Cyanobacteria hepatotoxic microcystins; and
3. The dam or barrier owner has contacted the DES River Restoration Program and expressed their interest in removal.

Currently, the following dams and barriers, listed in Table 4 below, meet the criteria. As DES becomes aware of additional dams or barriers meeting the criteria, this list will be updated.

Table 4. Priority Dam and Barriers sites.

WATERBODY NAME	WATERBODY AUID	TOWN
EXETER RIVER – GREAT DAM	NHIMP600030805-04	EXETER
OYSTER RIVER – MILL POND DAM	NHIMP600030902-04	DURHAM
BELLAMY RIVER – SAWYERS MILL DAM POND	NHIMP600030903-02	DOVER
SOUHEGAN RIVER – GOLDMAN DAM	NHIMP700060906-07	MILFORD
ASHUELOT RIVER DAM POND	NHIMP802010301-02	KEENE
TAYLOR RIVER REFUGE POND	NHLAK600031003-02	HAMPTON FALLS
HORSESHOE POND	NHLAK802020202-03	FITZWILLIAM
MCQUESTEN POND - DAM #1	NHLAK700060803-03	MANCHESTER
MCQUESTEN POND - DAM #2	NHLAK700060803-03	MANCHESTER
MCQUESTEN BROOK - SOUTH MAIN STREET DAM	NHRIV700060803-16	MANCHESTER

PRIORITIES FOR PROTECTION ACTIVITIES

New Hampshire does not have a formal list of high quality waters, and, as noted in the EPA National Water Quality Assessment, tends to have better than average water quality. Therefore, in the absence of a documented impairment, water quality is assumed to be high and eligible for protection activities. In many cases, an AU impaired for one parameter or use is eligible for protection activities due to generally high quality for other parameters or uses. The protection analysis was completed at the hydrologic unit code (HUC) 12 scale. The priority analysis, referred to as the Protection Potential Screening Tool (PPST), adapted by NHDES from EPA's Recovery Potential Screening Tool, calculated protection scores based upon the ecological, stressor, and social metrics in Table 5.

Priority for protection activities is given to those 17 AU watersheds that fully support both aquatic life and primary contact recreation designated uses in Table 6. In addition, priority for protection activities is given to those watersheds that have completed, EPA-approved watershed based plans, or that ranked medium or high priority in the PPST analysis. See Appendix F for the HUC 12 Protection Potential Ranking.

Table 5. Protection metrics.

ECOLOGICAL METRICS	STRESSOR METRICS	SOCIAL METRICS
MAINTENANCE OF % NATURAL COVER STRAHLER STREAM ORDER ≤ 3 WATERSHED %: NATURAL COVER FOREST WETLANDS NATURAL SERVICES NETWORK ACTIVE RIVER AREA %: NATURAL COVER FOREST WETLANDS	WATERSHED AQUATIC BARRIERS CORRIDOR ROAD CROSSING DENSITY WATERSHED %: IMPERVIOUS AREA DEVELOPED INCREASE IN DEVELOPED CLASSES ACTIVE RIVER AREA %: IMPERVIOUS AREA DEVELOPED	WATERSHED-BASED PLAN EXISTENCE JURISDICTIONAL COMPLEXITY # DRINKING WATER INTAKES WATERSHED %: PROTECTED LAND AGRICULTURE PASTURE

Table 6. Priority Protection sites that fully support aquatic life and primary contact recreation designated uses.

WATERBODY AUID	PRIMARY TOWN	WATERBODY NAME
NHRIV400010405-02	CLARKSVILLE	S AND W BRANCH AND LITTLE DEAD DIAMOND R - LOST VALLEY BRK - PESKY BRK
NHRIV400010502-01	DIXVILLE	CLEAR STREAM-FLUME BROOK - UNNAMED BROOK - CASCADE BROOK
NHRIV400020101-04	GORHAM	MOOSE RIVER
NHRIV600020106-08	BARTLETT	MEADOW BROOK - SACO RIVER - UNNAMED BROOK - BARTLETT BROOK - STONY BROOK
NHRIV600020302-03	CONWAY	ARTIST BROOK - UNNAMED BROOK
NHRIV700010305-07	GROTON	UNNAMED BROOK - TO BAKER RIVER
NHRIV700010401-06	WATERVILLE VALLEY	SNOWS BROOK
NHRIV700010401-09	WATERVILLE VALLEY	MAD RIVER
NHRIV700010601-01	GROTON	COCKERMOUTH RIVER - ATWELL BROOK - UNNAMED BROOK
NHRIV700010601-02	GROTON	HARDY BROOK
NHRIV700030504-10	HILLSBOROUGH	CONTOOCOOK RIVER - SAND BROOK - UNNAMED BROOK
NHRIV700030507-10	BOSCAWEN	CONTOOCOOK RIVER - LOWER FALLS DAM TO MERRIMACK R
NHRIV700060906-04	MONT VERNON	HARTSHORN BROOK
NHRIV801010201-01	PITTSBURG	MIDDLE BRANCH INDIAN STREAM - UNNAMED BROOK - GREELEY BROOK
NHRIV801030302-01	FRANCONIA	BEAVER BRK - LAFAYETTE BRK - SKOOKUMCHUCK BRK - UNNAMED BRK - JORDAN BRK
NHRIV801030401-01	THOMPSON AND MESERVES PURCHASE	AMMONOOSUC R - JEFFERSON BRK - CLAY BRK - FRANKLIN BRK - MONROE BRK
NHRIV802010302-04	SWANZEY	PERRY BROOK

NEW HAMPSHIRE'S NONPOINT SOURCE PROGRAM

PARTNERSHIPS AND PUBLIC PARTICIPATION

New Hampshire's NPS Program partners with many organizations using a variety of formal and informal mechanisms. These partners are identified, by milestone, in the Goals, Objectives, and Milestones section of each Nonpoint Source Pollutant Category beginning on page 25 of this Plan.

The state seeks involvement and solicits comment on significant proposed program changes from NPS program partners and stakeholders through a variety of ways, depending upon the change and the specific audiences involved. When soliciting input for programmatic changes, DES may form expert advisory groups, host informal meetings, attend stakeholder meetings, and solicit input via email or through social media. When announcing programmatic changes, DES may use social media, the DES Newsletter, press releases, stakeholder email, the NH Municipal EcoLink, or other outreach venues to inform stakeholders.

FUNDING

Funding for NPS activities in New Hampshire comes primarily from the Environmental Protection Agency under Section 319 of the Clean Water Act. DES administers the Watershed Assistance Grants Program to provide financial assistance (subgrants of Section 319 funds) to help subgrantees conduct on-the-ground NPS projects. NPS projects implement actions to restore or improve water quality and enhance the designated uses of the state's waters by addressing sources of NPS pollution, hydrologic modification of rivers and streams, and habitat losses.

DES has well-established financial management and programmatic systems to ensure that 319 dollars are used efficiently and consistently with the Nonpoint Source Grant Administrative Guidelines, last updated in March 2013 and available at http://des.nh.gov/organization/divisions/water/wmb/was/qapp/documents/qapp_319_attache.pdf. All statutory and grant conditions applicable to 319 grants received by the State are included in contracts and grant awards made to subgrantees so that all recipients must follow all federal requirements. Further, such requirements are included in grant project solicitations so that subgrantees are aware of them prior to commencing a project.

The State of New Hampshire has an integrated accounting system with separate accounts for individual programs. The accounts are reconciled monthly between the State of New Hampshire's accounting System (NHFIRST) and the agency's Legacy system (DES Ledger) to ensure the proper recording of financial transactions. Payment is then received via electronic transfer through ASAP (Automated Standard Application for Payments). Procedure manuals and approval processes are in place to strengthen internal controls and ensure the terms and obligations defined in the grant agreement are met.

Additional funding from partners may also be available to supplement or leverage 319 funds. These funds are subject to congressional approval or other authority, and may vary in amount from year to year. These include:

CLEAN WATER STATE REVOLVING LOAN FUND (CWSRF)

The 1987 amendments to the Clean Water Act created the Clean Water State Revolving Loan Fund (CWSRF), which provides low-interest loans to assist communities with the planning, design, and construction of eligible water pollution control infrastructure projects. Borrowers are typically municipal or other local government entities. Most communities with publicly owned wastewater systems or unlined landfills are eligible to apply for a loan to improve their wastewater system or close their landfill. Projects that address stormwater or nonpoint source pollution problems are also eligible. Each year, New Hampshire sets aside a portion of the CWSRF for “green infrastructure” projects.

NH DEPARTMENT OF AGRICULTURE, MARKETS, AND FOOD (NH DAMF)

MINI GRANT PROGRAM - Offers matching grants of up to \$500 to organizations to conduct projects focused on promoting New Hampshire agriculture.

AGRICULTURAL NUTRIENT MANAGEMENT (ANM) GRANT PROGRAM – ANM grants assist agricultural land and livestock owners with efforts to minimize adverse effects to waters of the state by better managing agricultural nutrients including commercial fertilizers, animal manures and agricultural composts. Applicants may apply for cost assistance of up to \$2,500 per year. The majority of funding is used for on-farm projects that address or prevent water pollution and some funding is available for educational projects. This grant program is administered through the NH DAMF, Bureau of Markets and is funded in NH DAMF’s budget.

ENVIRONMENTAL PROTECT AGENCY 604(B) WATER QUALITY PLANNING GRANTS

Water Quality Planning Grants are available to Regional Planning Commissions and/or the Connecticut River Joint Commissions for water quality planning purposes. Funding priority is given to projects developing watershed-based plans. A total award amount of \$80,000 is available every two years. Funds are available to NHDES through US EPA pursuant to section 604(b) of the Clean Water Act.

NH DRINKING WATER SOURCE PROTECTION GRANTS

Source Protection Grants are available to public water suppliers for source water protection projects. The program, which began in 1997, has a total of \$200,000 available annually to award to eligible municipalities. Grant amounts vary from \$2,000 to \$15,000.

CONSERVATION LICENSE PLATE PROGRAM (MOOSE PLATE GRANT)

The Moose Plate Grant, administered through the State Conservation Committee, funds projects that enhance the environment by promoting the sustainability of the state’s public and private land, air, water, and cultural resources to prevent their pollution or degradation.

Eligible applicants include county conservation districts, cooperative extension natural resource programs, conservation commissions, schools, scout troops, nonprofit groups, and conservation organizations.

AQUATIC RESOURCE MITIGATION (ARM) FUND

The ARM Fund, administered through the NHDES Wetland Bureau, supports projects that provide resource restoration, preservation or improvement projects. ARM funds are provided through an in-leau fee from compensatory mitigation requirements under RSA 482-A:28 and Env-Wt 800. Eligible projects include those involving land acquisition, wetland or stream restoration, culvert or dam repair or replacement, or invasive species management. Eligible applicants include NH communities within the Resource Mitigation Service Areas as well as county governments, regional planning commissions, watershed/river associations, state agencies, learning institutions, and nonprofit organizations.

NH COASTAL PROGRAM (NHCP) GRANTS

Coastal Program Grants address coastal resources, specifically water quality protection, habitat restoration, and climate change adaptation. Projects can be associated with coastal resource planning and management, coastal outreach and education, and construction and/or acquisition projects. Grants are offered to communities and organizations within NH's coastal zone. The funds are available through the National Oceanic and Atmospheric Administration (NOAA), Office of Ocean and Coastal Resource Management (OCRM), pursuant to the Coastal Zone Management Act of 1972. Total funds available each year are dependant on federal funding to OCRM.

EXOTIC SPECIES PROGRAM GRANTS

The Exotic Species Grants are funded through boater registration fees and include the following:

CONTROL GRANTS FOR EXOTIC AQUATIC PLANTS - Control Grants are awarded to local lake associations and municipalities for the control and treatment of exotic aquatic weeds, like milfoil and include the development of long-term management plans for each waterbody that requests funding.

MILFOIL AND OTHER EXOTIC PLANT PREVENTION GRANTS - Grant monies are available each year for forward-thinking strategies that seek to prevent new infestations of exotic plants, including outreach, education, Lake Host Programs, and other activities.

RESEARCH GRANTS - Grant monies are available for innovative research projects by institutions of higher learning (i.e., colleges and universities) that focus on issues associated with exotic aquatic plant management, control, biology, ecology or prevention, or other relevant projects.

NATURAL RESOURCES CONSERVATION SERVICE (NRCS) FUNDING OPPORTUNITIES

U.S. Department of Agriculture, NRCS provides technical and financial assistance to private landowners, many of which are agricultural producers. Some of these "working lands programs" address resource concerns associated with agricultural operations. Applications for funding are ranked and prioritized based on the environmental benefits associated with the completion of

the best management practices (BMP's). Applications for program funding are accepted year round at seven Field Office locations (Epping, Milford, Walpole, Concord, Conway, Orford, & Lancaster). Additional information on New Hampshire NRCS can be found on their website (www.nrcs.usda.gov/wps/portal/nrcs/site/nh/home/) or by calling the local field office. Local contact information can be found on the website.

319 PROGRAM

The 1987 amendments to the Clean Water Act (CWA) established the Section 319 Nonpoint Source Management Program. Under Section 319, the US EPA provides funding to states, territories and tribes to implement a wide variety of activities including technical assistance, financial assistance, education, training, technology transfer, demonstration projects and monitoring to assess the success of specific nonpoint source implementation projects.

The DES Watershed Assistance Section (WAS) in the Watershed Management Bureau administers New Hampshire's NPS Program. In addition to collaborating with NPS partners to implement statewide programs, WAS administers the Watershed Assistance Grants Program. Under the grant program, DES Watershed Assistance staff work with municipalities, universities, watershed associations and other organizations to develop and implement watershed based plans in priority watersheds as well as implement other water quality planning and implementation projects. These grants support local projects that implement actions to restore or improve water quality and enhance the designated uses of the state's waters by addressing sources of NPS pollution, hydromodification or rivers and streams, and habitat losses. The funding for these grants comes from the US Environmental Protection Agency under Section 319 of the Clean Water Act.

The 319 Program in New Hampshire follows EPA's Nonpoint Source Program Grants Guidelines for States and Territories issued in April 2013 (<http://water.epa.gov/polwaste/nps/upload/319-guidelines-fy14.pdf>) and operates under the New Hampshire Section 319 Nonpoint Source Program Grant Program Quality Assurance Project Plan, updated August 23, 2013 (http://des.nh.gov/organization/divisions/water/wmb/was/qapp/documents/qapp_319.pdf).

NPS PROGRAM GOALS, OBJECTIVES, AND MILESTONES

Goals, objectives, and measurable milestones for New Hampshire's NPS Program are summarized in tables 7 through 14 and 17, and include:

- Clean Watersheds
- Partnerships
- 319 Program
- Statewide Programs: Agriculture, Chlorides and Road Maintenance, Developed Land, Hydrologic and Habitat Modification, Landscape and Turf Management, Subsurface Systems

TABLE 7. CLEAN WATERSHED (CW) GOALS, OBJECTIVES, AND MILESTONES

Clean Watershed (CW) Goal. Water quality in priority watersheds is protected and restored.						
Objective	Milestone	Measure of Success	Schedule			
			2015	2016	2017	2018
<p>Objective CW-1 Grant funding is awarded to projects with the greatest likelihood for successful restoration or protection activities.</p> <p>Objective CW-2 Watershed based plans are developed and implemented in priority watersheds.</p>	<p>Milestone CW-1.1 Annual grant solicitation process utilizes watershed prioritization as the basis for funding projects. <i>Partners: DES</i></p>	<p>Measure CW-1.1a 100% of grants awarded annually are in priority watersheds.</p>				
	<p>Milestone CW-2.1 Restoration and protection projects identified in existing watershed-based plans are implemented. <i>Partners: DES, 319 Grantees</i></p> <p>Milestone CW-2.2 New watershed-based plans are developed and existing watershed-based plans are updated, where needed, to comply with EPA's Nine Minimum Elements of Watershed-based Plans, as part of implementation grants. <i>Partners: DES, 319 Grantees</i></p>	<p>Measure CW-2.1 Identify and implement 4 new restoration and 2 new protection projects.</p> <p>Measure CW-2.2 Develop new or updated watershed-based plans for 3 restoration and 1 protection watersheds that meet EPA's Nine Minimum Elements of Watershed-based Plans.</p>				
	<p>Milestone CW-2.3 Watershed-based plan implementation efforts result in measurable water quality benefits. <i>Partners: DES, 319 Grantees, DES and other monitoring programs</i></p>	<p>Measure CW-2.3a Estimated annual reductions in nitrogen, phosphorus, sediment, and other project-relevant parameters as reported annually into the Grants Reporting and Tracking Systems (GRTS) and the NPS annual report.</p> <p>Measure CW-2.3b The NPS Program Annual Report includes the number of waterbodies where the concentration of NPS parameters have been reduced.</p>				

TABLE 7 (CONT.). CLEAN WATERSHED (CW) GOALS, OBJECTIVES, AND MILESTONES

Objective	Milestone	Measure of Success	Schedule				
			2015	2016	2017	2018	2019
Objective CW-2 (cont.)	<p>Milestone CW-2.4 Progress toward implementing watershed-based plans is efficiently tracked, including action item implementation, condition and maintenance surveying of best management practices, and other relevant information. <i>Partners: DES, 319 Grantees</i></p>	<p>Measure CW-2.4a A system of cataloguing watershed-based plans is developed to track implementation activities, follow-up condition and maintenance, and provide status reports.</p> <p>Measure CW-2.4b 20 BMP condition assessments per year to determine general conditions of 319 or State Revolving Loan-funded BMP installations. Annual summary report.</p> <p>Measure CW-2.4c Completed BMP Maintenance Guidance is available to project implementers and supports follow-up maintenance for 319 or State Revolving Loan-funded BMPs to improve performance and life expectancy.</p>					
<p>Objective CW-3 Progress toward water quality improvement is quantified.</p>	<p>Milestone CW-3.1 Potential assessment unit delisting, partial delisting, and implementation projects are tracked so that success stories may be drafted as soon as possible. <i>Partners: DES, 319 Grantees, EPA, volunteer monitoring groups</i></p>	<p>Measure CW-3.1a Develop process to review in-progress and recently completed projects to determine potential candidates for success stories.</p> <p>Measure CW-3.1b Confirmation monitoring is completed annually in watersheds where watershed-based plans have been implemented to determine whether delisting of impairments is warranted.</p>					
	<p>Milestone CW-3.2 EPA success stories are approved and published on EPA, DES, and other websites to demonstrate program success for pollutant based, non-pollutant based, and partial restoration projects. <i>Partners: DES, 319 Grantees, EPA</i></p>	<p>Measure CW-3.2 Two EPA Success Stories completed by 2019.</p>					

TABLE 8. PARTNERSHIP (P) GOALS, OBJECTIVES, AND MILESTONES

Partnership (P) Goal. The NPS Program has strong partnerships with local, state, and federal agencies, as well as other organizations in New Hampshire.		Measure of Success	Schedule				
Objective	Milestone		2015	2016	2017	2018	2019
<p>Objective P-1 Existing and new NPS Program partnerships result in an increased understanding of NPS issues and the importance of clean water.</p>	<p>Milestone P-1.1 Existing and new NPS partners and stakeholders participate in statewide NPS programs and watershed projects. <i>Partners: DES, 319 Grantees, watershed organizations, municipalities, non-governmental organizations, universities</i></p>	<p>Measure P-1.1a NPS Program staff participate in two NPS outreach activities per year.</p>					
		<p>Measure P-1.1b Host and solicit evaluations from one Watershed Roundtable event per year in 2016 and 2018.</p>					
		<p>Measure P-1.1c One outreach/training event is designed per year for 319 grantees in response to Watershed Roundtable evaluations.</p>					
	<p>Milestone P-1.2 NPS Program partners/ stakeholder audiences, including 319 grantees, have access to NPS information and are able to obtain answers to NPS-related questions. <i>Partners: DES, 319 Grantees, Municipalities, Watershed Organizations</i></p>	<p>Measure P-1.2a Three 319 grant projects are promoted per year through various media, venues, and events.</p>					
		<p>Measure P-1.2b 16 environmental indicators are updated annually on the DES website.</p>					
		<p>Measure P-1.2c Quarterly updates provided to the Watershed Protection and Restoration Forum.</p>					
	<p>Milestone P-1.3 NH municipalities are familiar with low impact development practices, local stormwater regulations, technical assistance and other technical and financial resources. <i>Partners: DES, Natural Resource Outreach Coalition, Municipalities, Nashua, Manchester, and Seacoast Stormwater Coalitions</i></p>	<p>Measure P-1.3a Participate four Natural Resource Outreach Coalition (NROC) meetings per year.</p>					
		<p>Measure P-1.3b Facilitate and/or attend two meetings with each of the stormwater coalitions.</p>					
		<p>Measure P-1.3c Coordinate one activity per year with MS4 and other municipalities to meet water quality goals.</p>					

TABLE 8 (CONT.). PARTNERSHIP GOALS, OBJECTIVES, AND MILESTONES

Objective	Milestone	Measure of Success	Schedule				
			2015	2016	2017	2018	2019
Objective P-1 (cont.)	<p>Milestone P-1.4 Align priority watersheds with the Total Maximum Daily Load Study (TMDL) Program. <i>Partners: DES Watershed Assistance Section, DES TMDL Program</i></p>	<p>Measure P-1.4a TMDL program uses the watershed priority list to identify priority watersheds for TMDL development.</p> <p>Measure P-1.4b Watersheds with TMDLs are priorities for watershed-based plan development.</p>					
	<p>Milestone P-1.5 The State Revolving Fund (SRF) Program regularly funds stormwater and nonpoint source projects. <i>Partners: DES Watershed Assistance Section, DES SRF Program</i></p>	<p>Measure P-1.5a At least \$2 million annually in SRF loans available for stormwater and nonpoint source projects.</p> <p>Measure P-1.5b State Revolving Fund rules allow non-municipal applicants.</p>					
	<p>Milestone P-1.6 Explore the feasibility of dividing the single lake Winnepesaukee Assessment Unit ID (AUID) into a separate AUID for each bay. <i>Partners: DES Watershed Management Bureau, DES Water Quality Section, Lake Winnepesaukee Watershed Association</i></p>	<p>Measure P-1.6 Moultonborough inlet is assigned an individual AUID.</p>					
	<p>Milestone P-1.7 Explore the feasibility of adding geomorphic integrity (incision) to the assessment criteria in the NHDES Consolidated Assessment and Listing Methodology. <i>Partners: DES Watershed Management Bureau, DES Water Quality Section, NH Geological Survey</i></p>	<p>Measure P-1.7 Determination made.</p>					
	<p>Milestone P-1.8 Explore the options for addressing the dissolved oxygen criteria for Class A waters so that restoration of dissolved oxygen-impaired, Class A lakes can achieve successful restoration. <i>Partners: DES Watershed Management Bureau, DES Water Quality Section</i></p>	<p>Measure P-1.8 Determination made.</p>					

TABLE 9. 319 PROGRAM GOALS, OBJECTIVES, AND MILESTONE

319 Program (319) Goal. The NPS Program is managed efficiently and effectively.						
Objective	Milestone	Measure of Success	Schedule			
			2015	2016	2017	2018
<p>Objective 319-1 The Nonpoint Source Program Plan is up to date and used to track satisfactory progress.</p>	<p>Milestone 319-1.1 Completion of annual milestones, objectives, and goals in the NPS Management Program Plan are tracked and reported in the NPS Program Annual Report. <i>Partners: DES</i></p>	<p>Measure 319-1.1 Documentation of completed plan elements in the NPS Annual Report, the Measures Tracking and Reporting System (MTRS), and other relevant reports and systems.</p>				
	<p>Milestone 319-1.2 The NPS Management Program is updated every five years to reflect program changes and success toward meeting NPS Program goals. <i>Partners: DES, NPS stakeholders to be determined</i></p>	<p>Measure 319-1.2 The completed NPS Program update for years 2020 - 2024 is approved by October 1, 2019.</p>				
	<p>Milestone 319-1.3 Grant work plans are developed, applications for Section 319 funding are submitted, and required reports are completed. <i>Partners: DES, EPA, 319 Grantees, NPS Partners</i> <i>TBD</i></p>	<p>Measure 319-1.3a NPS Program Annual Report submitted by December 31st.</p> <p>Measure 319-1.3b Annual update of 319 staff work plans in Measures Tracking and Reporting System (MTRS) database with quarterly progress reporting.</p>				
	<p>Milestone 319-1.4 NPS project documentation is accurate, well-maintained, and meets DES and EPA requirements. <i>Partners: DES, EPA</i></p>	<p>Measure 319-1.3c Annual update and submittal of EPA's Priorities and Commitments (P&C) List.</p> <p>Measure 319-1.3d Annual grant progress reports are submitted to EPA on an agreed upon schedule.</p>				
		<p>Measure 319-1.4a NPS database is updated with improved reporting capabilities of project data, task progress, financials, BMP type, load reductions, and others.</p> <p>Measure 319-1.4b Transfer to paperless or partially paperless records.</p>				

TABLE 9 (CONT.). 319 PROGRAM GOALS, OBJECTIVES, AND MILESTONES

Objective	Milestone	Measure of Success	Schedule				
			2015	2016	2017	2018	2019
<p>Objective 319-2 Funding is adequate to fulfill NPS Program Plan objectives and dollars are used efficiently and are consistent with legal obligations.</p>	<p>Milestone 319-2.1 Apply and manage Section 319 funding from EPA as part of the DES Performance Partnership Grant (PPG) and continuing environmental program grant. <i>Partners: DES, EPA</i></p>	<p>Measure 319-2.1 Grant dollars are spent by the grant end date and no later than five years from the start date.</p>					
	<p>Milestone 319-2.2 Streamline the Request for Proposal process. Determine the feasibility of developing an online, iterative grant application. Update review/scoring criteria and project eligibility requirements for 319 and other funded projects managed by the NPS Program. <i>Partners: DES, grantees, NH Dept of Information Technology (DoIT)</i></p>	<p>Measure 319-2.2a Feasibility determination of online application process.</p> <p>Measure 319-2.2b Annual review and update of grant application scoring and eligibility criteria.</p>					
	<p>Milestone 319-2.3 Request for Proposals (RFPs) for 319 sub-awards are released to allow ample time for state and EPA approval and the execution of 319 sub-awards by DES as soon as feasible after federal 319 dollars are made available. <i>Partners: DES EPA</i></p>	<p>Measure 319-2.3 319 sub-awards are obligated within one year after the EPA grant award.</p>					
	<p>Milestone 319-2.4 Coordinate and report on Disadvantaged Business Enterprises (DBEs) <i>Partners: DES</i></p>	<p>Measure 319-2.4 Annual reporting on the utilization of minority and women-owned businesses.</p>					

STATEWIDE PROGRAMS TO ADDRESS PRIORITY NPS POLLUTANT CATEGORIES

NPS pollutant sources are divided into major and minor categories. Major categories of NPS pollutants are those that continue to cause the most severe impairments or pose the greatest threat to water quality. Goals, objectives, and measurable annual milestones are included in this plan for each Major NPS Pollutant Category.

Minor NPS Pollutant Categories are those that have a reduced potential to threaten water quality. Sufficient regulatory oversight, enforcement, technical, or other assistance programs have diminished the water quality threat from these sources. Individual goals, objectives, and annual milestones are not developed for Minor Categories as they do not represent priorities for the NPS Program in the next five years. A general goal of the NH Nonpoint Source Program is to collaborate with and support the programs associated with the Minor NPS Pollutant Categories as appropriate and as needed to protect and restore water quality in New Hampshire.

MAJOR NPS POLLUTANT CATEGORIES

Major categories of NPS pollution are those sources that cause the most water quality impairments or threaten water quality degradation in high quality watersheds. The priority restoration and protection activities associated with these major categories include technical and financial assistance, planning, and implementation. A detailed description of the pollutant category, measures to control NPS pollution, key programs and partners, specific goals, objectives, and annual milestones are included for each Major NPS Pollutant Category.

Major NPS Pollutant Categories in New Hampshire include:

- AGRICULTURE
- CHLORIDES AND ROAD MAINTENANCE
- DEVELOPED LAND
- HYDROLOGIC AND HABITAT MODIFICATION
- LANDSCAPING AND TURF MANAGEMENT
- SUBSURFACE SYSTEMS

AGRICULTURE

BACKGROUND

Well-managed agricultural operations are an important part of New Hampshire’s working landscape and are integral to maintaining good water quality. Good soil health, use of cover crops, and beneficial use of the nutrients contained in animal manure are all key components to both healthy water and a healthy agricultural sector.

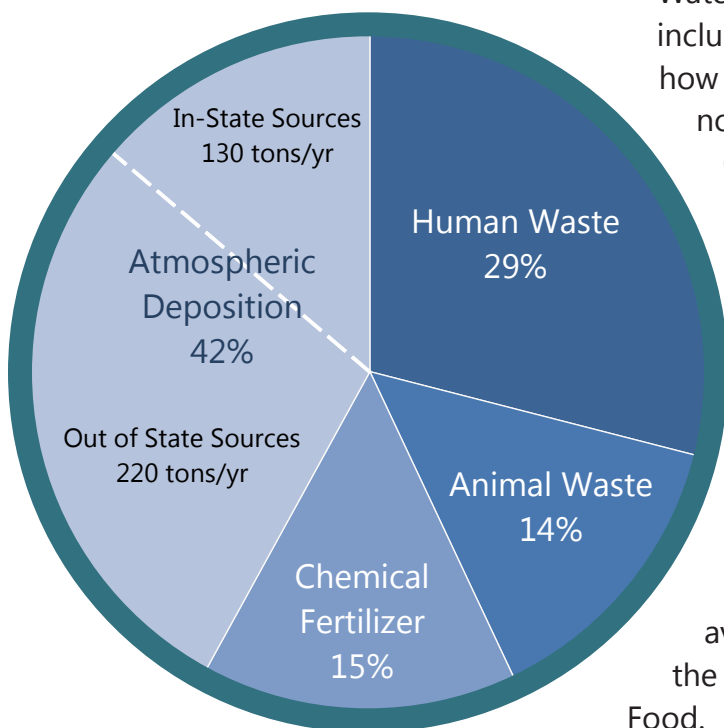
According to the 2012 New Hampshire Cropland Data Layer published by the US Department of Agriculture (<http://nassgeodata.gmu.edu/CropScape/>), only 3% of New Hampshire’s land area, or about 184,000 acres, is used for crops or pasture, producing revenue in excess of \$37,000,000.

The most recent Census of Agriculture data available, from 2007, counted 51,029 acres of New Hampshire cropland treated with fertilizer, including 30,110 acres treated with manure. Reflecting trends in the nature of New Hampshire agriculture, this was a reduction of over 20% from 10 years earlier.

While the number of fertilized acres has declined, the acreage in farmland use has increased slightly and the number of farms has increased by about 20% over the same period. These

data are reflective of a continuing transition from predominantly dairy agriculture to increasing numbers of vegetable and smaller non-dairy livestock operations.

Figure 3. NPS Nitrogen Delivered to Estuary. Total Load by Source Type and Land Use Type for the Great Bay Estuary Watershed. (Source DES 2014 Great Bay Nitrogen Pollution Source Study)



Water quality concerns relative to agriculture include nutrients and bacteria. To understand how agriculture can fit in proportionally with other nonpoint sources, it is instructive to review the Great Bay Nitrogen Nonpoint Source Study (June 16, 2014). The study researched the categories of sources contributing nitrogen to the impaired Great Bay estuary and determined the contributions of each source category. For agriculture, the study determined fertilizer loading from data available through the US Department of Agriculture, National Agricultural Statistics Service and several other sources. For animal waste, the study analyzed data available from US Census of Agriculture and the NH Department of Agriculture Markets and Food. Figure 3 summarizes the total NPS nitrogen

load to the Great Bay estuary.

The study found that chemical fertilizer on agricultural lands accounts for 23% of the chemical fertilizer load or 3.5% of the total NPS load. Animal waste from agricultural operations was found to contribute 58% of the animal waste load or about 8% of the total NPS load.

Other significant contributors of nonpoint source nitrogen loading to the Great Bay estuary include:

- Atmospheric deposition 42%
- Septic systems 29%
- Lawn and turf fertilizer 12%
- Non-agricultural animal waste 6%

The conservation title of the federal Farm Bill is implemented by the Natural Resources Conservation Service (NRCS). Primarily through the Environmental Quality Incentives Program, NRCS can provide financial assistance toward the cost of approved conservation practices. Many practices require development of nutrient management plans or engineering designs. These services are provided by NRCS, but are limited by available staff resources. The Farm Bill allows for third party Technical Service Providers (TSPs) to provide conservation planning and engineering assistance to eligible cooperators, but there are currently no TSPs certified in New Hampshire. Detailed information on specific agricultural BMPs can be found in the USDA Natural Resources Conservation Service's Field Office Technical Guide, available electronically at http://efotg.sc.egov.usda.gov/efotg_locator.aspx?map.

In June 2011 the New Hampshire Department of Agriculture, Markets and Food (DAMF) updated the *Manual of Best Management Practices (BMPs) for Agriculture in New Hampshire* (<http://agriculture.nh.gov/publications-forms/documents/bmp-manual.pdf>). The BMPs are agronomic/vegetative and structural practices that permit economically viable production while achieving the least possible adverse impact upon the environment, including water quality. They also minimize possible adverse impacts on human, animal, and plant health.

State law also requires DAMF to investigate complaints of improper handling of manure, agricultural compost, and chemical fertilizer. Where improper management is found, DAMF is required to provide to the operator, in writing, with the specific practices that need to be implemented to comply with the BMP manual. If compliance with the manual is not attained, the complaint is transferred to DES with respect to enforcement of water quality standards. To assist operators with BMP compliance, DAMF manages the Agricultural Nutrient Management Grant Program. Information on this grant program is included in the Funding section of this Plan on page 17.

The Division of Pesticide Control (Division) works to ensure the safe and proper use of pesticides by enforcing state pesticide laws affecting sale, storage and application of all registered pesticides, examining and licensing pesticide dealers and users, and registering pesticides

sold and used within the state. The Division conducts regulatory programs in cooperation with federal agencies and carries out the policies established by the New Hampshire Pesticide Control Board (Board). Through cooperative agreement between EPA and DAMP, New Hampshire is a delegated state, with primary enforcement responsibility, in carrying out certain provisions of the federal pesticide law. DAMF maintains a federally approved state plan for certification of commercial and private pesticide applicators. The Rules of the Board require licensing of all commercial and private pesticide applicators as well as pesticide dealers. Through this process, only persons demonstrating satisfactory competence in the safe and legal use of pesticides within New Hampshire may apply pesticides. The Rules also require re-certification whereby every five years each licensed individual attends educational seminars to ensure they remain up to date in pesticide knowledge.

Integrated Pest Management or IPM combines the use of biological, cultural, physical and chemical tactics in ways that minimize health and environmental risks and economic loss when controlling pests. The IPM Program is an instrument to promote, through education and training, a sustainable approach to managing pests and "to bring about the broadest possible application of the principles of integrated pest management to agriculture, horticulture, arboriculture, landscape and building maintenance, and any other areas in which economic poisons are employed."(RSA 430:50) Ten percent of pesticide registration fees are deposited into the integrated pest management fund, and disbursed through grants to explore and encourage IPM.

Agricultural easements are an important tool for the long term sustainability of agriculture in New Hampshire. There are many programs and land trusts that develop and fund conservation easements that result in protection of farmland in perpetuity. Given the diversity of land protection programs, it can be challenging to achieve consistency in the specific terms governing conservation easements to ensure the viability of agricultural operations. While it is not essential, nor even desirable, to use the exact same language in every conservation easement, many easements share a common goal of promoting agricultural land uses. Toward this end, further engagement of land conservation partners is needed to provide guidance on easement language in pursuit of this common goal.

MEASURES TO CONTROL NPS POLLUTION

- *Best Management Practices* RSA 431:34: Requires the DAMF to publish best management practices for handling manure, agricultural compost, and chemical fertilizer.
- *Manual of Best Management Practices (BMPs) for Agriculture in New Hampshire*. New Hampshire Department of Agriculture, Markets and Food. 2011. <http://agriculture.nh.gov/publications-forms/documents/bmp-manual.pdf>
- New Hampshire Pesticide Laws and Administrative Rules (RSA 430 and Pes 100 – 1100)

TABLE 10. AGRICULTURE GOALS, OBJECTIVES, AND MILESTONES

Agriculture (A) Goal. Agricultural land is well managed and demonstrated to be a water quality asset with local agricultural commissions, conservation commissions, regional planning commissions, and others working on land use issues.						
Objective	Milestone	Measure of Success	Schedule			
			2015	2016	2017	2018
Objective A-1 Foster good agricultural management through education, training, and certification programs.	Milestone A-1.1 Determine the feasibility of establishing and funding an agricultural outreach position at DAMF, which strives to review farm management and provide technical assistance. Specifically target new farmers and small operations to increase participation in existing programs and resources. Allocate \$25,000 of \$319 funds (as federal match) to leverage state funds. <i>Partners: NH Dept. of Agriculture, Markets, and Food, UNH Cooperative Extension, conservation districts, Natural Resources Conservation Services</i>	Measure A-1.1 Position established.				
	Milestone A-1.2 Promote nutrient management planning by funding NH Association of Conservation Districts to enroll Natural Resources Conservation Service (NRCS) - certified technical service providers. <i>Partners: Natural Resources Conservation Services</i>		Measure A-1.2 Three NRCS-certified technical service providers.			
Objective A-2 Implementation of agricultural best management practices are promoted.	Milestone A-2.1 Determine barriers to composting horse manure by interviewing those offering manure brokerage services on Dept. of Agriculture, Markets, and Food website and randomly selected horse owners. <i>Partners: Conservation Districts, NH Dept. of Agriculture, Markets, and Food, Natural Resources Conservation Service, UNH Cooperative Extension</i>	Measure A-2.1 Report of identified barriers and lessons learned from manure composting program.				

TABLE 10 (CONT). AGRICULTURE GOALS, OBJECTIVES, AND MILESTONES

Objective	Milestone	Measure of Success	Schedule				
			2015	2016	2017	2018	2019
Objective A-2 (cont.)	<p>Milestone A-2.2 Work with Dept. of Agriculture, Markets, and Food to update 1) <i>The Manual of BMPs for Agriculture in New Hampshire</i> to include land clearing BMPs, working buffers, and other adjustments determined by partners; and 2) the 1993 <i>Best Management of Wetlands Practices for Agriculture</i>.</p> <p><i>Partners: NH Association of Conservation Districts, NH Dept. of Agriculture, Markets, and Food, UNH Cooperative Extension, NH Farm Bureau, Natural Resource Conservation Service</i></p>	Measure A-2.2 Updated BMP manuals.					
	<p>Milestone A-2.3 Promote the working buffers BMP available through NRCS whereby farmers can raise cash crops in buffer areas to improve water quality without sacrificing income.</p> <p><i>Partners: Conservation Districts, Natural Resource Conservation Service, UNH Cooperative Extension</i></p>	Measure A-2.3 Partnership agreement with Natural Resources Conservation Service and NH Association of Conservation Districts is executed.					
	<p>Milestone A-2.4 Increase the number of farms or farmland parcels under agricultural easements.</p> <p><i>Partners: Dept. of Agriculture, Markets, and Food, Land and Community Heritage Investment Program (LCHIP), NH Farm Bureau, Natural Resources Conservation Service</i></p>	Measure A-2.4 Five new farms or farmland parcels under agricultural easement each year.					
	<p>Milestone A-2.5 Provide guidance on easement language to ensure long term viability of agricultural operations.</p> <p><i>Partners: Dept. of Agriculture, Markets, and Food, NH Land Trust Coalition, Natural Resource Conservation Service, NH Office of Energy and Planning, Land Conservation and Heritage Investment Program</i></p>	Measure A-2.5 Published guidance.					

TABLE 10 (CONT). AGRICULTURE GOALS, OBJECTIVES, AND MILESTONES

Objective	Milestone	Measure of Success	Schedule				
			2015	2016	2017	2018	2019
Objective A-2 (cont.)	<p>Milestone A-2.6 Increase the number of small farms with nutrient management plans. <i>Partners: Conservation Districts, NH Dept. of Agriculture, Markets, and Food, UNH Cooperative Extension</i></p>	<p>Measure A-2.6 Report on the number of small farms with new nutrient management plans.</p>					
	<p>Milestone A-2.7 Address phosphorus and soil pH in the BMP manual for land spreading of biosolids. <i>Partners: UNH Cooperative Extension, DES Residuals Program</i></p>		<p>Measure A-2.7 Updated BMP manual.</p>				
<p>Objective A-3 Adequate funding is available to support agricultural programs.</p>	<p>Milestone A-3.1 Seek an increase in either the pesticide registration fee or the percentage of the fee deposited into the Integrated Pest Management (IPM) fund from 10% to 50%, and expand the IPM program to an Integrated Crop Management program to address both pesticides and fertilizers. <i>Partners: NH Dept. of Agriculture, Markets, and Food, UNH Cooperative Extension</i></p>	<p>Measure A-3.1 Increase in fee or percentage determined.</p>					

CHLORIDES AND ROAD MAINTENANCE

BACKGROUND

Planning for the proposed widening of I-93 from four to eight lanes resulted in discovery of chloride impairments in four corridor watersheds in 2006, completion of TMDLs in 2008, and salt reduction implementation plans in 2010. The detailed studies done in the I-93 corridor found that state roads contributed only 10 – 15% of the overall chloride load to impaired waters. The remaining sources were town roads, private roads and parking lots.

As of 2012, there were 46 chloride-impaired water bodies due to road salt statewide (DES, 2013). Since routine chloride sampling is not conducted statewide, DES analyzed data from the TMDL watersheds and determined that chloride impairments were likely to occur when average chloride concentrations exceed 102 mg/l, and that such levels are likely to be found in watersheds where developed land uses (buildings, pavement, and transportation) exceed 15% of the watershed area.

With the need to reduce salt application by as much as 45% in the I-93 watershed, the NH Department of Transportation lead the way in salt reduction BMP implementation, using liquid brine anti-icing, underbody plows, road weather information systems, and increased driver training. Many of these BMPs are now routinely used on other sections of state highways. In addition to training its own drivers, DOT now requires all contract drivers to be trained in salt reduction techniques.

As part of the I-93 expansion project, DES and DOT entered into a ten-year memorandum of agreement (MOA) focused on salt reduction in 2006. The MOA calls for DOT to achieve salt reductions commensurate with the TMDL-specified load reductions in order to comply with their permit to expand the highway to eight lanes. The MOA also established a Salt Reduction Work Group, consisting of the two state agencies, the Federal Highway Administration, the EPA, the University of New Hampshire Technology Transfer Center (UNH T2), and representatives of corridor municipalities, regional planning commissions, environmental groups, and private sector parking lot maintainers. The Work Group reviewed and approved TMDL implementation plans for three of the four impaired watersheds as well as revised sector allocations for salt loading. The TMDL for the fourth watershed, the North Tributary to Canobie Lake,



was recently revised to account for dissipation in loading from a historic salt brine groundwater discharge.

A key to success for salt reduction in the I-93 corridor and statewide has been the UNH T2 center. Building on their historic success in training municipal highway maintainers, UNH T2 created a voluntary training and certification program, called Green SnowPro, for all winter maintenance professionals, public and private. This was the first effort in the northeastern United States to organize professional training and certification of private salt applicators. Since 2011, UNH T2 has trained and certified over 300 salt applicators. Certified applicators learn how salt functions, how different weather conditions affect winter maintenance practices, how to calibrate different types of salt spreaders, how to make and use salt brine for anti-icing and pre-wetting of salt, and how to track salt use.

The Green SnowPro program is the model cited for legislation (RSA 489-C) passed in 2013 creating a voluntary salt applicator certification program and limiting liability for hazards caused by snow and ice. The law requires certified applicators to maintain event-based records and to submit annual reports relative to salt use and the amount of pavement maintained. Under the program, DES will adopt rules and manage the certification program. The annual reports will be used to track application rates, adjusted for weather severity, over time to measure the effects of the program.

MEASURES TO CONTROL NPS POLLUTION

- Salt Applicator Certification Option (RSA 489-C)
- DOT Salt Reduction Plan for I-93, see particularly Appendix A, <http://www.rebuildingi93.com/documents/DOT%20TMDL%20Chloride%20Implementation%20Plan-Sept%202009.pdf>.
- DES Salt Reduction Initiative, <http://des.nh.gov/organization/divisions/water/wmb/was/salt-reduction-initiative/index.htm>.
- UNH Technology Transfer Center Road Salt Reduction BMPs, <http://t2.unh.edu/salt-reduction-bmps>.

TABLE 11. CHLORIDE AND ROAD MAINTENANCE GOALS, OBJECTIVES, AND MILESTONES

Chloride and Road Maintenance (C) Goal. Reduce salt loading while maintaining the current level of services on public and private roads, driveways, sidewalks, and parking lots.					
Objective	Milestone	Measure of Success	Schedule		
			2015	2016	2017
Objective C-1 New Hampshire salt applicators are trained in winter road maintenance best management practices.	Milestone C-1.1 Salt applicators are trained in winter maintenance BMPs each year. <i>Partners: DES, UNH Technology Transfer Program</i>	Measure C-1.1 500 new salt applicators complete Green Snow Pro certification training within 5 years.			
	Milestone C-1.2 Salt applicators working at the Pease Tradeport are certified. <i>Partners: Hodgson Brook Advisory Committee, Pease Development Authority (PDA)</i>	Measure C-1.2 75% of salt applicators at the Pease Tradeport are certified.			
Objective C-2 Increased understanding of the amount of road salt applied in New Hampshire.	Milestone C-1.3 Town of Durham and UNH implement winter maintenance BMPs. <i>Partners: Town of Durham, UNH</i>	Measure C-1.3 Salt reduction achieved by Durham and UNH in accordance with the College and Reservoir Brook Watershed-based Plans for chloride.			
	Milestone C-2.1 Increase the number of salt applicators using the on-line salt accounting database. <i>Partners: UNH Technology Transfer Program</i>	Measure C-2.1a Incorporate salt use reporting into program rules. Measure C-2.1b Reporting reminders sent annually.			
	Milestone C-2.2 Analyze salt use/salt loading data received from DOT and I-93 corridor towns and compare to TMDL sector allocation, adjusted for weather severity. <i>Partners: UNH Technology Transfer Program, NH Dept. of Transportation, I-93 Salt reduction Work Group</i>	Measure C-2.1c 80% of salt applicators submit annual reports.			
		Measure C-2.2 Complete report of salt use data annually.			

TABLE 11 (CONT). CHLORIDE AND ROAD MAINTENANCE GOALS, OBJECTIVES, AND MILESTONES

Objective	Milestone	Measure of Success	Schedule				
			2015	2016	2017	2018	2019
Objective C-3 Identify priority watersheds and develop Watershed-Based Plans for chloride.	Milestone C-3.1 Develop and incorporate priority list of salt reduction watersheds in NPS Program Plan by reference. <i>Partners: DES Water Quality Section</i>	Measure C-3.1 Develop priority list of salt reduction watersheds.					
	Milestone C-3.2 Complete Watershed-Based Plans for chloride. <i>Partners: Hodgson Brook Advisory Committee, Pease Development Authority, City of Portsmouth, UNH Technology Transfer Center, UNH Facilities, Town of Durham, others TBD</i>	Measure C-3.2 Two completed Watershed-Based Plans for chloride in Priority watersheds.					

DEVELOPED LAND

BACKGROUND

According to the 2012 Surface Water Quality Assessment completed by DES, runoff from developed lands (e.g., cities, residential neighborhoods, and other developed areas) contributes to approximately 93% of the water pollution problems in New Hampshire. These pollutants are carried by stormwater and are a major concern for water quality. The Great Bay Nitrogen Nonpoint Source Study (DES, 2014) reports that stormwater delivers 34% of the nitrogen load to Great Bay. Without adequately addressing the existing problems associated with stormwater runoff across the state, additional degradation of the state's water resources is likely.

New Hampshire's population is continuing to grow. The Southern New Hampshire Regional Planning Commission (SNHRPC) estimates that the population in their region, which includes the city of Manchester and 13 surrounding communities, will grow by over 45,000 residents by 2035 (SNHRPC, draft 2014). This increase in growth brings pressure to expand and improve housing, roads, and services, and inevitably increases impervious surfaces that prevent runoff from soaking into the ground.

Not only is New Hampshire's population growing and impervious surfaces increasing, but it is growing faster and growing bigger than in the past. In the Piscataqua Region, for example, the amount of impervious surface covering the land has grown from 28,695 acres in 1990 to 63,241 acres in 2010. On a percentage basis, 9.6% of the land in the watershed was covered by impervious surfaces in 2010. Since 1990, the amount of impervious surfaces in the Piscataqua region increased by 120% while population grew by only 19%. Therefore, the rate of increasing impervious surfaces has been six times the rate of population growth (PREP, 2013). Statewide, land consumption as measured by urbanized acres per capita increased from 0.24 to 0.31, for an increase of 29% during the same 1990- 2010 time period (GSF, 2013).

As New Hampshire communities accommodate this growth, the challenge of climate change impacts compound the problems caused by increased imperviousness. In southern New Hampshire, precipitation has already increased 12 - 20 percent since 1970 and is expected to increase by an additional 15 - 20 percent by 2100. Extreme precipitation events have increased dramatically and are expected to double by 2050. The growing season has lengthened by 2 - 4 weeks on average and may get even longer (Wake, et al., 2014).

Addressing runoff from developed lands requires a mix of regulatory and voluntary programs. At the state level, the Alteration of Terrain (AoT) permitting program specifies procedures and criteria to protect surface water quality by controlling soil erosion, and managing, treating, and recharging stormwater runoff from development activities. In 2013, DES completed an analysis of ten (four new development and six redevelopment) approved AoT projects in impaired watersheds using the Simple Method to compare pre- and post-construction pollutant loading estimates under the permitted conditions and under an alternate condition using enhanced

treatment. Summary observations include:

1. Pollutant loading estimates of new development projects, as permitted, showed an increase in total suspended solids (TSS), total phosphorus (TP), and total nitrogen (TN). While some new development projects had reductions in TSS as permitted, every new development project had an estimated increase in nutrient loading in the permitted condition. A summary of the estimated % increase in pollutant load and the highest increase at a single site summarized in Table 12.

Table 12. Summary of pollutant loading estimates for new development projects.

PARAMETER	ESTIMATED % INCREASE IN POLLUTANT LOAD	HIGHEST ESTIMATED INCREASE IN LOADING AT SINGLE SITE
Total Suspended Solids (TSS)	26% - 70%	9,400 lbs/year
Total Phosphorus (TP)	22% - 440%	108 lbs/year
Total Nitrogen (TN)	22% - 115%	416 lbs/year

2. Even with enhanced treatment using best management practices with the highest pollutant removal efficiencies, two out of four new development projects resulted in increases in nutrient loading.
3. Redevelopment projects more easily achieved reductions in pollutant loading compared to new development with four of the six re-development projects achieving reductions in TSS, TP, and TN, as permitted. However, substantial additional reductions were estimated for additional treatment and enhanced treatment for redevelopment projects.

It is important to note that pollutant loading models provide relative estimates with varying degrees of accuracy. The results of this modeling exercise serve to inform the discussion on potential ways to strengthen the AoT Program and assure that stormwater from new and redevelopment projects in New Hampshire is managed in a way that is protective of water quality.

While large-scale new and redevelopment projects are permitted at the state level, smaller disturbances such as individual lots and small subdivisions are regulated at the local level. Each municipality has its own set of regulations, procedures, and criteria with regard to development and managing stormwater from developed sites. This lack of uniformity in the regulation of stormwater at the municipal level poses challenges for developers and contractors. In an attempt to increase uniformity, in 2008, DES and the Regional Planning Commissions created the *Innovative Land Use Planning Techniques: A Handbook for Sustainable Development* (http://des.nh.gov/organization/divisions/water/wmb/repp/innovative_land_use.htm) which includes, among other techniques, a model ordinance for post-construction stormwater management.

Further encouraging regional approaches to local solutions, New Hampshire legislators passed enabling legislation in 2009 to create the Southeast Watershed Alliance (SWA) to provide

a framework for watershed communities to work together to protect and restore its water resources. The SWA encompasses all 42 upstream and downstream communities in the New Hampshire coastal watershed. In 2012, the SWA created the *Model Stormwater Standards for Coastal Watershed Communities* to, again, increase uniformity in managing stormwater in coastal communities.

In 2008 and 2009, the NHDES Watershed Assistance Grants Program provided funding for studies in Manchester, Dover, Portsmouth, and Nashua to determine the feasibility of stormwater utilities as a funding source for their municipal stormwater programs. Funding for these studies was from Clean Water Act Section 319 funds from the USEPA. Feasibility studies help a municipality determine if pursuing a stormwater utility approach to funding is appropriate. The results of the studies and the experiences of the participants were documented throughout the process and are available at <http://des.nh.gov/organization/divisions/water/stormwater/utilities-feasibility.htm>. Despite the passage of stormwater utility enabling legislation and the completed feasibility studies, no stormwater utilities have been formed in New Hampshire. Moving forward, it will be important to assess how changing precipitation patterns are causing additional stress on stormwater infrastructure. It will also be important to understand the capital and operating costs associated with the current funding approaches versus a stormwater utility approach for funding stormwater programs under increased rainfall scenarios.

Municipalities are under increasing pressure to address water quality problems caused by stormwater, primarily through Municipal Separate Storm Sewer (MS4) permits administered by EPA under the National Pollutant Discharge Elimination Program. While specific activities required by MS4 permits are outside the scope of Section 319 funds, regulatory pressure may eventually drive stormwater utility development in New Hampshire, as it has where EPA's use of Residual Designation Authority under the MS4 program resulted in stormwater utilities in cities and towns in Maine, Massachusetts, and Vermont. Stormwater utilities could provide resources to address the significant stormwater infrastructure needs documented in the Clean

Watershed Needs Survey. This survey, completed in 2012, estimated the cost of managing effective municipal stormwater programs in New Hampshire to be over \$386 million (DES, 2012b).

The documented needs occur both in regulated MS4 areas and outside of MS4 areas. To assist municipalities with meeting the costs to manage effective stormwater programs, the passage of RSA 149-I in 2008 enabled municipalities to create municipal stormwater utilities.

In 2012, the DES Watershed Assistance Section initiated a new program called Soak Up the Rain New Hampshire (SOAK) to protect and restore clean water in local lakes, streams, and estuaries from the negative impacts of excess runoff and pollution from stormwater. The program is based



on the 2011 DES publication, *New Hampshire Homeowner's Guide to Stormwater Management Do-it-Yourself Stormwater Solutions for Your Home* (<http://des.nh.gov/organization/commissioner/pip/publications/wd/documents/wd-11-11.pdf>).

The goal of this voluntary program is to reduce stormwater runoff and associated pollution from residential and small commercial properties through a coordinated, outreach and local capacity building campaign. The 2013 field season piloted the SOAK program by working with three partner organizations, the Great Bay Stewards in the Great Bay Watershed, the Nashua Regional Planning Commission in the Baboosic Lake Watershed, and the Lakes Region Planning Commission in the Lake Waukegan Watershed. In 2014, the Silver Lake Land Trust in Harrisville and the Green Mountain Conservation Group in the Ossipee region joined the program.

The Soak Up the Rain NH Program includes resources, training materials, and technical assistance to local organizations in order to build local SOAK programs. An accompanying website, www.soaknh.org, houses these resources and is used to showcase completed installation projects. The site tracks pollutant removal estimates associated with the installations in order to quantify the water quality benefit of the program over the long-term. Program resources on the website are intended to be used to raise community awareness of the connection between land use and water quality, the potential impacts of residential properties on local water resources, and the shared responsibility for clean water.

MEASURES TO CONTROL NPS POLLUTION

REGULATORY PROGRAMS

- New Hampshire Alteration of Terrain Permit Program (RSA 485-A:17, Env-Wq 1500)
- EPA National Pollutant Discharge Elimination System Programs
- Municipal Zoning Ordinances, site plan and subdivision regulations

VOLUNTARY PROGRAMS

- Soak up the Rain New Hampshire
- Local Youth and Lake Conservation Corp Programs (Acton Wakefield Watersheds Alliance, New Hampshire Lakes Association)
- Proactive Municipal Projects

GUIDANCE DOCUMENTS

- *New Hampshire Stormwater Manual. Volume 1 Stormwater and Antidegradation (WD-08-20A), Volume 2 Post Construction Best Management Practices Selection and Design (WD-08-20B), Volume 3 Erosion and Sediment Control During Construction (WD-08-20C)*. New Hampshire Department of Environmental Services. 2008. <http://des.nh.gov/organization/divisions/water/stormwater/manual.htm>
- New Hampshire Homeowner's Guide to Stormwater Management Do-it-Yourself Stormwater

Solutions for Your Home (WD-11-11). New Hampshire Department of Environmental Services. 2011.<http://des.nh.gov/organization/divisions/water/stormwater/stormwater-mgmt-homeowners.htm>

- Innovative Land Use Planning Techniques: A Handbook for Sustainable Development (WD-08-19). Section 2.1 Permanent (Post-Construction) Stormwater Management. New Hampshire Department of Environmental Services, New Hampshire Association of Regional Planning Commissions, New Hampshire Office of Energy and Planning and New Hampshire Municipal Association. 2008.
http://des.nh.gov/organization/divisions/water/wmb/repp/innovative_land_use.htm
- Model Stormwater Standards for Coastal Watershed Communities. Southeast Watershed Alliance. 2012.http://southeastwatershedalliance.org/wordpress/wp-content/uploads/2013/05/Final_SWA_SWStandards_Dec_20121.pdf

TABLE 12. DEVELOPED LAND GOALS, OBJECTIVES, AND MILESTONES

Developed Land (DL) Goal. Runoff from developed lands is managed in such a way that water quality is not degraded.					
Objective	Milestone	Measure of Success	Schedule		
			2015	2016	2017
<p>Objective DL-1 NPS Program partners understand the costs associated with managing stormwater from developed lands.</p>	<p>Milestone DL-1.1 Federal, state, and local decision-makers understand New Hampshire's stormwater capital needs and associated costs. <i>Partners: DES, Cities of Dover, Manchester, Nashua, and Portsmouth, NH Municipal Association members, NH Stormwater Coalitions</i></p>	<p>Measure DL-1.1 Submit 2016 Clean Watershed Needs Survey to Congress, state, and local decision makers to quantify municipal stormwater capital needs and associated costs.</p>			
	<p>Milestone DL-1.2 The need for sustainable funding of equitable stormwater programs is understood and supported. <i>Partners: DES, Legislators, municipalities, Southeast Watershed Alliance, NH Municipal Association, NH Stormwater Coalitions</i></p>	<p>Measure DL-1.2 Provide one presentation every odd year on the completed stormwater utility feasibility study projects and EPA's <i>Evaluation of the Role of Public Outreach and Stakeholder Engagement in Funding Decisions in New England</i> to gain better public and political understanding and support.</p>			
<p>Objective DL-2 NPS Program partners have access to an array of funding opportunities to implement stormwater-related projects.</p>	<p>Milestone DL-2.1 The 604(b) Planning Grants are used for NPS and stormwater-related planning projects. <i>Partners: DES, Regional Planning Commissions</i></p>	<p>Measure DL-2.1 Three 604(b) grants are awarded to NPS and stormwater-related planning projects every other year.</p>			
	<p>Milestone DL-2.2 Municipalities pursue the development of individual or regional stormwater utilities in New Hampshire to provide adequate, diverse, and sustainable funding of equitable stormwater programs. <i>Partners: DES, legislators, municipalities, Southeast Watershed Alliance NH Municipal Association, NH Stormwater Coalitions</i></p>	<p>Measure DL-2.2a A list of recommended changes with proposed amendments to RSA 149:1 is developed, and changes are adopted to reduce ambiguity and make other improvements that would more fully support the adoption of municipal, regional, or other stormwater utilities in New Hampshire.</p>			
		<p>Measure DL-2.2b Provide assistance to municipalities to complete four new stormwater utility feasibility studies</p>			
		<p>Measure DL-2.2c Provide assistance to the Southeast Watershed Alliance to promote stormwater utility development.</p>			

TABLE 12 (CONT). DEVELOPED LAND GOALS, OBJECTIVES, AND MILESTONES

Objective	Milestone	Measure of Success	Schedule				
			2015	2016	2017	2018	2019
Objective DL-2 (cont.)	<p>Milestone DL-2.3 The State Revolving Fund (SRF) Loan is used to fund NPS and stormwater projects in New Hampshire. <i>Partners: DES State Revolving Fund Loan Program, NH Municipal Association members, NH Stormwater Coalitions</i></p>	<p>Measure DL-2.3a Report on identified barriers and incentives to SRF funding of NPS and stormwater projects.</p> <p>Measure DL-2.3b Completed plan on how to overcome barriers and implement incentives for SRF funding of NPS and stormwater projects.</p> <p>Measure DL-2.3c Annual presentations made to NH Stormwater Coalitions and other municipalities to promote low impact development (LID) projects for SRF applications.</p>					
<p>Objective DL-3 State and local regulatory programs are more fully protective of water quality and minimize the water quality impacts from developed lands.</p>	<p>Milestone DL-3.1 Determine whether changes are needed to the Alteration of Terrain (AoT) Rules (Env-Wq 1500) for the 2017 rules re-adoption to improve water quality protection and climate change preparedness through AoT permits. <i>Partners: DES Alteration of Terrain Program and stakeholders, NH Chapter of American Council of Engineering Companies, UNH Stormwater Center</i></p> <p>Milestone DL-3.2 Work with the AoT Program to draft Re-Development Rules using the Southeast Watershed Alliance's 3-phase criteria as a model. <i>Partners: DES Alteration of Terrain Program, Southeast Watershed Alliance</i></p>	<p>Measure DL-2.3d Priority NPS and stormwater SRF projects are awarded loans to meet the annual stormwater allocation.</p> <p>Measure DL-3.1 Determination of need for AoT rules containing NPS recommendations, including whether the 1-hour or 10-hour storms should be addressed in design criteria to prevent erosion from more intense, shorter duration storm events.</p> <p>Measure DL-3.2 Completed AoT Re-Development Rules.</p>					

TABLE 12 (CONT). DEVELOPED LAND GOALS, OBJECTIVES, AND MILESTONES

Objective	Milestone	Measure of Success	Schedule				
			2015	2016	2017	2018	2019
Objective DL-3 (cont.)	<p>Milestone DL-3.3 Update Section 2.1 <i>Permanent (Post-Construction) Stormwater Management in the Innovative Land Use Planning Techniques Handbook for Sustainable Development</i>. Partners: <i>Regional Planning Commissions, Alteration of Terrain Program, UNH Stormwater Center, Southeast Watershed Alliance.</i></p> <p>Milestone DL-3.4 Research and draft incentive programs to improve stormwater management on existing developed lands, whether or not there is active re-development. Partners: <i>DES Alteration of Terrain Program, NH Municipal Association members, NH Stormwater Coalitions, NH Home Builders and Remodelers Association, NH Chapter of American Council of Engineering Companies</i></p> <p>Milestone DL-3.5 Research and determine the feasibility of developing an accounting system (similar to the NHDES Aquatic Resource Mitigation (ARM) Fund or Infrastructure Bank) to allow for water quality trading and offsets in the AoT Program and in the implementation of Total Maximum Daily Load Studies (TMDLs). Partners: <i>DES Alteration of Terrain Program, DES Aquatic Resource Mitigation Program, TMDL Program</i></p>	<p>Measure DL-3.3 Updated Section 2.1 published</p> <p>Measure DL-3.4 Incentive program proposal.</p> <p>Measure DL-3.5 Feasibility analysis completed.</p>					

TABLE 12 (CONT). DEVELOPED LAND GOALS, OBJECTIVES, AND MILESTONES

Objective	Milestone	Measure of Success	Schedule				
			2015	2016	2017	2018	2019
<p>Objective DL-4 Professional engineers, state and local regulators, and regulated entities have an improved understanding of how stormwater best management practices (BMPs) function and perform over the long term.</p>	<p>Milestone DL-4.1 Research and determine the appropriateness of using continuous simulation precipitation modeling, as opposed to event-based modeling, to design stormwater practices. <i>Partners: DES Alteration of Terrain Program, NH Municipal Association members, NH Chapter of American Council of Engineering Companies, UNH Stormwater Center</i></p>	<p>Measure DL-4.1 Decision made.</p>					
	<p>Milestone DL-4.2 Promote the integration of gray (conventional) and green (low impact development) infrastructure to most effectively achieve both flood control and water quality needs. <i>Partners: DES Alteration of Terrain Program, NH Municipal Association members, NH Chapter of American Council of Engineering Companies, UNH Stormwater Center</i></p>	<p>Measure DL-4.2 Updated DES Fact Sheets, guidance documents, and other publications, as needed.</p>					
	<p>Milestone DL-4.3 Update the <i>New Hampshire Stormwater Manual</i>, Volumes 1 - 3 to reflect the new science and understanding of stormwater management, system design, installation, and maintenance, as well as regulatory changes. <i>Partners: DES Alteration of Terrain Program</i></p>	<p>Measure DL-4.3 Updated <i>New Hampshire Stormwater Manual</i>, Volumes 1 - 3 published</p>					
<p>Objective DL-5 Stormwater best management practices are adequately maintained and continue to function through their intended design life.</p>	<p>Milestone DL-5.1 Request and review maintenance records from completed AoT permitted projects to determine effectiveness of a general adherence to maintenance conditions. <i>Partners: DES Alteration of Terrain Program</i></p>	<p>Measure DL-5.1 Compilation of a subset of maintenance records and summary report of findings each year.</p>					

TABLE 12 (CONT). DEVELOPED LAND GOALS, OBJECTIVES, AND MILESTONES

Objective	Milestone	Measure of Success	Schedule				
			2015	2016	2017	2018	2019
Objective DL-5 (cont.)	<p>Milestone DL-5.2 Survey municipalities to determine if they currently require that maintenance records be kept for locally permitted projects. Encourage municipalities to request maintenance records for completed, locally permitted projects to determine compliance with maintenance conditions. <i>Partners: DES Alteration of Terrain Program, NH Municipal Association members, NH Chapter of American Council of Engineering Companies, UNH Stormwater Center</i></p>	<p>Measure DL-5.2 List of municipalities that require maintenance records. Completed maintenance inspection/reporting recommendations for municipalities.</p>					
	<p>Milestone DL-5.3 Promote research, design, and use of low and easy maintenance low impact development practices. <i>Partners: DES Alteration of Terrain Program, UNH Stormwater Center</i></p>		<p>Measure DL-5.3 Promotional messaging included in updated fact sheets and guidance documents.</p>				
	<p>Milestone DL-5.4 Provide hands on training and technical assistance to municipal public works staff and professional landscapers on the installation and maintenance of low impact development stormwater practices. <i>Partners: NH Municipal Association members, UNH Stormwater Center, NH Stormwater Coalitions, NH Landscape Association, UNH Cooperative Extension, NH Sea Grant</i></p>		<p>Measure DL-5.4 One training per year.</p>				

TABLE 12 (CONT). DEVELOPED LAND GOALS, OBJECTIVES, AND MILESTONES

Objective	Milestone	Measure of Success	Schedule				
			2015	2016	2017	2018	2019
Objective DL-6 New Hampshire residents understand the connection between land use and water quality, and have access to resources to help manage stormwater on their properties.	Milestone DL-6.1 Provide resources to local organizations interested in participating in Soak Up the Rain New Hampshire (SOAK) <i>Partners: DES</i>	Measure DL-6.1 SOAK resources are updated and made available through a variety of print and social media.					
	Milestone DL-6.2 Recruit, train, and provide assistance to local organizations to participate in SOAK. <i>Partners: DES, SOAK program-eligible organizations</i>	Measure DL-6.2 One new local SOAK group per year.					
	Milestone DL-6.3 Site level best management practices are installed through the Soak Up the Rain NH program. <i>Partners: DES, SOAK program-eligible organizations</i>	Measure DL-6.3 Five BMP installations completed each year. Installation information including location and pollutant loading estimates are reported on the SOAK website and in the NPS Annual Report.					

HYDROLOGIC AND HABITAT MODIFICATION

BACKGROUND

Many programs exist in New Hampshire to protect, restore, and understand the impacts of activities that alter hydrology and habitat. The New Hampshire Rivers Management and Protection Program (RMPP) was established in 1988 with the passage of RSA 483 to protect certain rivers, called Designated Rivers, for their outstanding natural and cultural resources. Currently, there are over 1,000 miles of river designated, spanning over 120 communities. Twenty-three Local Advisory Committees (LAC), made up of over 250 volunteers are charged with developing local river corridor management plans and reviewing and commenting on activities affecting the river, including permit applications.

The Shoreland Water Quality Protection Act, originally named the Comprehensive Shoreland Protection Act (CSPA), was enacted in 1991 and establishes minimum standards for the subdivision, use, and development of shorelands adjacent to the state's public water bodies. On July 1, 2005, Senate Bill 83 established a commission to study the effectiveness of the CSPA. In 2008, as a result of the commission's recommendations, several changes were made including limits on impervious surfaces, limitations on the removal of vegetation in water front buffers, shoreland protection along rivers designated under RSA 483 (Designated Rivers), and the establishment of

a permit requirement for many new construction, excavation and filling activities within the Protected Shoreland.

During the 2011 legislative session, the CSPA was renamed to the Shoreland Water Quality Protection Act and included changes to vegetation requirements within the natural woodland and waterfront buffers, the impervious surface limitations and included a new shoreland permit by notification process.

In March 2004, the NH Department of Environmental Services Wetlands Bureau adopted a set of mitigation rules that establish what is necessary for an applicant to provide for wetland compensation. The rules spell out ratios for wetland creation, restoration and upland preservation relative to the type of wetland lost through the proposed development.

During the 2006 legislative session, the General Court enacted Senate Bill 140, known as Aquatic Resource Compensatory Mitigation. The law became effective



Photo caption: River restoration project on Black Brook, Manchester, NH.

on August 18, 2006 and NHDES adopted rules for operation of a wetland mitigation fund on June 20, 2007.

The Aquatic Resource Mitigation (ARM) Fund was created as an additional compensatory mitigation option available to applicants for impacts to wetlands and other aquatic resources. This mitigation option is available for use after avoidance and minimization of impacts to these aquatic resources has been achieved. The Department is authorized to collect mitigation funds in lieu of other forms of wetland mitigation as part of a wetlands application. DES holds and manages funds to be offered as grants for potential projects that consider the service area goals, and replaces or protects wetland and other aquatic resource functions and values that were impacted by development projects in the service area. ARM fund payments are collected according to nine service areas, which are generally the large watersheds in New Hampshire.

In 2008, the NH Geological Survey at DES initiated a Fluvial Erosion Hazard (FEH), using the Vermont Stream Geomorphic Assessment and Vermont FEH program as a model. Two key components of the program include:

1. River geomorphic assessments – Provide an understanding of the current physical condition of New Hampshire rivers and streams and establishes a baseline by which changes in the physical condition of the river can be tracked in the future. The data can be used to delineate FEH zones that identify the lands adjacent to river channels most at risk from flooding events, which provides a critical flood hazard planning tool and supports nonpoint source management goals. Between 2008 and 2014, fluvial geomorphology assessments were conducted in southeastern New Hampshire coastal watersheds as well as the Piscataquog and Souhegan River watersheds in the Lower Merrimack River basin, the Soucook River, Turkey River, and Sugar River watershed (Claremont-Newport area).
2. Bridge and culvert assessments - Stream crossing protocols were developed for New Hampshire by multiple federal and state partners. For each assessed crossing, final datasets are run through a geomorphic compatibility tool to provide guidance on crossings that are not fully compatible with river processes, and an aquatic organism passage tool to identify crossings partially or wholly incapable of adequately passing aquatic species. Crossings, typically culverts, that are not fully compatible geomorphologically are those that are undersized compared to the river or stream channel that enters them, or have an entry angle not aligned with the stream. These types of situations can cause water and sediment backup during high flow events, leading to culvert blowouts and downstream erosion hazards.

Along with site specific data, FEH data can be used to determine the feasibility of dam and other barrier removal for river restoration. There are more than 4,800 active and inactive dams and other barriers in the State of New Hampshire. Many of these dams were built during the Industrial Revolution in the 19th and early 20th centuries, and they played central roles in New Hampshire's economic and societal growth during that period. However, as technological and social needs have changed, so too has the need for some dams.

The New Hampshire River Restoration Task Force, formed in 2000, explores opportunities to selectively remove dams for a variety of reasons, most notably for the purposes of restoring rivers and eliminating public safety hazards. The NPS Program works directly with the DES Dam Bureau River Restoration Coordinator, consultants and river stakeholders to determine the feasibility of restoring priority river segments throughout the state by removing existing barriers. A list of priority river restoration and barrier removal sites and priority criteria are discussed in the Clean Watersheds section of this Plan beginning on page 18.

According to the preliminary 2014 DES Water Quality Assessment, impoundments caused 41 water quality impairments, including for dissolved oxygen and chlorophyll-a. Many of these dams no longer serve the purpose for which they were originally constructed. Often, dam regulations necessitate costly infrastructure repairs that dam owners weigh against the diminishing benefits of operating the dam. Dam removal often becomes an appealing option, accomplishing water quality restoration as well as improved economics for the dam owner.

It continues to be important to recognize and adapt to existing and anticipated climate change impacts from more intense precipitation on river, estuarine, and coastal habitats, including wetlands. Existing regulations in New Hampshire are likely inadequate to handle the increases in rainfall amounts and extreme precipitation events. It is necessary to begin thinking about how adaptation strategies, i.e., larger culverts, dam removals, increased buffer zones for flood protection, can be incorporated into state regulations, policies, and programs.

One of the groups working on developed adaptation strategies is the New Hampshire Coastal Risks and Hazard Commission (<http://nhcrhc.stormsmart.org/>). Established by legislation in 2013, the Commission is currently helping coastal communities and the state prepare for projected sea level rise and other coastal watershed hazards. In addition, Sea Level Affecting Marsh Migration models are being run for the coastal watershed, which may provide additional information about how sea level rise may impact estuarine river systems and their marsh systems.

MEASURES TO CONTROL NPS POLLUTION

REGULATORY

- New Hampshire Rivers Management and Protection Program (RSA 483)
- Designated River Nomination Rules (Env-Wq 1800)
- Shoreland Water Quality Protection Act (RSA 483-B)
- Shoreland Protection Administrative Rules (Env-Wq 1400)
- Aquatic Resource Compensatory Mitigation (RSA 482-A:29)

GUIDANCE DOCUMENTS

- *Innovative Land Use Planning Techniques: A Handbook for Sustainable Development* (WD-08-19). New Hampshire Department of Environmental Services, New Hampshire Association of Regional Planning Commissions, New Hampshire Office of Energy and Planning and New

Hampshire Municipal Association. 2008.

http://des.nh.gov/organization/divisions/water/wmb/repp/innovative_land_use.htm

- *Section 2.4 Wetland Protection*
- *Section 2.6 Shoreland Protection*
- *Section 2.7 Fluvial Erosion Hazard Area Planning*
- *A Guide to River Nominations (WD-08-4)*. New Hampshire Department of Environmental Services. 2008.
<http://des.nh.gov/organization/commissioner/pip/publications/wd/documents/wd-08-4.pdf>
- *Shoreland Water Quality Protection Act A Summary of the Standards*. New Hampshire Department of Environmental Services.
http://des.nh.gov/organization/divisions/water/wetlands/cspa/documents/summary_standards.pdf
- *Generic Quality Assurance Project Plan for Fluvial Geomorphology Data Collection*. DRAFT. New Hampshire Department of Environmental Services, New Hampshire Geological Survey. 2013.

TABLE 13. HABITAT AND HYDROLOGIC MODIFICATION GOALS, OBJECTIVES, AND MILESTONES

Hydrologic & Habitat Modification (H) Goal. Geomorphic, fluvial erosion hazard and bridge and culvert assessments inform decision makers and provide a critical planning tool for flood protection, hydraulic, hydrologic, and habitat connectivity and development activities.					
Objective	Milestone	Measure of Success	Schedule		
			2015	2016	2017
Objective H-1 New fluvial erosion hazard (FEH) zones are identified in New Hampshire.	Milestone H-1.1 Fluvial geomorphology assessments on rivers throughout the state collect information on the physical condition of New Hampshire's rivers and develop FEH zones. <i>Partners: NH Geological Survey</i>	Measure H-1.1 One new fluvial geomorphology assessment per year.			
Objective H-2 NPS partners have an increased understanding of FEH and bridge and culvert assessment programs and resources.	Milestone H-2.1 Common protocols for data collection regarding culverts and stream crossings are established. <i>Partners: UNH Technology Transfer Center, NH GIS Advisory Committee, NH Geological Survey, NH Fish and Game Dept., Trout Unlimited</i>	Measure H-2.1 Protocol established.			
Objective H-3 Fluvial Erosion Hazard data is fully integrated into NPS-related programs, projects, and assessments.	Milestone H-3.1 Determine the appropriateness of including FEH program criteria and data into the DES Consolidated Assessment and Listing Methodology (CALM) to be used to make surface water quality assessments. <i>Partners: DES Water Quality Assessment, NH Geological Survey Fluvial erosion Hazard Program</i> Milestone H-3.2 FEH Program collaborates with 319 projects and DES River Restoration projects to provide input and design review. <i>Partners: NH Geological Survey Fluvial Erosion Hazard Program, DES River Restoration Program, DES Watershed Assistance Section</i>	Measure H-3.1 Determination made by 2018 assessment cycle.			
	Milestone H-3.3 Incorporate FEH criteria into clean watershed prioritization analysis.	Measure H-3.2 Develop a formal process to incorporate FEH program input and review.			
		Measure H-3.3 Criteria for FEH prioritization developed and incorporated.			

LANDSCAPE AND TURF MANAGEMENT

BACKGROUND

Many of New England's lakes, streams, and coastal waters suffer from water quality impairments related to phosphorus and nitrogen pollution (U.S. Environmental Protection Agency, 2011). Fertilizer use on turfgrass is a source of nitrogen and phosphorus to New Hampshire waters. Turf is the largest "crop" in the United States. It is estimated that there is between 225,600 and 330,900 acres of turf in New Hampshire, which would cover between 3.8 to 5.5% of the state, including lawns, municipal fields, and golf courses (Milesi et al., 2005).

Plants will not absorb more phosphorus and nitrogen than they can use. Excess nutrients that are applied to turfgrass can run off the land and into the water. In New Hampshire's freshwater lakes and rivers, phosphorus is considered the "limiting nutrient" or pollutant, while nitrogen is more of a problem in salt water systems, including estuaries like Great Bay.

Volunteer Lake Assessment Program (VLAP) data from 1985 through 2012 shows an increase in median total phosphorus values and Chlorophyll-a, and a decrease in transparency (DES, 2012c). In the 2009 Lake Nutrient Criteria Assessment study, median values for chlorophyll-a and phosphorus were calculated for 233 lake assessments units in New Hampshire. Twenty-six (11%) of the lakes were on the New Hampshire Section 303(d) list for chlorophyll-a and phosphorus impairments.

While it is understood that fertilizer used on turf that contains phosphorus can contribute to excess phosphorus pollution in freshwater systems, directly connecting phosphorus load data from turf fertilizer applications is challenging.

Total nitrogen load to the Great Bay Estuary in 2009-2011 was 1,225 tons per year. It is difficult to identify a trend in nitrogen loads over time; however, at this time the Great Bay Estuary exhibits many of the classic symptoms of too much nitrogen; low dissolved oxygen in tidal rivers, increased macroalgae growth, and decline in eelgrass. Between 1974 and 2011, data indicates a significant

Photo Caption. Participants try out the turf reflectance meter at the training hosted by the NH Coastal Program meter.



overall increasing trend for dissolved inorganic nitrogen (DIN) at Adams Point in the estuary, which is of concern. (PREP, 2013).

While it is also difficult to identify direct sources of nitrogen from fertilizer applied to turf, studies from DES in the Great Bay Watershed indicate nitrogen is a significant contribution to water quality impairments in coastal New Hampshire. The Great Bay Nitrogen Nonpoint Source Study (GBNNPSS) (DES, 2014), reports that in the model for delivered loads of nitrogen to the Great Bay Estuary, chemical fertilizer is 15% (130 +/- 20 tons/yr). Lawns contributed 70% of this load or about 10.5% of the total NPS load. Recreational fields, including golf courses, were responsible for just 8% or about 1% of the total NPS load.

Statewide, fertilizer application rates are variable depending on the use and management of the turf. Landscaping fertilizers can be a significant source of phosphorus and nitrogen from areas of residential development and other areas where grass lawns are maintained (e.g. office parks, schools, sports fields, etc.). Though research by DES suggests that professionally-managed turf is better managed than residential lawns.

Different strategies for managing turfgrass are needed depending upon conditions and desired outcomes. Using sound, research-based information to determine how much fertilizer, pesticides, and water turfgrass needs to remain healthy can reduce water quality impacts from nutrients. When fertilizers, either synthetic or organic, are applied **in the proper amounts at appropriate times during the growing season**, lawns can thrive and the risks of nutrients from erosion and fertilizer entering out waterways can be reduced. State and local partners are just beginning to connect turf science and social science research with BMPs associated with reducing water quality impacts from turf management practices.

UNH Cooperative Extension (UNHCE) and NH Sea Grant work with partners and stakeholders to incorporate the latest science into outreach and education efforts. UNHCE also partners with Master Gardeners, Natural Resource Stewards, the NH Landscape Association, the NH Plant Growers Association, and other interested citizens and stakeholders in the Green Industry to provide educational programs such as *Landscaping at the Waters Edge: Ecological Landscape Training* and promote ecologically sound landscape and turf management practices.

In 2011, the DES Coastal Program funded a partnership with DES Watershed Assistance Section, the Seacoast Stormwater Coalition, UNH Cooperative Extension, and University of Connecticut to conduct the *Green Spaces: BMPs to Protect Water Quality: Clean Water, One field at a Time* workshop and guidance. This included incorporating Karl Guillard's (UConn) training on Turf Reflectance Meters to guide nitrogen fertilization on turf managed by professionals.

In 2013, the New England Interstate Water Pollution Control Commission (NEIWPC) worked closely with states and EPA to facilitate *Northeast Voluntary Turf Fertilizer Initiative*: a turf fertilizer stakeholder process to develop a regional set of guidelines for turf fertilizer aimed at protecting water quality. The guidelines were designed to provide consistent recommendations to potentially

alleviate the need for legislation in states that have not passed laws on turf fertilizer, to supplement laws in states that have passed legislation, and to serve as a basis for public education and outreach for any state or municipality. Local and state regulations can complement or reinforce voluntary messaging and behavior change efforts to reduce nutrient pollution from fertilizer. The New Hampshire legislature recently passed the NEIWPC guidelines into state law - the first state in New England to do so.

MEASURES TO CONTROL NPS POLLUTION

REGULATORY PROGRAMS:

- HB 393: Relative to effluent limitations with regard to nitrogen and phosphorus (passed in 2013) limits the nitrogen and phosphorus content of fertilizers sold at retail and intended for use on home lawns.
- RSA 483 B: NH Shoreland Water Quality Protection Act - states that no fertilizer, except limestone, can be used within 25 feet of the reference line. Beyond 25 feet, slow or controlled release fertilizer may be used. Local town ordinances in several New Hampshire towns and cities have restrictions that are more stringent than the SWQPA.
- RSA 431: Dept of Agriculture Soil Conditions - Fertilizers

VOLUNTARY PROGRAMS:

- *Landscaping at the Waters Edge: Ecological Landscape Training*. UNH Cooperative Extension. <http://extension.unh.edu/Sustainable-Landscapes-and-Turf/Landscaping-Waters-Edge>
- *Green Spaces: BMPs to Protect Water Quality. Clean Water, One field at a Time* <http://des.nh.gov/organization/divisions/water/stormwater/bmps-green-spaces.htm>
- Annual Winter and Spring Landscape Conferences for professional landscape and turf businesses
- Biennial Municipal Turf and Grounds Conference for municipal and school employees who manage parks and playing fields
- Master Gardener Course and Natural Resource Stewards volunteer training

GUIDANCE DOCUMENTS:

- *New England Regional Nitrogen and Phosphorus Fertilizer and Associated Management Practice Recommendations for Lawns Based on Water Quality Considerations*. 2008. Karl Guillard (ed.). Turfgrass Nutrient Management Bulletin 0100. College of Agriculture and Natural Resources, University of Connecticut. USDA CSREES project # 2006-51130-03656.
- *Changing Homeowner's Lawn Care Behavior to Reduce Nutrient Losses in New England's Urbanizing Watersheds: the Report of Findings from Social Science Research*. Eisenhauer, B.W. and B. Gagnon. 2008. USDA CSREES project # 2006-51130-03656.
- *Proper Lawn Care in the Protected Shoreland (SP-2)*, New Hampshire Department of

Environmental Services,. 2009 <http://des.nh.gov/organization/commissioner/pip/factsheets/sp/documents/sp-2.pdf>

- *Green Grass Clear Water: Environmentally Friendly Lawn Care Recommendations for Northern New England*. UNH Cooperative Extension https://seagrant.unh.edu/sites/seagrant.unh.edu/files/media/pdfs/extension/lawncare_information_sheet.pdf.
- *Sustainable Landscapes and Turf*. UNH Cooperative Extension. <http://extension.unh.edu/Agriculture/Sustainable-Landscapes-and-Turf>
- *Innovative Land Use Planning Techniques: A Handbook for Sustainable Development, New Hampshire Department of Environmental Services - Chapter 3.6 Landscaping*. NH Association of Regional Planning Commissions, NH Association of Regional Planning Commissions, NH Office of Energy and Planning, and NH Municipal Association. http://des.nh.gov/organization/divisions/water/wmb/repp/documents/ilupt_chpt_3.6.pdf
- *New Hampshire's Turf Fertilizer Law: What You Should Know*. 2014. Margaret Hagen, University of New Hampshire Cooperative Extension Agriculture Fact Sheet. http://extension.unh.edu/resources/representation/Resource004116_Rep5835.pdf
- *Final Report to the New England and New York State Environmental Agency Commissioners Regional Clean Water Guidelines for Turf Fertilizer Formulated for and used on Urban Turf*. NEIWPC, Sept, 2013
- *Great Bay Nitrogen Non-point Source Study*. (R-WD-13-10) New Hampshire Department of Environmental Services, June 2014. <http://des.nh.gov/organization/divisions/water/wmb/coastal/documents/gbnpss-report.pdf>

TABLE 14. LANDSCAPE AND TURF MANAGEMENT GOALS, OBJECTIVES, AND MILESTONES

Landscape & Turf Management (L) Goal. Pollutants from turf management and landscaping practices do not run off or leach to surface or groundwater.					
Objective	Milestone	Measure of Success	Schedule		
			2015	2016	2017
Objective L-1 Fertilizer from turf management and landscaping practices does not degrade water quality.	Milestone L-1.1 NPS partners have access to and understanding of current soil, turf, water quality, and social sciences in order to reduce water quality impacts from landscaping and turf management fertilizer application. <i>Partners: UNH Cooperative Extension, NH Sea Grant, New England Water Pollution Control Commission, DES Pollution Prevention Program, Conservation Districts, Master Gardeners, garden clubs, 319 Grantees, Natural Resource Stewards, opinion leaders, professional landscapers</i>	Measure L-1.1a Report on current science, research, and outreach resources related to water quality and landscaping/turf management to identify gaps and needs to guide future projects and programs.			
		Measure L-1.1b Post relevant information to the DES Watershed Restoration and Protection Forum (blog) quarterly.			
		Measure L-1.1c Present on water quality impacts of landscaping practices, including fertilizer use, at the NH Water and Watershed Conference.			
	Milestone L-1.2 NH residents are aware of best management practices to reduce water quality impacts from landscaping and lawn care activities including fertilizer use. <i>Partners: Great Bay Stewards, UNH Cooperative Extension, UNH Marine Docents, UNH Coastal Research Volunteers</i>	Measure L-1.2a Develop homeowner outreach program components, focused on fertilizer use.			
		Measure L-1.2b Pilot program messages and methods.			
		Measure L-1.2c Implement and evaluate program messages and methods.			
	Milestone L-1.3 Landscaping companies are aware of and incorporate best management practices to reduce water quality impacts from fertilizer applications. <i>Partners: NH Landscape Association, UNH Cooperative Extension, NH Sea Grant, commercial lawn services</i>	Measure L-1.3a Identify barriers to adding water quality options to commercial lawn service menus			
		Measure L-1.3b Develop a plan for enhancing existing NH Landscape Certification Program.			
		Measure L-1.3c Identify opportunities to include water quality friendly recommendations in landscaping curriculum at secondary and post-secondary education institutions.			

TABLE 14 (CONT). LANDSCAPE AND TURF MANAGEMENT GOALS, OBJECTIVES, AND MILESTONES

Objective	Milestone	Measure of Success	Schedule				
			2015	2016	2017	2018	2019
Objective L-1 (cont.)	<p>Milestone L-1.4 Garden Centers and nurseries promote best management practices to reduce water quality impacts from landscaping and fertilizer use. <i>Partners: UNH Cooperative Extension, NH Sea Grant, NH Plant Growers, garden centers, plant nurseries</i></p>	<p>Measure L-1.4a Create and offer best fertilizer practices outreach options to garden centers and nurseries e.g., shelf talkers, videos, mobile applications, fact sheets, brochures, trainings.</p> <p>Measure L-1.4b Determine the feasibility of revitalizing the Master Gardener at Garden Centers/Nurseries program.</p>					
	<p>Milestone L-1.5 DES Watershed Assistance grantees and partners are educated on and promote the new fertilizer packing law requirements (HB 393), effective January, 2014, which requires specific TN limitations by application rate recommendation on labels of fertilizer bags sold at retail. <i>Partners: UNH Cooperative Extension, NH Sea Grant, NH Plant Growers, garden centers, plant nurseries</i></p>	<p>Measure L-1.5a Revise UNHCE soil testing recommendations to meet new fertilizer law.</p> <p>Measure L-1.5b Increase the number of soil tests by 5%</p>					
	<p>Milestone L-1.6 Municipal field managers are aware of and use best management practices to reduce water quality impacts from landscaping and turf management. <i>Partners: DES Coastal Program, NH Municipal Association, NH Stormwater Coalitions, UNH Cooperative Extension, UNH Sea Grant</i></p>	<p>Measure L-1.6a Completed guidance materials to promote and complement the existing <i>Green Spaces: BMPs to Protect Water Quality</i> (Seacoast Stormwater Coalition - NH Coastal Program Grant)</p> <p>Measure L-1.6b Documented municipal turf management practices and barriers to implementing water quality friendly practices</p> <p>Measure L-1.6c Develop and distribute promotional materials to all MS4 towns for the use of reflectance meters to measure "green" in municipally managed field grass and reduce fertilize application.</p>					

TABLE 14 (CONT). LANDSCAPE AND TURF MANAGEMENT GOALS, OBJECTIVES, AND MILESTONES

Objective	Milestone	Measure of Success	Schedule				
			2015	2016	2017	2018	2019
Objective L-1 (cont.)	Milestone L-1.1 (cont.)	Measure L-1.6d Develop and implement municipal recognition program for "green" lawns and athletic fields (Green Spaces).					
Objective L-2 Pesticides from turf management and landscaping practices do not degrade water quality.	Milestone L-2.1 Water quality impacts from pesticide use on turf and lawn maintenance are identified. <i>Partners: NH Dept. of Agriculture, Markets, and Food, DES Waste Management Ecological Risk Program, UNH Cooperative Extension, NH Sea Grant,</i>	Measure L-2.1a Report on research of existing toxicity data and impacts of pesticides on water quality.					
		Measure L-2.1b Draft pesticide use report including data on pesticide use for turf and landscape management for registered pesticide applicators.					
	Milestone L-2.2 Identified target audiences understand best management practices to reduce water quality impacts from pesticide use in turf and lawn maintenance. <i>Partners: UNH Cooperative Extension, NH Sea Grant, DES Pollution Prevention Program, golf courses, conservation districts, municipalities</i>	Measure L-2.1c Incorporate pesticide information into fertilizer outreach efforts and materials, where appropriate.					
		Measure L-2.2a Target audiences identified.					
		Measure L-2.2b Develop, distribute, and promote recommendations for control of grubs, weeds, and other pests, including basic integrated pest management (IPM).					

SUBSURFACE SYSTEMS

BACKGROUND

According to the 2000 census, 65% of New Hampshire's housing units, or about 400,000, relied on septic systems for wastewater disposal. For new development, the figure is higher; about 80% of new housing units have septic systems. (DES, 2008a)

When onsite systems do not function properly it is likely that either they were installed before current standards were in effect (1967) or they were not properly designed, sited, constructed or maintained. DES estimates that between 8 and 10 percent of current septic system approvals address repair or replacement of existing systems (DES, 2008a). As a result of a law (RSA 485-A:39) passed in 1993, evaluation of systems within 200 feet of a great pond or fourth order or higher river is required before the property changes hands; however, upgrading substandard systems is not required.

While directly observable impacts of septic systems on water quality are difficult to quantify, several watershed studies have modeled the impact of septic systems with respect to nutrient contamination. According to the Great Bay Nitrogen Nonpoint Source Study (DES, 2014) septic systems contribute 29% of the nonpoint source nitrogen load to Great Bay. This calculation was determined from a detailed analysis of the number of septic systems in the watershed, a nitrogen generation rate of 10.6 pounds per person, and the distance of septic systems from the estuary.

Several recent watershed-based plans estimated phosphorus contributions from septic systems based on a count of septic systems in the watershed, number of people per housing unit, seasonal occupancy, pounds of phosphorus per person using the system, and soil retention rates. It found the following percent contributions of phosphorus from septic systems:

- Baboosic Lake 43% (NHDES, 2008b.)
- Cobbetts Pond 22% (Cobbetts Pond Improvement Association, 2010.)
- Pawtuckaway Lake 27% (NHDES, 2008b.)

DES is responsible for both subsurface system regulation (RSA 485-A:29) and licensing of designers and installers (RSA 485-A:35 and 36). Septic system installation has been regulated since 1967; licensing of designers and installers since 1979. The state's controlling role in subsurface systems has made for consistently high standards in force throughout the state.

Since 1994, RSA 485-A:29 has provided a regulatory process for innovative/alternative septic systems, which allows for review and approval of designs that are not specified in the subsurface system rules. The review process entails submittal of detailed technical specifications and operational data which DES reviews to determine whether the technology will be at least as protective of the environment and will function as reliably as or better than a conventional septic system.

There has been increased attention nationally on nitrogen loading from septic systems, particularly on Cape Cod due to groundwater contamination and the Chesapeake Bay watershed due to eutrophication of the Bay. In 2013, EPA produced a model program for septic system management in the Chesapeake Bay watershed (http://executiveorder.chesapeakebay.net/130627_Ches_Bay_Tech_Assist_Manual.pdf) that quantifies some of the options for alternative septic systems in terms of nitrogen reduction and costs.

The model program recommends a tiered, risk-based approach for nitrogen management, where nitrogen reduction goals are recommended based on the proximity of a site to a water body of concern, recognizing that there is a greater potential for attenuation of nitrogen for septic systems located farther from the nitrogen-limited water body. Table 15, reproduced from the EPA model program, describes the tiered management system approach. Table 16, also from the EPA model program, compares conventional systems with advanced treatment systems in terms of nitrogen removal and costs.

With each model, the complexity of requirements and management options increases. The first model is roughly equivalent to the current system of management in New Hampshire. The second model introduces nitrogen removal goals and system maintenance requirements. The third model includes operating permits with operation and maintenance provided by a qualified service provider. The fourth and fifth models require a responsible management entity to operate or own the system, respectively.

Table 15. Summary of septic system management approaches*

MODEL #	DESCRIPTION	COMMENTS
1	Homeowner Awareness	Homeowner management of existing systems is promoted through outreach and education programs. Appropriate for conventional systems which provide limited nitrogen removal.
2	Maintenance Contracts	A property owner contracts with a qualified service provider to ensure O&M is conducted and nitrogen removal goals are met.
3	Operating Permits	The regulatory agency issues a limited-term operating permit to the property owner that requires sustained performance levels for nitrogen reduction. O&M is performed by a qualified service provider with regular monitoring. This provides a greater level of oversight and accountability compared to Model #2.
4	Responsible Management Entity (RME) O&M	Frequent and highly reliable O&M is the responsibility of a management entity, further increasing the level of accountability. This approach is appropriate for clustered systems or complex treatment systems providing high levels of nitrogen reduction.
5	RME Ownership	Ownership passes to a management entity which is responsible for all management aspects, similar to publicly owned treatment works, providing a high level of assurance that nitrogen removal goals are met.

* Source: U.S. Environmental Protection Agency. *A Model Program for Onsite Management in the Chesapeake Bay Watershed*. June 2013

Table 16. Examples of Nitrogen Load Reductions Achievable Through Advanced Treatment.*

TYPE OF SYSTEM	NITROGEN DISCHARGE ¹ CONCENTRATION (MG/L)	LOAD REDUCTION PROVIDED	LOADING (PER PERSON/YR)		NITROGEN REDUCTION (PER PERSON/YR)		APPROX. TOTAL SYSTEM COST
			kg	lb	kg	lb	
Conventional System	39	0%	4	9	0	0	\$8,000 - \$10,000 ⁴
Advanced Treatment ²	20	49%	2	5	2	4	conventional + \$10,000 - \$15,000 ⁵
Advanced Treatment with Denitrification ³	10	74%	1	2	3	7	conventional + \$22,000 ⁵

* Source: U.S. Environmental Protection Agency. *A Model Program for Onsite Management in the Chesapeake Bay Watershed*. June 2013

¹ This is the concentration of wastewater effluent as it enters the drainfield.

² Advanced treatment system refers to a system that includes a septic tank, an aeration system, and a recirculation system into the septic tank, or equivalent.

³ Advanced treatment system with denitrification refers to a septic tank, an aeration system, and an anoxic environment separate from the septic tank, or equivalent.

⁴ Source: NHDES Subsurface Systems staff (August 26, 2014). Personal communication.

⁵ Source: Maryland Dept. of Environmental Protection Bay Restoration Fund <http://www.mde.state.md.us/programs/Water/BayRestorationFund/OnsiteDisposalSystems/Documents/HB347%20ranking%20data%2005162014.pdf>.

The EPA model program recommends varying approaches to septic system management depending on the distance from the septic system to the bay or to the tidal portion of tributaries to the bay. For septic systems within 200 meters (about 650 feet) of the Great Bay Estuary or large rivers (5th order or greater), the Great Bay Nitrogen Nonpoint Source Study (GBNNPS) (DES, 2014) assumes that there is too little space for nitrogen losses in groundwater to occur. Therefore, the GBNNPS assumes that all of the nitrogen discharged from septic systems within 200 meters is delivered to Great Bay. Therefore, any programs developed to promote or finance installation of denitrifying systems should consider this area to be the highest priority for such systems.

For freshwater bodies, phosphorus is the nutrient of concern delivered by septic systems. Phosphorus is not removed by conventional onsite systems, but rather is adsorbed to varying degrees by the soil and plant roots through which the treated effluent passes on its way to surface waters. When the adsorption capacity of the soil is reached, phosphorus export will occur. This problem is typical of densely developed shoreland areas near lakes and ponds. Increasing the distance from the leach field to the water body will provide greater adsorption of phosphorus by the soil.

Many of New Hampshire's shorelines were developed prior to regulations requiring septic system setbacks. Dense development of small, waterfront lots provided room for cess pools, dry wells, or other disposal systems that were often inadequate in treating waste. Many of these systems remain in place because the lot sizes are too small for a septic system that will meet today's standards. In this situation, where many small, waterfront lots have inadequate systems, a single community system that collects wastewater from three or more residences may be a viable solution to wastewater disposal, particularly in phosphorus-impaired lake watersheds.

MEASURES TO CONTROL NPS POLLUTION

REGULATORY PROGRAMS

- **Design and Installation Criteria:** RSA 485-A and administrative rules Env-Wq 1000 require that septic systems be designed and installed according to criteria designed to mitigate nitrate contamination in groundwater. DES must review and approve designs and issue operational permits for all individual systems. In about 10% of cities and towns, local approval is required prior to DES approval. All subdivisions creating lots less than 5 acres in size must be approved by DES to insure that new lots can accommodate proper septic systems.
- **Licensing of Designers and Installers:** RSA 485-A and Administrative Rules Env-Wq 1000 require that all septic systems are designed by licensed designers and are installed by licensed installers.
- **Waterfront Property Site Assessment:** RSA 485-A requires a site assessment by a licensed designer prior to execution of a purchase and sales agreement for any waterfront property (developed land within 200 feet of a water body) using a septic system.

NON-REGULATORY PROGRAMS

- **Training:** County Conservation Districts, NH Association of Natural Resource Scientists, Granite State Designers and Installers, and others provide training opportunities for septic system designers and installers.
- **NH Department of Environmental Services Subsurface Systems Environmental Fact Sheets** <http://des.nh.gov/organization/commissioner/pip/factsheets/ssb/index.htm>.

TABLE 17. SUBSURFACE SYSTEMS GOALS, OBJECTIVES, AND MILESTONES

Subsurface Systems (S) Goal. Septic systems are designed, installed, and maintained in a way that allows them to function without degrading water quality.					
Objective	Milestone	Measure of Success	Schedule		
			2015	2016	2017
Objective S-1 Reduce nitrogen and phosphorus pollution from septic systems through system maintenance, system replacement, alternative technologies, and the development of community systems.	Milestone S-1.1 Demonstrate alternative technologies that reduce nitrogen export to Great Bay. <i>Partners: Rockingham County Conservation District, Strafford County Conservation District, Granite State Designers and Installers</i>	Measure S-1.1a Installation of a permeable reactive barrier system within the 650 foot buffer of Great Bay or its tributaries.			
		Measure S-1.1b Completion of monitoring report document including two years of effectiveness monitoring data from the permeable reactive barrier system.			
		Measure S-1.1c Identification of candidate sites for installation of other types of de-nitrifying systems in the Great Bay Watershed			
		Measure S-1.2 Complete draft rules addressing de-nitrification.			
Milestone S-1.2 Allow for the evaluation of de-nitrifying septic systems within the Alternative Technology Rules. <i>Partners: DES, Granite State Designers and Installers, Southeast Watershed Alliance, Piscataqua Region Estuaries Partnership</i>	Milestone S-1.3 Collect phosphorus data on Baboosic Lake (volunteer monitoring) to measure the results of a community septic system. <i>Partners: Town of Amherst, UNH Lakes Lay Monitoring Program</i>	Measure S-1.3 Completed analysis of phosphorus trend in LLMP annual reports.			
		Measure S-1.4a Candidate community septic system sites are identified.			
		Measure S-1.4b Candidate community septic system sites is selected.			
		Measure S-1.4c Completed community septic system design.			
Milestone S-1.4 Implement a community septic system in a phosphorus impaired lake watershed that has an approved watershed-based plan. <i>Partners: Granite State Designers and Installers, NH Municipal Association, NH State Revolving Loan Fund Program, NH Health Officers Association, NH Building Officials Association, watershed organizations.</i>	Measure S-1.4d Community septic system installed.				

TABLE 17 (CONT). SUBSURFACE SYSTEMS GOALS, OBJECTIVES, AND MILESTONES

Objective	Milestone	Measure of Success	Schedule				
			2015	2016	2017	2018	2019
Objective S-1 (cont.)	<p>Milestone S-1.5 Provide increased opportunities for septic system replacement and development of community systems. <i>Partners: DES, Granite State Designers and Installers, NH Municipal Association, NH State Revolving Loan Fund Program, NH Health Officers Association, NH Building Officials Association, Southeast Watershed Alliance, Piscataqua Region Estuaries Partnership, NH Housing Authority, US Dept. of Agriculture Rural Development</i></p> <p>Milestone S-1.6 Evaluate the success of the Town of Meredith's septic system ordinance for Lake Waukewan. <i>Partners: DES, Town of Meredith, Lake Winnepesaukee Watershed Association</i></p>	<p>Measure S-1.5a Annual State Revolving Fund (SRF) loans and State Aid Grants are made available for septic systems.</p> <p>Measure S-1.5b Completed assessment of the current septic system rules to determine incentives and disincentives with respect to community systems with draft administrative rules to provide more incentives for community systems, if needed.</p>					
	<p>Milestone S-1.7 Evaluate whether certain community systems should be required to have licensed operators, maintenance funds, and capital reserve funds for system replacement. <i>Partners: DES, Granite State Designers and Installers, NH Municipal Association, NH Health Officers Association, NH Building Officials Association</i></p>	<p>Measure S-1.6a Completed case study report including the number of failing systems identified, number of systems repaired or replaced as a result of the ordinance, lessons learned, and information for other communities interested in pursuing similar ordinances.</p> <p>Measure S-1.7 Feasibility report with recommended changes to administrative rules.</p>					
Objective S-2 Determine the feasibility of creating septic system management districts or utilities.	<p>Milestone S-2.1 Review existing districts or utilities in California, Connecticut, and Texas. <i>Partners: Granite State Designers and Installers, NH Municipal Association, Southeast Watershed Alliance, Piscataqua Region Estuaries Partnership</i></p>	<p>Measure S-2.1 Report evaluating legal structure of septic system authorities in other states.</p>					

TABLE 17 (CONT). SUBSURFACE SYSTEMS GOALS, OBJECTIVES, AND MILESTONES

Objective	Milestone	Measure of Success	Schedule				
			2015	2016	2017	2018	2019
Objective S-2 (cont.)	<p>Milestone S-2.2 Determine authority in existing state law and whether new authority is needed. <i>Partners: Granite State Designers and Installers, NH Municipal Association, Southeast Watershed Alliance, Piscataqua Region Estuaries Partnership</i></p> <p>Milestone S-2.3 Determine interest among stakeholders in pursuing septic system utility development. <i>Partners: Granite State Designers and Installers, NH Municipal Association, Southeast Watershed Alliance, Piscataqua Region Estuaries Partnership</i></p>	<p>Measure S-2.2 Report assessing current legal authority for septic system utilities and recommending new authorities.</p> <p>Measure S-2.3 Interest determined.</p>					
<p>Objective S-3 Implement a rigorous site assessment process for waterfront septic systems.</p>	<p>Milestone S-3.1 Determine the feasibility of amending the RSA 485-a:39 site assessment process to incorporate a full inspection of the existing system by a permitted designer. <i>Partners: Granite State Designers and Installers, NH Municipal Association, Southeast Watershed Alliance, Piscataqua Region Estuaries Partnership, NH Health Officers Association, NH Building Officials Association</i></p> <p>Milestone S-3.2 Improve the requirements for replacement of systems during seasonal conversions and capacity expansions, and for systems without state approvals. <i>Partners: Granite State Designers and Installers, NH Municipal Association, Southeast Watershed Alliance, Piscataqua Region Estuaries Partnership, NH Health Officers Association, NH Building Officials Association</i></p>	<p>Measure S-3.1a Completed draft procedures for requiring in-ground inspection by a permitted designer of waterfront septic systems at the time of sale, if determined to be feasible.</p> <p>Measure S-3.1b Completed report documenting the feasibility of adopting inspection procedures in rule or statute.</p> <p>Measure S-3.2a Assessment report summarizing the existing process for addressing seasonal conversions and capacity expansions, and systems without state approvals.</p> <p>Measure S-3.2b Draft administrative rule changes for addressing seasonal conversions and capacity expansions, and systems without state approvals.</p>					

MINOR NPS POLLUTANT CATEGORIES

Minor NPS Pollutant Categories are those that are no longer major sources of nonpoint source pollution in New Hampshire. Sufficient regulatory oversight, enforcement, technical, or other assistance programs have reduced the water quality threat from these sources. In order for these categories to remain minor, funding and support of the programs that protect and restore water quality from these pollutant sources must be maintained. A general goal of the NH Nonpoint Source Program is to collaborate with and support these programs as appropriate and as needed to protect and restore water quality in New Hampshire; however, it is anticipated that these categories will not be priorities for the NPS Program in the next five years.

MARINAS AND RECREATIONAL BOATING

BACKGROUND

Between 80,000 –100,000 recreational boats are registered in New Hampshire each year. The environmental impacts associated with boats require continuous attention. State and Federal budget approvals impact the degree to which the various programs listed below are able to address NPS pollution related to marinas and recreational boating.

Programs of NPS partners, including the NHDES Boat Inspection Program, On-site Fuel Storage requirements for marinas, NH Clean Lakes Program, Clean Vessel Act Program, Federal No Discharge Areas for NH waters, and the programs and partnerships of the NH Department of Transportation Marine Patrol, NH Fish and Game Department, US Fish and Wildlife Service, the NH Marine Trades Association, and others, all work toward minimizing water quality impacts from marinas and recreational boating activities.

MEASURES TO CONTROL NPS POLLUTION

- BMPs for New Hampshire Marinas: Guidelines for Environmentally Proactive Marinas NHDES 2006. <http://des.nh.gov/organization/commissioner/pip/publications/wd/documents/nhdes-wd-01-12.pdf>
- The Boater's Guide of New Hampshire: A Handbook of Boating Laws and Responsibilities. 2012. <http://www.boat-ed.com/newhampshire/handbook/book.html>
- RSA 487:1-14, Marine Toilets and Disposal of Sewage from Boats; No Discharge Zones
- Env-Wt 402.16, Marinas - Design Standards
- RSA 487:15-25, Clean Lakes Program
- Env-WM 1401.32, Petroleum Storage Facilities

TIMBER HARVESTING

BACKGROUND

New Hampshire's rural areas and working forests provide the backdrop for recreation and

tourism as well as the foundation for the state's \$1.15 billion forest industry, in addition to the \$1.12 billion of tourist spending each year that is attributed to NH's open space (NH Division of Forests and Lands, 2011). In the late 18th century, land clearing for farms and pastures reduced forest cover to about 45% statewide. By 1998, forest cover rebounded to an estimated 84%. Of this, 94% (4.5 million acres) is classified as timberland, which is land that is currently producing or capable of producing wood crops. 76% of the timberland in New Hampshire is privately owned.

In 2010, the State Division of Forests and Lands completed the New Hampshire Statewide Forest Action Plan. The NPS Program works with state partners including the State Division of Forests and Lands and the New Hampshire Timberland Owners Association to support sustainable forest management and practices that protect water quality.

Despite the large percentage of forested land in New Hampshire, timber harvesting operations are considered a minor category because there are no documented water quality impairments caused by timber harvesting. The BMP manuals in place are referenced in the administrative rules for both Wetlands and Alteration of Terrain. Updates to the manuals, by DRED and with input from NHDES Wetlands staff, are expected to be completed in July of 2014. The most significant update involves matching the manuals with DES stream crossing rules.

MEASURES TO CONTROL NPS POLLUTION

- NH Stream Crossing Rules (Env-Wt 900) and Guidelines
<http://des.nh.gov/organization/divisions/water/wetlands/documents/nh-stream-crossings.pdf>
- NH Vernal Pool Rules
- NH Licensed Forester Law (RSA 310-A:98-117)
- Wetlands Program, Dredge and Fill Permit (RSA 482-A, Env-Wt 700)
- Surface Water Quality Protection Act (RSA 483-B) (formerly known as the Comprehensive Shoreland Protection Act)
- *NH Timber Harvesting Council's Professional Loggers Program* <http://www.nhtoa.org/PLPlogger.html>
- *Best Management Practices for Erosion Control on Timber Harvesting Operations in New Hampshire*. State of New Hampshire Division of Forests and Land. 2004. <http://www.nhdf.org/library/pdf/Publications/BMPs%20erosion%20control%202004.pdf>.
- *Best Management Practices for Forestry: Protecting New Hampshire's Water Quality*. University of New Hampshire Cooperative Extension. 2005. http://extension.unh.edu/resources/files/Resource000248_Rep267.pdf.
- *Good Forestry in the Granite State: Recommended Voluntary Forest Management Practices for New Hampshire*. University of New Hampshire Cooperative Extension. 2010. <http://extension.unh.edu/goodforestry/index.htm>.
- *Guide to New Hampshire Timber Harvesting Laws*. University of New Hampshire Cooperative

Extension. 2012. http://extension.unh.edu/resources/files/Resource000253_Rep274.pdf

- State Forest Rangers under the New Hampshire Department of Resources and Economic Development, Division of Forests and Lands, Forest Protection Bureau are responsible enforcing laws pertaining to timber harvesting operations, among other duties.

LAND DISPOSAL

BACKGROUND

SEPTAGE

New Hampshire generates nearly 100 million gallons of septage annually for disposal, which is predominately treated at publicly owned wastewater treatment plants (85%). Other treatment/disposal methods such as land application (7%), unlined lagoons (3%), and innovative/alternative facilities (5%) comprise the remaining management options. In 2011, land application of septage was reduced to 283 acres at 10 active sites where just over 6 million gallons were land applied. All septage land application sites in the state are regulated and permitted according to the New Hampshire Septage Permitting Program.

BIOSOLIDS

In response to legislation, DES has been collecting sludge samples from New Hampshire wastewater treatment plants for chemical analysis since 1999. This legislation requires DES to make an annual report to the Legislative by November 1st regarding sludge quality for samples collected during the year. These reports show few violations of state standards and that land applied sludge is generally of acceptable quality. In November 2002, Dr. Thomas Ballestero of the Environmental Research Group of UNH reported to DES and the legislature on a statistical evaluation of the chemical quality of biosolid samples collected by DES between 1999 and 2001. Specifically, Dr. Ballestero was evaluating compliance with DES biosolids standards and the potential that land-applied sludges would violate state standards. His assessment showed that the majority of regulated contaminants were not detected. Further, those contaminants that were detected generally did not exceed standards.

In 2007, House Bill 699 established a commission to study various aspects of septage and sludge management. One of the charges of the commission was to consider the potential health effects of current disposal practices. The commission concluded that with adequate control and monitoring, current disposal practices are adequate to protect public health. The DES Residuals Management Program is currently updating their administrative rules (Env-Wq 800) and expect adoption of final rules in June 2015.

MEASURES TO CONTROL NPS POLLUTION

- Septage Permitting Program (RSA 485-A:4 XVI-a)
- Groundwater Discharge Permit and Registration Rules (Env-Wq 402)
- Sludge Management Rules (RSA 485-A:4, XVI-b; RSA 485-A:6, X-a, Env-Wq 800)

- EPA National Pollutant Discharge Elimination System Permit, Standards for the Use and Disposal of Sewage Sludge (40 CFR Part 503)

RESOURCE EXTRACTION

BACKGROUND

Mining activities that can contribute to water quality degradation in New Hampshire include sand and gravel mining and recreational mining for gold. Sand and gravel excavations are governed by RSA 155-E, which includes both “express” standards, which are operational standards that all excavations must follow, as well as “minimum” standards that certain excavations subject to local permitting must follow. The operational standards address such issues as setbacks from abutters, maintenance of vegetation, drainage, storage of fuels, and setbacks from water bodies. Reclamation standards require that within 12 months of the completion of an excavation operation, the area must be reclaimed, with attention paid to reseeding, disposal of debris, grading of slopes, and drainage. The law designates the planning board as the local permitting authority, unless the municipality votes to vest such authority in the selectmen or zoning board of adjustment.

Excavations larger than 100,000 square feet, or 50,000 square feet in the protected shoreland, also require an Alteration of Terrain (AoT) permit from DES. AoT permits govern stormwater and the effects of earth disturbance on water quality.

Gold found in stream gravel is known as a placer deposit. Panning and dredging are methods for separating the heavy gold flakes and nuggets from the stream gravels. Panners may not use a shovel to dig into the stream bottom or stream banks. Scooping gravel up with a gold pan is allowed. Mineral seekers in the White Mountain National Forest (WMNF) need to check out WMNF regulations at: http://www.fs.fed.us/r9/forests/white_mountain/recreation/minerals/. New Hampshire state lands, such as state parks, geologic and historic sites, etc., have rules regarding mineral collecting. See: Administrative Rule Res 7301.19 – Res 7301.21 at http://www.gencourt.state.nh.us/rules/state_agencies/res7300.html.

Dredging and the use of sluice boxes, involves disturbing the stream sediments, but on a larger scale than panning. Processing stream gravels in search of placer gold, releases fine sediments back into the stream. Sediment-laden streams can be an environmental issue. Therefore, certain regulations apply to this activity in New Hampshire. Dredging and similar operations are regulated by the state under statutes RSA 482-A and RSA 485-A:17 because of the potential for environmental damage. Gold seekers who anticipate dredging, or similar work in New Hampshire, are required to obtain a permit.

MEASURES TO CONTROL NPS POLLUTION

- Vegetating New Hampshire Sand and Gravel Pits. USDA Natural Resources Conservation Service. April 2000. <http://des.nh.gov/organization/divisions/water/aot/documents/>

vegetating-nh.pdf.

- Local Regulation Excavations (RSA 155-E).
- Wetlands Program, Dredge and Fill Permit (RSA 482-A, Env-Wt 700).
- Terrain Alteration (RSA 485-A:17, Env-Wq 1500).
- Gold in New Hampshire. Environmental Fact Sheet #CO-GEO-1, NH Department of Environmental Services, 2011. <http://des.nh.gov/organization/commissioner/pip/factsheets/geo/documents/geo-1.pdf>.

NPS PROGRAM EVALUATION

The NPS Program staff review and, as appropriate, work with partners to revise and update the NPS Plans every five years to ensure that Section 319 funding, technical support, and other resources are directed in an effective and efficient manner to support state efforts to address water quality issues on a watershed basis. This allows for periodic revision to update program goals, objectives, and milestones as existing activities are completed and new activities develop.

Section 319 provisions require that the states report on progress in meeting annual milestones to demonstrate NPS Program success and track satisfactory performance and progress. The following evaluation measures are used to determine NPS Program success.

- Tracking of completed measurable milestones and other NPS activities in the DES Measures Tracking and Reporting System (MTRS).
- Annual reporting of completed goals, objectives, and measurable milestones in the NPS Program Annual Report. Annual reports are available on the Watershed Assistance Section's publication web page at <http://www.des.state.nh.us/organization/divisions/water/wmb/was/categories/publications.htm>.
- Annual reporting of pollutant load reduction estimates as a result of implementation projects in the Grants Reporting and Tracking System (GRTS). GRTS is the primary tool for management and oversight of the Nonpoint Source Pollution Control Program by EPA. Additional information about GRTS is available at <http://iaspub.epa.gov/pls/grts/f?p=GRTS:199>.
- Post-implementation water quality monitoring of restoration project sites in accordance with the DES Consolidated Assessment and Listing Methodology (CALM) available at <http://www.des.state.nh.us/organization/divisions/water/wmb/swqa/documents/calm.pdf> to determine whether or not an impaired waterbody assessment unit has been restored and can be removed from the State's 303(d) list of impaired waters. New Hampshire's Surface Water Quality Assessment reporting, including the 303(d) list is updated and reported to EPA every two years and is available at <http://www.des.state.nh.us/organization/divisions/water/wmb/swqa/index.htm>.
- Annual financial and performance reports are completed for each separate fiscal year 319 grant, as required by 40 CFR 31.40(b)(1) and 40 CFR 31.41(b).

FEDERAL CONSISTENCY

Nearly 800,000 acres, or about 13%, of New Hampshire is owned by the federal government. The largest land manager is the US Forest Service (USFS), with over 750,000 acres in the White Mountain National Forest. Many of these publicly owned areas have a significant economic impact from tourism. The National Park lands attract over 33,000 visitors annually and contribute

around 1 million dollars each year to the local economy. The US Army Corps of Engineers (USACE) owns dams and reservoirs in New Hampshire including the Blackwater Dam in Webster, Edward MacDowell Lake in Peterborough, Hopkinton-Everett Lakes in Contoocook, Franklin Falls Dam in Franklin, Otter Brook Lake in Keene and Roxbury, and Surry Mountain Lake in Surry. The US Fish and Wildlife Service manages three National Wildlife Refuges including Lake Umbagog, Great Bay, and Wapack. New Hampshire is also home to one federal prison in Berlin, and the Pease Air National Guard Base, which represent a smaller proportion of federally owned land.

While DES has worked with these federal partners in many programs and projects across the state, a formal review of the management plans for these federal lands has not been performed. During the term of this NPS Management Plan, a review of all of the existing plans will be completed and DES will identify any components of the plans found to be inconsistent with the state NPS Management Plan. Where appropriate, the state will seek assistance from US EPA to resolve any issues with coordination of these plans

The State and Federal governments work closely on many projects through shared funding, cooperative involvement of agency personnel, and technical assistance. In addition, there are three formal review processes:

1. The New Hampshire Coastal Program (NHCP) is responsible for finalizing all federal Coastal Zone Management Act (CZMA) Section 307 consistency decisions in NH. A complete description of the NHCP federal consistency review is documented in the New Hampshire Coastal Program Guide to Federal Consistency Coastal Zone Management Act §307 (DES 2011) at <http://des.nh.gov/organization/commissioner/pip/publications/wd/documents/wd-05-21.pdf>.
2. The Intergovernmental Review process in New Hampshire is coordinated by the state's Office of Energy and Planning. Activities captured by this review focus on deferral domestic assistance activities.
3. The 401 Water Quality Certification (WQC) program protects surface water quality and uses (such as swimming and aquatic life) by ensuring compliance with State surface water quality standards. The WQC program is authorized by NH RSA 485-A:12, III and IV. Water Quality Certification for federal National Pollutant Discharge Elimination System (NPDES) permits are administered by the DES Wastewater Engineering Bureau. All other WQCs are administered by the DES Watershed Management Bureau. More information on the WQC program is available at <http://des.nh.gov/organization/divisions/water/wmb/section401/categories/overview.htm>.

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